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The fishes of the Batang Hari drainage, Sumatra, with description of six new species

Tan Heok Hui* and Maurice Kottelat*, **

Fish surveys were conducted between 1994 and 2003 in the Batang Hari drainage, Sumatra. The fish fauna of the drainage now includes a total of 297 species of which 48 are new records (45 of them new records for Sumatra). Six new species are described in the families Cyprinidae (*Crossocheilus obscurus*, *Osteochilus kerinciensis*, *Pectenocypris micromysticetus*), Nemacheilidae (*Nemacheilus papillos*) and Cobitidae (*Pangio atactos*, *P. bitaimac*). *Crossocheilus pseudobagroides*, *Diplocheilichthys*, *D. jentinkii*, *Osteochilus scapularis*, *O. vittatoides*, *Leptobarbus rubripinna* and *Rasbora hosii* are revalidated. Lectotypes are designated for *Labeo oblongus* and *Rasbora hosii*. The identity of *Osteochilus enneaporos*, *Nemacheilus longipinnis* and *Monotrete leiurus* are discussed. A brief overview of *M. leiurus* suggests that *M. bergii* and *M. ocellaris* are valid species.

Introduction

Although ichthyological exploration and research had been carried out in Central Sumatra for over a centruy, it has not been extensive. The first notable collections of freshwater fish in Central Sumatra were reported by Pieter Bleeker (1852a-e, 1853a-b, 1854a-b, 1855, 1858a-b, 1859a, 1860a-b). Odoardo Beccari made a small collection of fishes in western Sumatra in 1878 (Vinciguerra, 1879). Gustav Schneider obtained a collection of freshwater fishes from Central Sumatra during the period 1897-1899 (Schneider, 1906), which was documented by Walter Volz (1903a-b, 1907), who himself collected in Sumatra in 1900-1902 while he was employed as geologist by the 'Royal Dutch Company for the Exploitation of Petroleum in the Dutch East Indies' (Volz, 1909). Bruno Machan (1930) wrote on a collection of fishes from western Sumatra made by J. Schild in 1899. Alfred C. Harrison and H. M. Hiller made a small collection of freshwater fishes from western Sumatra in 1901, which was described by Henry W. Fowler (1904). Max Weber and Lieven F. de Beaufort (1912) reported on a large collection of fishes from the Kampar and Indragiri drainages obtained by Alfred Maass in 1907. The last known major collections were made from Bagansiapiapi near the mouth of the Rokan River by J. D. F. Hardenberg in 1929 and 1933 (Hardenberg, 1931, 1934).

Comparatively little has been done on the ichthyological fauna of the northern and southern ends of Sumatra. In the 1890s, Elio Modigliani made a small collection of freshwater fishes from northern Sumatra, which was reported by Alberto Perugia (1893). A small collection of fishes was made by H. C. Kellers in 1925 from south and southwestern Sumatra (Fowler & Bean, 1927).

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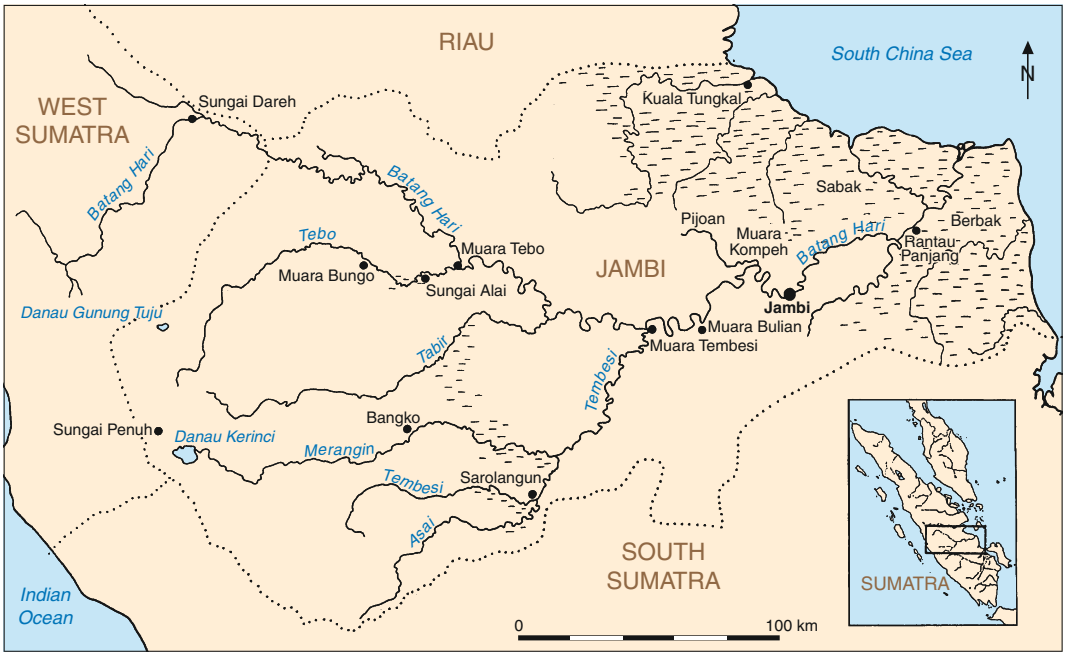


Fig. 1. The Batang Hari drainage, Sumatra. Dashed areas: swamps (drawing by Kelvin Lim).



Fig. 2. Batang Hari River in Jambi town, riverbank with view of Angso Duo market (July 1997).

Ernst Ahl (1934) published on a small collection of fishes from Lake Toba (in northern Sumatra) collected by August Thienemann in 1933; Thienemann himself (1957) listed the material he collected at other localities during the same trip. More recently, Soetikno Wirjoatmodjo reported on the fish fauna of the Alas river in northern Sumatra (Wirjoatmodjo, 1987). The present review does not include isolated smaller papers that record just a few species.

Kottelat (1995a: 422) stated that the knowledge of Sumatran fish fauna is poor, having no published surveys of a single large drainage. Since 1984, separately or together, we have had the opportunity to obtain various collections from central Sumatra. The results have been compiled in the first author's thesis (Tan, 1999a) from which the present paper is partly derived. We present here a list of the species known from the Batang Hari drainage, highlight some new distribution record, comment on the taxonomy of some species, describe taxa new to science and present various information on biology. The elasmo-



▷

Fig. 3. Batang Merangin, immediately downstream of Danau Kerinci (June 1994).



Fig. 4. Danau Souak Padang, an oxbow lake connected to Sungai Pijoan (November 1996).

branchs have been reported by Tan & Lim (1998), the Siluriformes by Tan & Ng (2000) and the Anabantoidei and Channoidei by Tan & Ng (2005).

Geography

Sumatra is the second largest island on the Sunda Shelf, with an area of 475 000 km^2, more than 1700 km long but only 350 km at its widest point. The western margin of the island (the outer margin of the Shelf) is mountainous, dominated by the Barisan range, and of volcanic origin consisting of mainly two folds of mountains with a valley in-between. There are several large volcanic lakes scattered in this valley, namely (from North to South) Toba, Meninjau, Singkarak, Kerinci and Ranau. Several large rivers flow in a northeastern direction out of the mountains, including the Rokan, Kampar, Indragiri, Batang Hari and Musi. Rivers draining the lakes or plateaus in the mountain range pass through stretches of high gradient on the way to the coastal plain. An example is Batang Merangin draining the Kerinci plateau, whose course drops by 300 m in a 15 km distance. Much of Sumatra is perhumid, and the original cover was tropical rain forest and swamp forest along the northeastern coast. The northern tip of Sumatra has pronounced seasons (Loeb, 1935; Whitten et al., 1987; Rainboth, 1996a).

The Sunda Shelf is an extended continental shelf, which is currently exposed as a series of large islands (Greater Sunda Islands: Java, Sumatra, Borneo). Molengraaff & Weber (1921) first noted that the entire shelf might have become exposed during the Pleistocene glacial periods. The extent of continental surface exposure has varied greatly during the Pleistocene and the shallow sea floor that connects the islands is actually a system of drowned river valleys (de Beaufort, 1951). The paths of the drowned rivers during the most recent sea regression indicate that drainages on modern islands actually were part of a continuous network with parts of other islands. The southern side of Borneo and the northern side of Java were drained by the East Sunda River during the late Pleistocene. The southern tip of Sumatra shared a drainage with some of the northern Javanese rivers at the eastern most end of the island through the Sunda Straits that nowadays separates Sumatra and Java. The rivers from the western side of Borneo, Central Sumatra, and the western tip of the Malay Peninsula formed the West Sunda River. In the northern Straits of Malacca, rivers of northern Sumatra and western Malay Peninsula took a northwesterly course towards the Indian Ocean. See Voris (2000) for maps of Pleistocene sea levels.

The major drainages in Central Sumatra include the Musi, Batang Hari, Indragiri and Kampar. All these rivers drain into the South China Sea. The Batang Hari (Fig. 1) is about 600 km from the headwaters of its longest tributary to the river mouth (Fig. 2). Its drainages covers most of Jambi Province and the southern part of the highlands of Sumatra Barat Province (Fig. 3). The remainder of Jambi Province is drained by a few smaller coastal drainages (which are included in the present review). The eastern and central portions of Jambi Province encompass much lowlying areas, originally made up of mainly tropical rainforests, oxbow lakes (Figs. 4-6), freshwater swamp forests (Figs. 7-9) and peat swamp forests (Figs. 10-14). The western portion of Jambi Province is situated about 1000-3000 metres above sea level, in the highlands of the Barisan range. The highland volcanic lakes of Kerinci (710 m a.s.l.; Fig. 15) and Gunung Tujuh (1950 m a.s.l.; Fig. 16) are some of the headwaters of the Batang Hari. The lake of Gunung Tujuh is the highest lake in Southeast Asia (Whitten et al., 1987: 402; Clarke, 2001).

Material and methods

All measurements are taken from the left side (whenever possible) with digital calipers. Method for taking counts and measurement follow Kottelat (2001), except for *Nemacheilus* which follows Kottelat (1984, 1990). Fin ray counts were obtained under transmitted light using a binocular dissecting microscope. The last two branched dorsal and anal rays articulating on a single pterygiophore are counted as "1½". Notation for vertebrae counts follows Roberts (1989). Numbers in parentheses following a particular count are the numbers of examined specimens with that count.

Unless otherwise noted, identifications follow Tan & H. H. Ng (2000) and H. H. Ng & Tan (2000) for Siluriformes, Tan & P. K. L. Ng (2005) for Anabantoidei and Channoidei, Compagno & Roberts (1982) and Last & Stevens (1994) for

Table 1. Fishes observed or collected in Batang Hari basin. * new records for Batang Hari; ** new records for Sumatra (new records includes all species first obtained during our surveys, some of which already recorded in Kottelat (2008), Kottelat & Tan (2008), Kottelat et al. (2006), Lim & H. H. Ng (2008), H. H. Ng (1996, 2009), H. H. Ng & Kottelat (1998), H. H. Ng & Lim (2006), H. H. Ng & Tan (2000), Tan (1998, 1999b), Tan & Kottelat (1998, 2008), Tan & Lim (1998), Tan & H. H. Ng (2000) and Tan & P. K. L. Ng (1996, 2005).

Family Carcharhinidae
Carcharhinus leucas (Müller & Henle, 1839)

Family Pristidae
Pristis microdon Latham, 1794

Family Dasyatidae
Himantura signifer Compagno & Roberts, 1982

Family Osteoglossidae
Scleropages formosus (Müller & Schlegel, 1844)

Family Notopteridae
Chitala borneensis (Bleeker, 1851)
Chitala lopis (Bleeker, 1851)
Notopterus notopterus (Pallas, 1769)

Family Megalopidae
Megalops cyprinoides (Broussonet, 1782)

Family Anguillidae
Anguilla bicolor McClelland, 1844

Family Muraenidae
Gymnothorax tile (Hamilton, 1822)

Family Clupeidae
Clupeichthys goniognathus Bleeker, 1855
Clupeichthys perakensis (Herre, 1936)
Clupeoides borneensis Bleeker, 1851

Family Engraulididae
Coilia lindmani Bleeker, 1858
Lycothrissa crocodilus (Bleeker, 1851)
Setipinna melanochir (Bleeker, 1849)

Family Sundasalangidae
****Sundasalanx platyrhynchus*** Siebert & Crimmen, in Siebert, 1997

Family Cyprinidae
Albulichthys albuloides (Bleeker, 1855)
Amblyrhynchichthys truncatus (Bleeker, 1851)
Balantiocheilos melanopterus (Bleeker, 1851)
Barbichthys laevis (Valenciennes, in Cuvier & Valenciennes, 1842)
Barbonymus gonionotus (Bleeker, 1850)
Barbonymus schwanenfeldii (Bleeker, 1854)
Boraras maculatus (Duncker, 1904)
Crossocheilus cobitis (Bleeker, 1854)
Crossocheilus gnathopogon Weber & de Beaufort, 1916
Crossocheilus langei Bleeker, 1860
Crossocheilus oblongus Kuhl & van Hasselt, in van Hasselt, 1823
****Crossocheilus obscurus*** Tan & Kottelat, 2009
****Crossocheilus pseudobagroides*** Duncker, 1904
Cyclocheilichthys apogon (Valenciennes, in Cuvier & Valenciennes, 1842)
Cyclocheilichthys enoplos (Bleeker, 1850)

Family Cyprinidae (continued)
Cyclocheilichthys heteronema (Bleeker, 1854)
Cyclocheilichthys repasson (Bleeker, 1853)
Diplocheilichthys pleurotaenia (Bleeker, 1855)
****Eirmotus furvus*** Tan & Kottelat, 2008
****Eirmotus isthmus*** Tan & Kottelat, 2008
Epalzeorhynchos kalopterus (Bleeker, 1851)
Hampala ampalong (Bleeker, 1852)
Hampala macrolepidota Kuhl & van Hasselt, in van Hasselt, 1823
Hypsibarbus huguenini (Bleeker, 1853)
Labeo chrysophekadion (Bleeker, 1850)
Labeo erythropterus Valenciennes, in Cuvier & Valenciennes, 1842
Labiobarbus fasciatus (Bleeker, 1853)
Labiobarbus leptocheila (Valenciennes, in Cuvier & Valenciennes, 1842)
Labiobarbus ocellatus (Heckel, 1843)
Leptobarbus hoevenii (Bleeker, 1851)
****Lobocheilos ixocheilos*** Kottelat & Tan, 2008
Lobocheilos schwanenfeldii Bleeker, 1854
Luciosoma setigerum (Valenciennes, in Cuvier & Valenciennes, 1842)
Luciosoma spilopleura Bleeker, 1855
Luciosoma trinema (Bleeker, 1852)
Macrochirichthys macrochirus (Valenciennes, in Cuvier & Valenciennes, 1844)
Malayochela maassi (Weber & de Beaufort, 1912)
Mystacoleucus marginatus (Valenciennes, in Cuvier & Valenciennes, 1842)
Neobarynotus microlepis (Bleeker, 1851)
Osteochilus bleekeri Kottelat, 2008
Osteochilus borneensis (Bleeker, 1857)
Osteochilus intermedius Weber & de Beaufort, 1916
****Osteochilus kerinciensis*** Tan & Kottelat, 2009
Osteochilus melanopleura (Bleeker, 1852)
Osteochilus microcephalus (Valenciennes, in Cuvier & Valenciennes, 1842)
Osteochilus scapularis Fowler, 1939
Osteochilus schlegelii (Bleeker, 1851)
Osteochilus spilurus (Bleeker, 1851)
Osteochilus vittatus (Valenciennes, in Cuvier & Valenciennes, 1842)
Osteochilus waandersii (Bleeker, 1852)
Oxygaster anomalura van Hasselt, 1823
****Paedocypris progenetica*** Kottelat, Britz, Tan & Witte, 2006
****Parachela cyanea*** Kottelat, 1995
Parachela hypophthalmus (Bleeker, 1860)
Parachela oxygastroides (Bleeker, 1852)
****Pectenocypris micromysticetus*** Tan & Kottelat, 2009
Puntioplites bulu (Bleeker, 1851)



Fig. 5. Danau Arang Arang, an oxbow lake near Muara Kompeh (July 1997).



Fig. 6. Danau Arang Arang, an oxbow lake near Muara Kompeh (high water; May 1994).



Fig. 7. Swamp forest at Pijoan (November 1996).



Fig. 8. Danau Kamining, near Muara Bungo (May 1994). Type locality of *Pangio atactos*.

Table 1. (continued).

Family Cyprinidae (continued)
Puntioplites waandersi (Bleeker, 1859)
Puntius sp. 'Bertam'
Puntius sp. 'Kerinci'
Puntius gemellus Kottelat, 1996
Puntius hexazona (Weber & de Beaufort, 1912)
Puntius johorensis (Duncker, 1904)
Puntius lateristriga (Valenciennes, in Cuvier & Valenciennes, 1842)
Puntius lineatus (Duncker, 1904)
Puntius tetrazona (Bleeker, 1855)
**Raiamas guttatus* (Day, 1870)
Rasbora argyrotaenia (Bleeker, 1850)
***Rasbora brittani* Axelrod, 1976
Rasbora cephalotaenia (Bleeker, 1852)
Rasbora dorsiocellata Duncker, 1904
Rasbora dusonensis (Bleeker, 1851)
Rasbora einthovenii (Bleeker, 1851)
Rasbora elegans Volz, 1903
Rasbora gracilis Kottelat, 1991
Rasbora jacobsoni Weber & de Beaufort, 1916
Rasbora kalbarensis Kottelat, 1991
Rasbora kalochroma (Bleeker, 1851)
Rasbora myersi Brittan, 1954
Rasbora pauciperforata Weber & de Beaufort, 1916
Rasbora paucisqualis Ahl, in Schreitmüller, 1935
***Rasbora subtilis* Roberts, 1989
Rasbora sumatrana (Bleeker, 1852)
Rasbora trilineata Steindachner, 1870
Rasborichthys helfrichii (Bleeker, 1857)
Rohteichthys microlepis (Bleeker, 1851)
Schismatorhynchus heterorhynchos (Bleeker, 1854)
**Sundadanio axelrodi* (Brittan, 1976)
Thynnichthys polylepis Bleeker, 1860
Thynnichthys thynnoides (Bleeker, 1852)
Tor tambroides (Bleeker, 1854)
Trigonostigma hengeli (Meinken, 1956)

Family Balitoridae
***Barbucca diabolica* Roberts, 1989
Homaloptera ocellata van der Hoeven, 1830
Homalopteroides nebulosus (Alfred, 1969)
Homalopterula gymnogaster (Bleeker, 1853)
Neohomaloptera johorensis (Herre, 1944)
***Neohomaloptera* sp.

Family Nemacheilidae
***Nemacheilus* cf. *kapuasensis* Kottelat, 1984
***Nemacheilus papillos* Tan & Kottelat, 2009
Nemacheilus longipinnis Ahl, 1922
Nemacheilus pfeifferae (Bleeker, 1853)
Nemacheilus selangoricus Duncker, 1904

Family Vaillantellidae
***Vaillantella euepipterus* (Vaillant, 1902)
Vaillantella maassi Weber & de Beaufort, 1912

Family Cobitidae
Acantopsis dialuzona van Hasselt, 1823
***Kottelatlimia katik* (Kottelat & Lim, 1992)
Kottelatlimia pristes (Roberts, 1989)
Lepidocephalichthys tomaculum Kottelat & Lim, 1992
***Pangio alcoides* Kottelat & Lim, 1993
Pangio anguillaris (Vaillant, 1902)
***Pangio atactos* Tan & Kottelat, 2009
***Pangio bitaimac* Tan & Kottelat, 2009
Pangio cuneovirgata (Raut, 1957)
Pangio malayana (Tweedie, 1956)
Pangio oblonga (Valenciennes, in Cuvier & Valenciennes, 1846)
Pangio semicincta (Fraser-Brunner, 1940)
Pangio shelfordii (Popta, 1903)

Family Botiidae
Chromobotia macracanthus (Bleeker, 1852)
Syncrossus hymenophysa (Bleeker, 1852)
Syncrossus reversus (Roberts, 1989)

Family Bagridae
Bagrichthys hypselopterus (Bleeker, 1852)
Bagrichthys macracanthus (Bleeker, 1854)
Bagrichthys macropterus (Bleeker, 1854)
Bagroides melapterus Bleeker, 1851
Hemibagrus hoevenii (Bleeker, 1846)
Hemibagrus aff. *nemurus* (Valenciennes, in Cuvier & Valenciennes, 1840)
***Hemibagrus velox* Tan & Ng, 2000
Hemibagrus wyckii (Bleeker, 1858)
***Hyalobagrus flavus* Ng & Kottelat, 1998
***Leiocassis hosii* Regan, 1906
Leiocassis poecilopterus (Valenciennes, in Cuvier & Valenciennes, 1840)
Mystus abbreviatus (Valenciennes, in Cuvier & Valenciennes, 1840)
Mystus bimaculatus (Volz, 1904)
Mystus castaneus Ng, 2002
Mystus singaringan (Bleeker, 1846)
Mystus wolffii (Bleeker, 1851)
Nanobagrus fuscus (Popta, 1904)
***Nanobagrus stellatus* Tan & Ng, 2000
**Nanobagrus torquatus* Thomson, López, Hadiaty & Page, 2008
***Pseudomystus heokhuii* Ng & Lim, 2008
Pseudomystus leiacanthus (Weber & de Beaufort, 1912)
Pseudomystus rugosus (Regan, 1913)
Pseudomystus stenomus (Valenciennes, in Cuvier & Valenciennes, 1840)

Family Siluridae
Belodontichthys dinema (Bleeker, 1851)
Ceratoglanis scleronema (Bleeker, 1863)
Hemisilurus heterorhynchus (Bleeker, 1854)
Hemisilurus moolenburghi Weber & de Beaufort, 1913
Kryptopterus bicirrhis (Valenciennes, in Cuvier & Valenciennes, 1840)

Table 1. (continued).

Family Siluridae (continued)
Kryptopterus cryptopterus (Bleeker, 1851)
Kryptopterus eugeneiatus (Vaillant, 1893)
Kryptopterus limpok (Bleeker, 1852)
Kryptopterus macrocephalus (Bleeker, 1858)
Kryptopterus palembangensis (Bleeker, 1852)
Kryptopterus schilbeides (Bleeker, 1858)
****Ompok fumidus*** Tan & Ng, 1996
Ompok leiacanthus (Bleeker, 1853)
Ompok rhadinurus Ng, 2003
Phalacronotus apogon (Bleeker, 1851)
Silurichthys indragiriensis Volz, 1904
Wallago leerii Bleeker, 1851

Family Schilbeidae
Laides hexanema (Bleeker, 1852)
Pseudeutropius brachypopterus (Bleeker, 1858)
Pseudeutropius moolenburghae Weber & de Beaufort, 1913

Family Pangasiidae
Helicophagus typus Bleeker, 1858
Helicophagus waandersii Bleeker, 1858
Pangasius djambal Bleeker, 1846
Pangasius nasutus (Bleeker, 1863)
Pangasius polyuranodon Bleeker, 1852
Pseudolais micronemus (Bleeker, 1847)

Family Akysidae
Acrochordonichthys rugosus (Bleeker, 1847)
****Akysis fontaneus*** Ng, 2009
****Akysis heterurus*** Ng, 1996
Breitensteinia cessator Ng & Siebert, 1998
Parakysis grandis Ng & Lim, 1995
Pseudobagarius macronema (Bleeker, 1860)

Family Sisoridae
Bagarius yarrelli (Sykes, 1839)
Glyptothorax platypogon (Valenciennes, in Cuvier & Valenciennes, 1840)
Glyptothorax aff. *schmidti* (Volz, 1904)

Family Chacidae
Chaca bankanensis Bleeker, 1852

Family Clariidae
Clarias batrachus (Linnaeus, 1758)
Clarias leiacanthus Bleeker, 1851
Clarias meladerma Bleeker, 1846
Clarias nieuhofii Valenciennes, in Cuvier and Valenciennes, 1840
Clarias olivaceus Fowler, 1904
****Encheloclarias** cf. *kelioides* Ng & Lim, 1993
****Encheloclarias velatus*** Ng & Tan, 2000

Family Ariidae
Arius maculatus (Thunberg, 1792)
Batrachocephalus mino (Hamilton, 1822)
Cephalocassis borneensis (Bleeker, 1851)
Cephalocassis melanochir (Bleeker, 1852)
Cryptarius truncatus (Valenciennes, in Cuvier & Valenciennes, 1840)

Family Ariidae (continued)
Hemiarius stormii (Bleeker, 1858)
Nemapteryx nenga (Hamilton, 1822)
Netuma bilineata (Valenciennes, in Cuvier & Valenciennes, 1840)
Osteogeneiosus militaris (Linnaeus, 1758)
Plicofollis argyropleuron (Valenciennes, in Cuvier & Valenciennes, 1840)
Plicofollis dussumieri (Valenciennes, in Cuvier & Valenciennes, 1840)
Plicofollis polystaphylodon (Bleeker, 1846)

Family Plotosidae
Plotosus canius Hamilton, 1822
Plotosus lineatus (Thunberg, 1787)

Family Hemiramphidae
Hemirhamphodon pogonognathus (Bleeker, 1853)

Family Belonidae
Xenentodon canciloides (Bleeker, 1854)

Family Aplocheilidae
Aplocheilus panchax (Hamilton, 1822)

Family Synbranchidae
Monopterus albus (Zuiew, 1793)

Family Syngnathidae
Doryichthys deokhatoides (Bleeker, 1853)
Doryichthys martensii (Peters, 1868)

Family Ambassidae
****Gymnochanda filamentosa*** Fraser-Brunner, 1955
Gymnochanda limi Kottelat, 1995
Paradoxodacna piratica Roberts, 1989
Parambassis apogonoides (Bleeker, 1851)
Parambassis macrolepis (Bleeker, 1857)
Parambassis wolffii (Bleeker, 1851)

Family Datnioididae
Datnioides microlepis Bleeker, 1854
Datnioides polota (Hamilton, 1822)

Family Sciaenidae
Boesemania microlepis (Bleeker, 1859)
Panna microdon (Bleeker, 1849)

Family Toxotidae
Toxotes jaculator (Pallas, in Schlosser, 1767)
Toxotes microlepis Günther, 1860

Family Nandidae
Nandus nebulosus (Gray, 1835)

Family Pristolepididae
Pristolepis fasciata (Bleeker, 1851)
Pristolepis grootii (Bleeker, 1852)

Family Polynemidae
Polydactylus macrophthalmus (Bleeker, 1859)
Polynemus dubius Bleeker, 1854
Polynemus multifilis Temminck & Schlegel, 1843



Fig. 9. Lower part (in freshwater swamp forest) of stream connecting Danau Rasau (a lake on a peat dome) to Batang Hari (May 1994).



Fig. 10. Sungai Bakung, a stream in flooded peat swamp forest near Arang Arang (May 1994).



Fig. 11. Sungai Bakung, a stream in flooded peat swamp forest near Arang Arang (May 1994).

elasmobranchs, and Kottelat et al. (1993) for the other taxa. Authors of scientific names of species of the Batang Hari drainage are listed in Table 1 and are not repeated in the text.

Unless otherwise stated, our material is deposited in ZRC and CMK, with holotypes and part of the paratypes of the new species in MZB. Abbreviations: BMNH, Natural History Museum, London; CAS, California Academy of Sciences, San Francisco; CMK, collection of the second author; MNHN, Muséum National d'Histoire Naturelle, Paris; MZB, Museum Zoologicum Bogoriense, Bogor; RMNH, Nationaal Natuurhistorisch Museum, Leiden; UMMZ, University of Michigan Museum of Zoology, Ann Arbor; USNM, National Museum of Natural History, Smithsonian Institution, Washington; ZMA, Instituut voor Systematik and Populatiebiologie, Amsterdam; and ZRC, Raffles Museum of Biodiversity Research, National University of Singapore.



Fig. 12. Danau Rasau peat swamp forest (May 1994).

Results

The species observed or recorded on the Batang Hari drainage and the small coastal drainages immediately adjacent are listed in Table 1. A total of 297 species are recorded, of which 48 were then new records (45 were new records for Sumatra). Several of the new records have already been announced in earlier publications by us or associates: Kottelat (2008), Kottelat & Tan (2008), Kottelat et al. (2006), Lim & H. H. Ng (2008), H. H. Ng (1996, 2009), H. H. Ng & Kottelat (1998), H. H. Ng & Lim (2006), H. H. Ng & Tan (2000), Tan (1998, 1999b), Tan & Kottelat (1998, 2008), Tan & Lim (1998), Tan & H. H. Ng (2000) and Tan & P. K. L. Ng (1996, 2005). The following are notes and comments on selected species.

Family Osteoglossidae

Scleropages formosus

Remarks. Systematics of the genus *Scleropages* follows Kottelat & Widjanarti (2005). *Scleropages formosus* was sighted once in 1996 on Jambi fish market, as a cut up posterior section, for sale as

Table 1. (continued).

Family Blenniidae
Phenablennius heyligeri (Bleeker, 1859)

Family Eleotrididae
Bunaka gyrinoides (Bleeker, 1853)
Butis humeralis (Valenciennes, in Cuvier & Valenciennes, 1837)
Oxyeleotris marmorata (Bleeker, 1852)
Oxyeleotris urophthalmoides (Bleeker, 1853)

Family Gobiidae
Brachygobius doriae (Günther, 1868)
***Eugnathogobius siamensis* (Fowler, 1934)
***Eugnathogobius* cf. *festivus* Larson, 2009
Glossogobius giuris (Hamilton, 1822)
Parapocryptes serperaster (Richardson, 1846)
Periophthalmodon septemradiatus (Hamilton, 1822)

Family Gobioididae
Caragobius urolepis (Bleeker, 1852)

Family Helostomatidae
Helostoma temminkii Cuvier, 1829

Family Anabantidae
Anabas testudineus (Bloch, 1792)

Family Osphronemidae
Belontia hasselti (Cuvier, in Cuvier & Valenciennes, 1831)
Betta coccina Vierke, 1979
***Betta cracens* Tan & Ng, 2005
***Betta falx* Tan & Kottelat, 1998
Betta pugnax (Cantor, 1849)
***Betta raja* Tan & Ng, 2005
***Betta renata* Tan, 1998
***Betta simorum* Tan & Ng, 1996
***Luciocephalus aura* Tan & Ng, 2005
Luciocephalus pulcher (Gray, 1830)
Osphronemus goramy La Cepède, 1801
**Parosphromenus* cf. *bintan* Kottelat & Ng, 1998
Parosphromenus sumatranus Klausewitz, 1955
Sphaerichthys osphromenoides Canestrini, 1860
Trichopodus leerii Bleeker, 1852

Family Osphronemidae (continued)
Trichopodus trichopterus (Pallas, 1770)
Trichopsis vittata (Cuvier, in Cuvier & Valenciennes, 1831)

Family Channidae
Channa bankanensis (Bleeker, 1852)
Channa cyanospilos (Bleeker, 1853)
Channa gachua (Hamilton, 1822)
Channa lucius (Cuvier, in Cuvier & Valenciennes, 1831)
Channa marulioides (Bleeker, 1851)
Channa melasoma (Bleeker, 1851)
Channa micropeltes (Cuvier, in Cuvier & Valenciennes, 1831)
Channa pleurophthalmus (Bleeker, 1851)
Channa striata (Bloch, 1793)

Family Chaudhuriidae
***Bihunichthys monopteroides* Kottelat & Lim, 1994
***Chendol keelini* Kottelat & Lim, 1994
***Nagaichthys filipes* Kottelat & Lim, in Kottelat, 1991

Family Mastacembelidae
Macrognathus circumcinctus (Hora, 1924)
Macrognathus maculatus (Cuvier, in Cuvier & Valenciennes, 1832)
Macrognathus tapirus Kottelat & Widjanarti, 2005
Mastacembelus erythrotaenia Bleeker, 1850
Mastacembelus unicolor Cuvier, in Cuvier & Valenciennes, 1832

Family Cynoglossidae
Cynoglossus feldmanni (Bleeker, 1854)
Cynoglossus waandersii (Bleeker, 1854)

Family Soleidae
Achiroides melanorhijnchus (Bleeker, 1851)
Brachirus panoides (Bleeker, 1851)

Family Tetraodontidae
Auriglobus amabilis (Roberts, 1982)
Monotrete leiurus (Bleeker, 1851)
Monotrete palembangensis (Bleeker, 1852)

food fish. Juveniles are in the aquarium-fish trade in season, usually towards last quarter of the year. The Batang Hari and Musi drainages are inhabited only by the green form, Riau by a gold form. The species is rare or uncommon, due to overcollecting and habitat destruction.

Family Anguillidae

Anguilla bicolor

Remarks. Species of *Anguilla* had not yet been recorded from eastern Sumatra; they are restricted to the western, ocean-facing slope of the island. We obtained specimens from the Sungai Puneh market in Kerinci; they could possibly have come from Padang or nearby streams draining to the Indian Ocean. They were sold alongside species which are locally caught in Kerinci, and therefore we tentatively retain the species as present in the highlands of Jambi.

Family Muraenidae

Gymnothorax tile

Remarks. Normally in estuarine habitats, but observed in freshwater in the lower Batang Hari still under tidal influence.

Family Clupeidae

Clupeoides borneensis

Remarks. Fresh specimens (Fig. 17) have a yellow caudal fin with black distal margin, somewhat similar to the coloration of *Rasbora myersi*. Obtained so far only from market in Jambi.

Family Sundasalangidae

Sundasalanx platyrhynchus

Remarks. *Sundasalanx* was placed in the family Clupeidae by Siebert (1997). Britz & Kottelat (1999) considered that there is no data to support this conclusion and retained Sundasalangidae as a valid family in Clupeiformes.

We have two specimens only and their identity cannot be definitively cleared without damaging them as identification requires examination of osteological characters. They seem identical or closely related to *S. platyrhynchus*, originally described from the Kapuas drainage, Borneo. However, Siebert's (1997) description of *S. platyrhynchus* distinguishes it only minimally from *S. microps* Roberts, 1981. Siebert only mentions that the eye of *S. microps* is "much smaller" (approx. 3 % of SL,vs. 4-6 in his Table 4) and its pharyngeal dentition is "much smaller". His Table 4 does not really list differences in pharyngeal dentition (pharyngobranchial 3 [as "Ipb 3" in Table] tooth plate "small" with 1-2 teeth in *S. microps*, vs. "small" with 2-3 teeth in *S. platyrhynchus*; "Ipb 4" with tooth plate "small" vs. "large"). "Small" and "large" are not defined, but in the text, the "large" pharyngobranchial 4 tooth plate is described as "small, about ⅓ size of pharyngobranchial 4"; the condition in *S. microps* is not described. The type series of *S. platyrhynchus* had earlier been reported as *Sundasalanx* sp. by Kottelat (1991) who pointed to some differences with *S. microps* but considered it premature to described this limited sample as a distinct species.

Material. ZRC 43027, 1, 16.4 mm SL; Sumatra: Pantai Anduri, Batang Hari. – CMK 11178, 1, 23.0 mm SL; Sumatra: Batang Hari in Kampung Rantau Panjang.

Family Engraulididae

Coilia lindmani
(Fig. 18)

Remarks. This species is not commonly encountered in the local markets. It was originally described from the Musi drainage in South Sumatra (Kottelat et al., 1993; Fig. 18).

Setipinna melanochir

Remarks. The Batang Hari collections include specimens with black pectoral fins as well as specimens with hyaline fins, which can otherwise not be distinguished.

Family Cyprinidae

Balantiocheilos melanopterus

Remarks. *Balantiocheilos melanopterus* seems extinct in the Batang Hari drainage, apparently as a result of overfishing and habitat destruction. This species was widely distributed in Malay Peninsula, Sumatra and Borneo. It is also re-



Fig. 13. Air Hitam peat swamp, Berbak (June 1996).



Fig. 14. Degraded peat swamp forest at Sabak (November 1996).



Fig. 15. Danau Kerinci (June 1996).



Fig. 16. Danau Gunung Tujuh (June 1996).

ported as very rare in the Kapuas (Kottelat & Widjanarti, 2005) and the related *B. ambusticauda* is extirpated in the Chao Phraya and of uncertain status in the Mekong (Ng & Kottelat, 2007). It is still present in the Musi (Sumatra) (pers. obs.). We have seen material collected in Jambi in 1909 by Moolenburgh (ZMA 115.913).

Barbonymus gonionotus

Remarks. Cultivated and found either naturally or introduced throughout Southeast Asia. Regularly seen in markets in Jambi but we have not seen wild specimens.

Crossocheilus obscurus, new species
(Figs. 19a-b)

Holotype. MZB 10706, 108.1 mm SL; Indonesia: Sumatra: Sumatra Barat: market at Kiliran Jao, a village along road from Sungai Dareh to Solok; H. H. Tan & H. H. Ng, 13 Dec 2003.

Paratypes. ZRC 49879, 2; UMMZ 248781, 2; CMK 18915, 2; 76.6-138.8 mm SL; same data as holotype.

Diagnosis. *Crossocheilus obscurus* is distinguished from its congeners in South East Asia by the following combination of characters: size up to at least 142 mm SL; one pair of rostral barbels, no maxillary barbels; midlateral stripe with edges not sharply contrasted, slightly curved downward, obscured in largest individuals, continued on median caudal-fin rays, reaching posterior margin; no black mark between anus and anal fin; mouth wide (30-36 % HL).

Description. General appearance in Figures 19a-b; morphometric data of holotype and 6 paratypes in Table 2. Dorsal fin with 3 simple and 8½ branched rays; dorsal-fin origin above lateral line scale 9 (3), 10 (3) or 11 (1). Pectoral fin rounded to slightly falcate, with 15 (5) or 16 (2) rays, reaching halfway to pelvic-fin base. Pelvic fin triangular to slightly falcate, with 9 rays, reaching about ⅗ of distance to anal-fin origin and slightly beyond anus; axillary scale present. Anus separated from anal-fin origin by 3 scales (4 in one specimen). Anal fin with 2 simple and 5½ branched rays. Caudal fin with 10+9 principal rays, 9+8 branched. Caudal peduncle 1.50-1.68 times longer than deep. 31-32 + 1-2 = 32-33 scales along lateral line, 8 or 9 predorsal scales, ½4/1/5½ scales in transverse line, ½3/1/3½ scales in transverse line on caudal peduncle, 3 or 3½ scales between lateral line and pelvic-fin origin.

One pair of rostral barbels, length about ½ to ⅔ of eye diameter. Upper lip with 14-18 fimbriae (18 in 5 specimens), entirely covered by small papillae. Anterior edge of lower lip with a few large papillae.

Coloration. Preserved: Dorsal half of body, and top and sides of head brown, all scale pockets blackish. Ventral half of body and ventral and lower surface of head yellow to pale brownish, scales of upper 2-3 rows with brown margins. A darker midlateral stripe along lateral line, extending on scale rows above and below lateral line row. Edges of stripe not sharply marked, somewhat irregular. All fins with hyaline membranes, rays usually margined by a few black pigments, denser at level of branching points. Two median caudal-fin rays black, adjacent membranes dark grey, continuing midlateral stripe.

Distribution. *Crossocheilus obscurus* is presently known only from the middle Batang Hari drainage.

Etymology. Obscurus, Latin, dark, allusion to the dark general appearance compared to other South East Asian species of the genus. An adjective.

Remarks. The Batang Hari samples include material of five species of *Crossocheilus*. The most common one is a small species (up to 52 mm SL) commonly found in the lowlands, in murky waters, usually with muddy bottom, under logs, floating houses, boats, etc. It has two pairs of barbels; the midlateral stripe continuous from tip of snout to base of caudal fin, with a conspicuous small blotch at posterior extremity, faintly marked on caudal fin; a faint mark between anus and anal-fin origin in juveniles; and a narrow mouth. We identify it as *C. cobitis* (see below) (Fig. 20).

The second species, which we identify as *C. langei* (Fig. 21), reaches 75 mm SL, has two pairs of barbels; a well contrasted colour pattern with the midlateral stripe continuous from the tip of the snout to the tip of the median caudal-fin rays, sometimes with a blotch at the posterior extremity of the caudal peduncle; sometimes a conspicuous black blotch between the anus and the anal-fin origin; and a narrow mouth.

The third species, which we identify as *C. pseudobagroides* (Fig. 23), reaches up to 52 mm SL, has a body shape very similar to that of *C. cobitis* and also occurs in lowland streams. It has one or two pairs of barbels, a conspicuous black spot between the anus and the anal-fin origin, up to four spots on the dorsal mid-line and a conspicuous black stripe ending in a blotch in the upper half of the lower lobe of the caudal fin, not reaching the posterior extremity of the rays.

The remaining two species have been collected in swift waters over rocky bottom in the foothills and hilly areas. The fourth species, described here as *C. obscurus*, reaches 140 mm SL, has a single pair of barbels; a midlateral stripe from the opercle to the tip of the median caudal-fin rays, slightly curved downward; the edges of the stripe not sharply contrasted, not linear, and obscured in the largest individuals; no mark between the anus and the anal-fin origin; and a wide mouth.

Finally, we group in a fifth species a number of individuals reaching up to 90 mm SL, with a single pair of barbels; a midlateral stripe from the extremity of the opercle to the tip of the median caudal-fin rays, conspicuously marked, no conspicuous spot at caudal-fin base; no mark between the anus and the anal-fin origin; a small to moderate mouth; and a short snout. We tentatively identify them as *C. oblongus* (Fig. 22), but we are not yet certain whether or not they are really conspecific with the Javanese populations of *C. oblongus*. The limited number of specimens we obtained on markets, their preservation state as well as the non-availability of recent material of topotypical populations made an accurate identification impossible at the present stage.

Identification of the new Batang Hari species *(C. obscurus)* requires a prior clarification of the identity of *C. oblongus*, *C. cobitis* and *C. langei*, which have often been confused. The name *C. oblongus* was first used in a letter by van Hasselt (1823) published by Temminck. The 'description'

Table 2. Morphometric data of *Crossocheilus obscurus* (holotype and 6 paratypes, ZRC 49879, UMMZ 248781, CMK 18915) and *C. gnathopogon*.

	C. obscurus			*C. gnathopogon*
	holotype MZB 49879	range	mean	lectotype ZMA 113745
Standard length (mm)	108.1	76.6-138.8		91.6
In percent of standard length				
Total length	132.2	129.8-134.6	131.8	–
Head length	22.5	22.2-24.4	23.2	22.1
Predorsal length	46.3	45.0-49.3	47.6	45.1
Prepelvic length	52.0	51.7-53.8	52.6	49.1
Preanal length	76.5	75.3-78.4	77.2	71.7
Head depth	15.0	13.9-16.8	15.4	15.1
Body depth at dorsal-fin origin	23.8	21.7-25.6	23.3	22.7
Depth of caudal peduncle	11.0	10.8-12.1	11.4	12.3
Length of caudal peduncle	18.5	17.7-19.0	18.1	20.1
Snout length	10.9	10.9-13.2	11.7	7.5
Eye diameter	5.4	4.8-5.9	5.4	5.2
Interorbital width	10.6	9.8-11.5	10.7	9.2
Mouth width	7.0	6.8-8.5	7.7	6.6
Distance from anus to anal fin	–	–	–	5.1
Dorso-hypural distance	–	–	–	60.7
In percent of head length				
Snout length	49	48-54	51	34
Eye diameter	24	22-25	23	24
Interorbital width	47	43-48	46	42
Mouth width	29	30-36	32	30
Ratio length/depth of caudal peduncle	1.68	1.50-1.68	1.55	1.63



Fig. 17. *Clupeoides borneensis*, ZRC 41953, about 65 mm SL, fresh; Sumatra: Batang Hari drainage (July 1997).



Fig. 18. *Coilia lindmani*, ZRC 44138, about 150 mm SL, fresh; Sumatra: Batang Hari drainage (Oct 1999).



Fig. 19. *Crossocheilus obscurus*; Sumatra: Batang Hari drainage, Kiliran Jao; **a,** holotype, MZB 10706, 108.1 mm SL; **b,** one of the paratypes, about 120 mm SL, fresh (Dec 2003).



Fig. 20. *Crossocheilus cobitis*, ZRC 42376, 41.4 mm SL; Sumatra: Batang Hari drainage.



Fig. 21. *Crossocheilus langei*, ZRC 44141, 75.1 mm SL; Sumatra: Batang Hari drainage.



Fig. 22. *Crossocheilus oblongus*, ZRC 49228, 70.1 mm SL; Sumatra: Batang Hari drainage (right side, reversed).

is laconic but suffices to make the name available, with Kuhl & van Hasselt as authors (Kottelat, 1987). It is impossible to know from van Hasselt's text on how many specimens his account was based. Alfred (1971: 101) assumed that specimen RMNH 1755 is the holotype. In fact, RMNH has several specimens collected by van Hasselt (see Roberts, 1993: 15), which probably are all syntypes and Alfred's listing of one of them as holotype makes it a lectotype by inference of a holotype (ICZN art. 74.6). Roberts (1993: 15) listed specimen RMNH 2640 as "probable holotype or syntype", but did not provide explanations.

Labeo oblongus Valenciennes (in Cuvier & Valenciennes, 1842: 357) is based on the same RMNH 1755 specimen and on a figure sent by van Hasselt with his letter to Temminck. It is not possible to determine if the model of the figure shows the same specimen or another of the RMNH specimens and therefore both are syntypes. We

designate RMNH 1755 as lectotype of *Labeo oblongus* Valenciennes and this makes it an objective junior synonym and junior homonym of *Crossocheilus oblongus* Kuhl & van Hasselt.

Van Hasselt's drawing is reproduced in Roberts (1993: 55, fig. 2), but the identity of the figured fish is irrelevant for nomenclatural purposes as the identity of the name is fixed by the lectotype. Unfortunately we have not been able to examine the lectotype. Nevertheless, it is worth mentioning that the figure shows a slender fish with a blueish colour, a stripe not extending on the caudal fin, and a relatively narrow mouth (not quantified). The figure does not show the barbels, but Alfred (1971: 102) observed only one pair. This combination of characters corresponds to our *C. oblongus*, except that our material has a faint stripe on the caudal fin.

Alfred (1971) compared material from the Malay Peninsula with the lectotype of *C. oblongus* and concluded that they are conspecific and that *C. siamensis* is possibly conspecific too. We examined part of the material in ZRC identified as *C. oblongus* by Alfred. While these specimens generally agree with the above diagnosis of our *C. oblongus*, we observe variation in the shape of the caudal peduncle, the width of the mouth and the head, and the shape and pigmentation of the caudal fin. The differences are observed both between our Batang Hari material and these Malayan samples identified by Alfred, as well as within both sets. The differences we observe among the Malayan material are as follows:

ZRC 2294, 9 specimens not clearly identifiable (specimens in poor condition): ? *C. cobitis* (long snout, caudal spot, 2 pairs of barbels) and ? *C. oblongus* (short snout, no caudal spot, 1 pair of barbels);

ZRC 2296, 1 specimen: *C. oblongus* (long snout, conspicuous caudal spot, faint stripe on caudal, 1 pair of barbels);

ZRC 1953, 2 specimens: *C. oblongus* (long snout, stripe conspicuous but not extending on caudal fin, no caudal spot, similar to drawing of *C. oblongus* in Bleeker [1863-64: pl. 105 fig. 2] and in van Hasselt's drawing [Roberts, 1993], 1 pair of barbels).

Our observations on other *C. 'oblongus'* from the Sundaic area suggest that a number of species have been confused under the names *C. oblongus* and *C. siamensis* (see also Kottelat, 2000a: 39). While it is premature to discuss further their identity, we can conclude that Alfred's concept of *C. oblongus* (including its lectotype) refers to fishes mostly similar to our *C. oblongus* as diagnosed above. For the time being, we tentatively retain the name *C. oblongus* for both our Batang Hari and Malayan material. Future studies may show that the Malayan populations are specifically distinct. Kottelat (2000a) considered Indochinese and Malayan populations as conspecific with *C. oblongus*, but this might have to be revisited, once fresh material is obtained from Java. In any case, with their linear, contrasted midlateral stripe with sharp edges all these populations are immediately distinguished from *C. obscurus*, which has a midlateral stripe with edges not sharply contrasted, not linear, obscured in largest individuals.

Bleeker (1854a: 523) described *C. cobitis* on the basis of 40 specimens 32-44 mm TL from Sumatra (Padang) and Java (Batavia). The Atlas' account (Bleeker, 1863-64: 40, pl. 105 fig. 2) mentions 70 specimens 32-67 mm TL, including two additional localities in Java (Krawang, Surabaya) and there is no way to know exactly what is the locality of the figured specimen. The drawings in the Atlas usually are natural size (e.g., the figure of *C. langei* [pl. 105 fig. 1, about 79 mm TL] shows the only specimen known to Bleeker, which he mentions (p. 42) to be 81 mm TL). The drawing of *C. cobitis* is 68 mm TL and apparently shows the longest of Bleeker's specimens; thus, the figured specimen is not a syntype and is from either Krawang [Karawang] or Surabaya.

Bleeker (1854a, 1863) explicitly stated that *C. cobitis* "seems to always remain of small size", and is distinguished from *C. langei* by a shallower head (erroneous, see below), shorter barbels and a wide silvery mid-lateral band with a median blackish line. The shape of the head disagrees with Bleeker's comment as it is more pointed and shallower in *C. langei* (see below). We have seen a single specimen labelled syntype of *C. cobitis* (BMNH 1866.5.2.54), but we cannot be certain that it is really a syntype. Also, it cannot be excluded that the remaining syntypes include more than one species and a lectotype might be needed, but it would be premature to designate it here.

Well developed tubercles in most specimens of *C. cobitis* and the presence of ripe eggs in a female 43.8 mm SL (ZRC 38828) are evidence that they are sexually mature. It (or closely related species) is known from Java, Sumatra, Borneo, Malay Peninsula and Chao Phraya and Mekong drainages.

Bleeker (1860c: 127) described *C. langei* based on a single specimen from Palembang, Sumatra. He diagnosed it from his *C. cobitis* by having longer barbels (two pairs), broad dark midlateral stripe, a deeper head (1½ times in HL, vs 1⅓ to 1⅔; which in fact is erroneous, as 1.5 times in HL means 67 % HL and 1.33-1.4 times means 71-75 %). The description further states that the stripe passes through a large black blotch at caudal-fin base [not that it terminates at the blotch; "basi pinnae caudalis in maculam magnam nigram transiente", "transiens" is the present participle of "transeo", to go through), and that there is a round black blotch between the anus and the anal-fin origin. This species has not been reported again until Alfred (1971: 100) recorded it from Malay Peninsula.

We have examined part of the material Alfred identified as *C. langei* (ZRC 1783, 2, 90.5-105.4 mm SL; ZRC 1788, 1, 70.7 mm SL). The specimens are in a poor state, most of the pigments have disappeared, and we cannot see the black blotch between the anus and the anal-fin origin. Alfred did not report the diagnostic blotch on the caudal-fin base and we did not observe any remnant of it in the damaged fins. Although Alfred reports the presence of maxillary barbels, we did not see any, but the mouth of all is damaged. ZRC 1788 and one of ZRC 1783 (105.9 mm SL) seem conspecific with our *C. oblongus*. The second specimen from ZRC 1783 (89.3 mm SL) possibly belongs to *C. langei* or *C. gnathopogon*; confirmation of the presence of one or the other species in the Malay Peninsula requires fresh material.

Two specimens from the Batang Hari (ZRC 44141, 69.6 and 75.1 mm SL; Fig. 21) agree with Bleeker's descriptions and figure of *C. langei*. A third specimen (ZRC 43016, 93.5 mm SL) generally agrees too, but has a much fainter stripe (possibly an artefact from poor preservation [market-purchased specimen]) and a single pair of barbels.

Weber & de Beaufort (1916: 234) distinguished *C. langei* from *C. cobitis* by having only 2 scale rows (vs. 3) between lateral lin and pelvic-fin origin, and 4½ (vs. 5½) below lateral line (apparently in front of pelvic-fin origin). Our specimens of the two species have 3½ and 5½ [in front of pelvic-fin origin], respectively.

We identify as *C. pseudobagroides* Duncker, 1904 a small-sized species (up to 52 mm SL) with a body shape very similar to that of *C. cobitis*. It has one or two pairs of barbels, a conspicuous black spot between the anus and the anal-fin origin, spots on the dorsal mid-line and a conspicuous black stripe ending in a blotch in the upper half of the lower lobe of the caudal fin, not reaching the posterior extremity of the rays. This is apparently the undetermined species of Roberts (1989: 32, fig. 16c). It is presently known only from the southern Malay Peninsula (Johor), Sumatra (Batang Hari), Kalimantan Tengah (Kahayan drainage) and Kalimantan Barat (Kapuas drainage) (pers. obs.).

Crossocheilus pseudobagroides (Fig. 23) was originally described from Muar River near Tubing Tinggi, Malaysia (Duncker, 1904: 176). Duncker's description and figure report diagnostic characters observable in our material: the distinct stripe extending to the end of the upper rays of the lower lobe of the caudal fin, with a blotch in the middle of the caudal-fin base; the spots on the dorsal mid-line (in front of dorsal-fin origin, at dorsal-fin origin, at base of last dorsal-fin rays, and behind dorsal fin); the black spot between the anus and the origin of the anal fin; four barbels; and 38 total lateral line scales. The spots along the dorsal midline maybe very poorly contrasted in specimens from turbid water (e.g. the specimen on Fig. 23 shows only the spots in front of and at dorsal-fin origin, and even these are poorly marked). Alfred (1971: 100) treated *C. pseudobagroides* as a junior synonym of *C. langei*, but part of the material he listed as *C. langei* (ZRC 1783, 1788) belongs to *C. oblongus* or is not identifiable.

Besides, *C. pseudobagroides* differs from *C. cobitis* in having a greater predorsal length (dorsohypural distance falling much in front of tip of snout, vs. about at tip of snout); a more slender caudal peduncle (depth 1.63-2.04 times in its length, vs. 1.51-1.68; length 17.5-19.6 % SL, vs. 16.3-19.1); more lateral line scales (33-34 + 2-3, vs 30-32 + 2-3); the anus closer to the origin of the anal fin (3, vs. 4 scales; behind tip of pelvic rays, vs in front); and a bolder and broader midlateral stripe. The development of barbels seems variable, with some specimens having rudimentary or apparently no (e.g., ZRC 51770) maxillary barbels. *Crossocheilus cobitis* also often has a few black pigments between the anus and anal-fin origin, but never forming a conspicuous blotch as in *C. pseudobagroides*.

The last of the named *Crossocheilus* species from Sumatra is *C. gnathopogon* Weber & de Beaufort,



Fig. 23. *Crossocheilus pseudobagroides*, ZRC 42748, 39.7 mm SL; Malaysia: Johor: Sungai Kahang.



Fig. 24. *Crossocheilus gnathopogon*, ZMA 113745, lectotype, 91.6 mm SL; Sumatra: Bukittinggi.

1916 (Fig. 24). It was described on the basis of two specimens from Fort de Kock [Bukittinggi, Sumatra]. Banarescu (1986: 150) also recorded specimens from Bengkulu and Lake Kerinci. He recorded the type series as from "Lake Mannindjan, Fort de Kock" [Lake Maninjau, Bukittinggi]. The reason he mentioned Lake Maninjau is not known and this mention is erroneous. There is neither catalogue nor label data mentioning Lake Maninjau (R. Vonk, pers. comm., 14 Nov 2008). It is possible that Banarescu mentioned Lake Maninjau as the water body closest to Bukittinggi on a large scale map. Waters from both Bukittinggi and Lake Maninjau flow towards the southwest to the Indian Ocean. Bengkulu is on the southwestern coast of Sumatra. The record from Lake Kerinci requires confirmation.

Crossocheilus gnathopogon was diagnosed



Fig. 25. *Diplocheilichthys pleurotaenia*; Sumatra: Batang Hari drainage, Sungai Dareh; **a,** ZRC 43003, 192.5 mm SL; **b,** ZRC 51767, 108.0 mm SL, fresh (December 2003).



Fig. 26. *Diplocheilichthys jentinkii*; CMK 11525, 108.1 mm SL; Borneo: Kapuas drainage: Sungai Hulu Leboyan.

mainly by the absence of rostral barbels. Weber & de Beaufort reported the absence of rostral barbel and the presence of minute maxillary barbels. The lectotype (ZMA 113745; Fig. 24) in fact has a tiny rostral barbel on each side in the groove between the rostral cap and the posterior part of the lower lip, and a small maxillary barbel on the left side and none on the right side. This is the specimen (with the dissected mouth) figured by Weber & de Beaufort (1916: 232, fig. 96). The paralectotype is figured by Kottelat et al. (1993: pl. 7).

Key to the species of *Crossocheilus* from Sumatra

1. - Up to 4 spots on dorsal mid-line; a black spot between anus and anal-fin origin; midlateral stripe ending in a bold blotch in upper half of lower lobe of caudal fin, not reaching posterior extremity of rays. .....*C. pseudobagroides*
   - No spot on dorsal midline; black spot between anus and anal-fin origin absent (except in *C. langei*); midlateral stripe ending at caudal-fin base or at tip of median caudal-fin rays. 2

2. - Midlateral stripe ending at caudal-fin base, with a small blotch at posterior extremity, well marked on caudal peduncle, faintly marked on caudal fin. .....*C. cobitis*
   - Midlateral stripe ending at tip of median caudal-fin rays, sometimes with a blotch at posterior extremity of caudal peduncle. 3

3. - Two pairs of barbels; a black blotch between anus and anal-fin origin. ..... *C. langei*
   - A single pair of barbels; no black blotch between anus and anal-fin origin. 4

4. - Edges of midlateral stripe not sharply contrasted, irregular, not linear, and obscured in largest individuals. .....*C. obscurus*
   - Midlateral stripe linear, with sharp edges, contrasted at all sizes. .....*C. oblongus*

Comparison material. The list includes only part of the material we identified.

Crossocheilus cobitis: BMNH 1866.5.2.54, 1 syntype, 40.0 mm SL; Sumatra: Padang; or Java: Batavia [Jakarta]. – ZRC 42376, 18, 21.0-41.4 mm SL; ZRC 38550, 1, 52.0 mm SL; Sumatra: Batang Hari drainage. – CMK 11455, 11; CMK 11476, 2; Sumatra: Musi drainage. – CMK 11882, 1; Sumatra: Indragiri drainage. – ZRC 38828, 3, 37.9-43.8 mm SL; CMK 10427, 61; CMK 11611, 29; Borneo: Kapuas. – CMK 13234, 7; Laos: Nam Leuk.

Crossocheilus langei: ZRC 44141, 2, 69.6-75.1 mm SL; ZRC 43016, 1, 93.5 mm SL; Sumatra: Jambi: Angso Duo market. – CMK 11761, 1; CMK 11675, 7; Borneo: Kapuas drainage.

Crossocheilus gnathopogon: ZMA 113745, lectotype, 91.6 mm SL; Sumatra: Fort de Kock [Bukittingi].

Crossocheilus oblongus: ZRC 49288, 1, 70.1 mm SL; Sumatra: Jambi. – ZRC 41550, 2, 56.1-89.8 mm SL; Sumatra: Sumatera Barat: Sungai Dareh. – ZRC 2294, 9; Malaysia: Negri Sembilan: Sungai Jelai. – ZRC 2296, 1; Malaysia: Pahang: Sungai Tahan. – ZRC 1953, 2; Malaysia: Pahang: Ulu Telom. – CMK 10555, 10; Borneo: Kapuas drainage. – CMK 11858, 21; Borneo: Barito drainage.

Crossocheilus pseudobagroides: ZRC 51770, 2, 44.1-52.0 mm SL; ZRC 42748, 1, 39.7 mm SL; ZRC 42804, 1, 35.5 mm SL; Malaysia: Johor: Sungai Kahang. – ZRC 21102, 4, 30.5-40.0 mm SL; Malaysia: Johor: Sungai Selangi. – ZRC 51772, 37, 35.3-48.8 mm SL; Sumatra: Jambi.

Diplocheilichthys pleurotaenia

Remarks. This species is redescribed by Karnasuta (1993: 37) as *Osteochilus pleurotaenia*. Kottelat & Lim (1995b) commented that it should be placed in a separate genus, for which the name *Diplocheilichthys* Bleeker, 1860 is available. But the material that Kottelat & Lim (1995b) referred to as *D. pleurotaenia* in fact belongs to a distinct species, originally described as *O. jentinkii* Popta, 1906 and later considered as a synonym of *D. pleurotaenia* by Karnasuta (1993). Our comparison of fresh material of both nominal species reveals that they are clearly distinct from each other and from all species of *Osteochilus* and we place them in *Diplocheilichthys*. *Lobocheilos rohitoides* Bleeker, 1857 is a synonym of *D. pleurotaenia*.

Diplocheilichthys has the general appearance of a typical *Osteochilus* but differs in details of mouth and lip organisation. The mouth is much wider than in species of *Osteochilus* (about 80 % of interorbital width, vs. about 50 %), the interorbital width itself is relatively wider (almost equal to head width, as a result of a lateral extension of the frontal). The snout is conspicuously protruding (vs. blunt). The lateral part of the lower lip is plicated as in *Osteochilus*, but it is concealed in the interior of the mouth (vs. expanded laterally and exposed). Similarly, the plicated part of the lower lip is not exposed laterally; only a few sparsely set papillae are exposed on the anterior margin. The ventral surface of the lower lip is hard and musculous. The rostral cap entirely covers the upper lip in *D. pleurotaenia* or leaves only the margin of the lip exposed in *D. jentinkii* (vs. the basis only is covered in *Osteochilus*); the rostral cap has a lateral lobe (vs. none).

Weber & de Beaufort (1916: 214) placed *D. pleurotaenia* in *Labeo*. They (1912: 524, 1916: 214) redescribed *L. rohitoides* on the basis of a specimen from Sumatra; they also mention having seen a syntype of *D. jentinkii*. We found no difference between their description of the Sumatra specimen and our material of *D. pleurotaenia*. They redescribed *D. pleurotaenia* on the basis of literature accounts (Bleeker, 1855: 267, syntypes, from Lahat; Volz, 1904, material from upper Langkat) and specimen(s) from the upper and middle Kapuas. We do not wish to discuss the identity of the material in the references they cite. But from the published data and our material, *D. pleurotaenia* is unambiguously recorded from Java and Sumatra. We have examined two juvenile specimens from the Kapuas (CMK 6448, 11680) that we identify as *D. pleurotaenia*. *Diplocheilichthys jentinkii* is known only from the Kapuas drainage (Borneo). Record of *D. jentinkii* from the Mahakam (Roberts, 1989: 52) results from the erroneous placement of the type locality (Bongan). The two species of *Diplocheilichthys* are distinguished as follows:

D. pleurotaenia (Figs. 25a-b): in lateral view, snout pointed, almost triangular; head and body dorsal profile steeply slanted; in lateral view, eye not reaching dorsal profile; numerous small tubercles on tip of snout; mouth arched, lower lip rectangular, length about ½ of width; rostral cap covering median part of upper lip; tip of anal fin reaching end of caudal peduncle; depth of caudal peduncle 1.2-1.4 times in its length; pectoral fin reaching about ⅔ of distance to pelvic-fin origin; 4½ scale rows between lateral line and pelvic-fin origin; body depth 30.7-32.9 % SL. See also Table 3.

D. jentinkii (Fig. 26): in lateral view, snout deep, squarish; head and body dorsal profile glently slanted; in lateral view, eye almost reaching dorsal profile; no tubercle on snout; mouth strongly arched, lower lip squarish, length about ⅔ of width; rostral cap not covering upper lip; tip of anal fin not reaching end of caudal peduncle; depth of caudal peduncle 1.7-1.8 times in its length; pectoral fin almost reaching pelvic-fin origin; 3½ scale rows between lateral line and pelvic-fin origin; body depth 22.9-24.9 % SL. See also Table 3.

See also discussion under *Osteochilus scapularis*.

Material. *Diplocheilichthys jentinkii*: ZRC 49225, 3, 58.3-164.2 mm SL; CMK 16906, 1, 143.4 mm SL; Borneo: Kalimantan Barat: Sungai Sibau. – CMK 11525, 9, 87.3-137.7 mm SL; Borneo: Kalimantan Barat: Sungai Hulu Leboyan.

Diplocheilichthys pleurotaenia: ZRC 42349, 2, 60.3-58.5 mm SL; Sumatra: Jambi: Batang Hari at Perlingat. – ZRC 42371, 2, 50.4-65.6 mm SL; Sumatra: Jambi: Batang Hari at Desa Lounderang. – ZRC 43003, 1, 192.5 mm SL; Sumatra: Sumatera Barat: Sungai Dareh. – ZRC 51767, 2, 99.3-

Table 3. Meristic and morphometric data of *Diplocheilichthys pleurotaenia* (ZRC 43003 [1], ZRC 51767 [2], ZRC 51768 [1]) and *D. jentinkii* (ZRC 49225 [2]).

	D. pleurotaenia	*D. jentinkii*
Standard length (mm)	99.3-192.5	121.0-164.2
Meristics		
Dorsal-fin rays	iii, 11½	iii, 11½
Caudal-fin rays	10+9	10+9
Anal-fin rays	iii, 5½	iii, 5½
Pelvic-fin rays	9	9
Pectoral-fin rays	16	15
Lateral line scales	30+2-3	30-31+3
Scale rows between dorsal-fin origin and lateral line	½6	½6
Scale rows around caudal peduncle	15-16(16)	15
Morphometrics		
In percent of standard length		
Total length	137.3-147.3	140.3-142.6
Head length	24.0-27.5	25.6
Predorsal length	45.7-48.7	43.4-44.6
Prepelvic length	51.5-53.8	49.9-50.5
Preanal length	74.4-78.8	74.8-75.4
Body depth at dorsal-fin origin	30.7-32.9	22.9-24.9
Body depth at anus	23.1-24.3	15.6-17.4
Depth of caudal peduncle	12.9-14.5	10.6-11.0
Length of caudal peduncle	15.7-17.2	17.7-18.3
Length of dorsal-fin base	20.8-25.0	20.4-22.7
Length of anal-fin base	9.4-10.8	9.0-9.2
Length of pectoral fin	22.3-26.4	22.7
Length of pelvic fin	23.3-27.0	22.8-24.6
Length of upper caudal lobe	39.8-45.4	43.2-43.3
Length of lower caudal lobe	36.6-45.1	42.4-44.0
Snout length	12.6-14.0	12.4-13.5
Eye diameter	5.0-6.7	4.9-6.4
Postorbital length	6.5-8.2	5.9-7.0
In percent of head length		
Snout length	48-53	48-53
Eye diameter	21-26	19-25
Postorbital length	25-30	19-27



Fig. 27. *Labeo erythropterus*, about 800 mm SL, 7 kg, not preserved (December 2003); Sumatra: Batang Hari drainage, Pulau Punjung market (upper photograph by Ng Heok Hee).

108.0 mm SL; West Sumatra: Kiliran Jao. – ZRC 51768, 1, 105.1 mm SL; West Sumatra: Pulau Punjung. – CMK 6848, 1, 41.1 mm SL; Borneo: Kalimantan Barat: Kapuas River mainstream at Nanga Embaluh. – CMK 11680, 1, 50.8 mm SL; Borneo: Kalimantan Barat: Sungai Lanjak and Sungai Lanjak Deras.

Labeo erythropterus

Remarks. Recorded from Air Penatai in Kerinci (ZMA 120.816, 395 mm) by Roberts (1993). We have examined one fresh specimen (about 800 mm SL, 7 kg) at Pulau Punjung market at Sungai Dareh (Fig. 27), which fits Bleeker's (1863-64: 52, pl. 106) description and plate.



Fig. 28. *Leptobarbus hoevenii*; **a,** ZRC 49880, 33.0 mm SL; Sumatra: Batang Hari drainage, Jambi; **b,** CMK 11721, 137 mm SL; Borneo: Kapuas drainage, Danau Sentarum.



Fig. 29. *Leptobarbus rubripinna*, ZRC 49881, 135.4 mm SL; Thailand: aquarium trade.

Leptobarbus hoevenii

Remarks. Fry of *Leptobarbus hoevenii* is harvested from the wild and exported for growing out in aquaculture. It is often encountered in the markets as large uniformly sized individuals. The juveniles from Sumatra look very different from those from Indochina, in having a stouter body and smaller eye.

Leptobarbus hoevenii is reported from Java, Sumatra, Borneo, the Malay Peninsula, and the Mekong and Chao Phraya drainages. Bleeker (1851a: 207, 1863-64: 116, pl. 132 fig. 2) and Weber & de Beaufort (1916: 96) described and figured the species (on the basis of Sundaic material) as plain coloured, with a black blotch behind the opercle. Our material from the Batang Hari as well as from Borneo and the Malay Peninsula

(ZRC 2303, 10, collected in 1968, before the beginning of the importation of large quantities of fry from Thailand) agrees with their descriptions. Specimens 30-60 mm SL (ZRC 49880, 41947) have a narrow faint stripe running along the flank, between the lateral line scale row and the row above it. This stripe is missing in specimens over about 100 mm SL (ZRC 38849, 38987, 39040, 39150, 43163, CMK 4761, 11883, 11721) (Figs. 28a-b).

The material from Thailand (Mae Khlong, Chao Phraya and Mekong drainages) is immediately distinguished from the Sundaic one by the presence of a broad midlateral stripe covering most of the scale row above the lateral line scales (Fig. 29). The two species also differ in head shape. In specimens up to at least 160 mm SL, the interorbital area is clearly rounded in the Indochinese specimens (vs. almost flat in the Sundaic ones), in lateral view the head dorsal profile is slightly rounded and symmetric to the ventral profile (vs. straight to slightly concave), the eye is located at mid-depth of head (vs. closer to the dorsal profile), the barbels shorter (posterior maxillary one reaching vertical through middle of eye, vs. beyond posterior margin of eye), the pelvic and anal fins are orange to red (vs. dark grey). The rounded caudal lobes and anal fin of the figured specimen from Thailand (Fig. 29) is possibly due to some extent to it having been in captivity for some time; nevertheless, Smith's (1945) figure shows them more rounded than in the Sundaic material.

We consider that they are distinct species. The Sundaic one is *L. hoevenii* whose type locality is Banjarmasin (Borneo). The Indochinese species is *L. rubripinna* (Fowler, 1937) whose type locality is Kemarat (Thailand, Mekong drainage). The photograph of *L. hoevenii* in Kottelat et al. (1993: pl. 10) shows a specimen of *L. rubripinna* from Thailand and the one in Kottelat (2001: 60; here Fig. 28b) a specimen of *L. hoevenii* from the Kapuas drainage (Borneo).

Leptobarbus rubripinna is cultivated in Thailand and is exported to Malaysia. The fry is also reportedly harvested in the wild in Laos for export. In Sumatra, the fry of *L. hoevenii* is harvested for export to Malaysia.

Material. *Leptobarbus hoevenii*: ZRC 38987, 2, 126.2-149.1 mm SL; ZRC 43163, 3, 170-215 mm SL; ZRC 49880, 27, 28.0-34.3 mm SL; ZRC 50849, 2, 135.2-146.1 mm SL; Sumatra: Jambi. – CMK 4761, 3, 107.9-133.1 mm SL; Sumatra: Jambi. – ZRC 39150, 1, 104.9 mm SL; Sumatra: Berbak. – ZRC 41947, 10, 40.1-63.8 mm SL; Sumatra: Batang Hari in Kampung Rantau Panjang. – ZRC 39040, 2, 113.8-121.2 mm SL; CMK 11883, 1, 97.9 mm SL; Sumatra: Riau: Indragiri drainage: Sungai Bengkwan. – ZRC 2303, 10, 108.8-162.0 mm SL; Malaysia: Pahang: Tasek Bera. – CMK 11721, 2, 137.0-145.0 mm SL; ZRC 38849, 1, 135.7 mm SL; Borneo: Kalimantan Barat: Kapuas drainage: Sungai Piyam. – ZRC 41947, 10, 40.4-64.6 mm SL; Sumatra: Jambi.

Leptobarbus rubripinna: ZRC 49881, 2, 102.3-135.4 mm SL; Thailand: aquarium trade. – CMK 17513, 6, 87.8-92.4 mm SL; Thailand: Mae Khlong.

Additional material examined in the field.

Lobocheilos ixocheilos

Remarks. Described by Kottelat & Tan (2008). Probably the species recorded from Jambi as *L. kajanensis* by and Weber & de Beaufort (1916: 221).

Neobarynotus microlepis

Remarks. Not observed by us. Recorded by Weber & de Beaufort (1916: 120). There is no record of *Neobarynotus* collected after 1976 anywhere in its range, which originally included Borneo, Sumatra, Malaysia, Cambodia and Vietnam (Kottelat & Widjanarti, 2005: 155).

Osteochilus kerinciensis, new species

(Figs. 30a-b)

Holotype. MZB 10711, 129.4 mm SL; Indonesia: Sumatra: Kerinci, Danau Lingkat; H. H. Tan et al., 10 June 1996.

Paratypes. ZRC 42288, 5; MZB 10712, 2; CMK 18914, 3; 115.1-151.0 mm SL; same locality as holotype. – ZRC 42278, 2, 42.2-67.2 mm SL; Kerinci, Sungai Seli; H. H. Tan et al., 11 June 1996. – ZRC 42284, 1, 92.0 mm SL; ZRC 43002, 3, 175-215 mm SL; Kerinci, Danau Kerinci, near outflow into Batang Merangi; H. H. Tan et al., 11 June 1996. – ZRC 43000, 1, 119.0 mm SL; Sungai Dareh.

Diagnosis. *Osteochilus kerinciensis* shares with *O. waandersii* and *O. flavicauda* the black midlateral stripe ending at the posterior extremity of the median caudal-fin rays, which distinguishes them from all other species of the genus. *Osteochilus kerinciensis* is distinguished from these two species by the combination of: three tubercles at tip of snout; red fins; transverse groove across snout which appears as if pushed upwards; mouth

subinferior. See below for further characters distinguishing these three species.

Description. General appearance in Figures 30a-b; morphometric data of holotype and 5 paratypes in Table 4. Dorsal fin with 3 simple and 11-12½ branched rays; origin above lateral line scale 8-9. Pectoral fin rounded to slightly angular, with 15 rays, reaching halfway to pelvic-fin base. Pelvic fin triangular to slightly falcate, with 9 rays, reaching about ⅔ of distance to anal-fin origin; axillary scale present. Anal with 3 simple and 5½ branched rays. Caudal fin with 10+9 principal rays, 9+8 branched. Caudal peduncle 1.41-1.65 times longer than deep. 31-32 + 2-3 scales along lateral line, 10-11 predorsal scales, ½5/1/6½ scales in transverse line, ½3/1/3½ scales in transverse line on caudal peduncle, 4 scales between lateral line and pelvic origin.

Three tubercles at tip of snout, median one much larger and conspicuous than lateral ones. Main plicae on lateral portion of upper lip long unbroken ridges (ectomorph type of Roberts, 1989: 46). Two pairs of maxillary barbels, length about equal to eye diameter. About 39-45 gill rakers on lower arm of first gill arch.

Coloration. Preserved: Body dark brown, paler on belly. Dark and pale areas separated by a midlateral stripe, from upper extremity of gill opening to end of median caudal-fin rays, narrower and fainter anteriorly, margins not discrete. Pale area usually with conspicuous reticulated pattern made of dark marks on scale pockets. Head dark brown above; part below level of lower eye margin pale yellowish brown; also distinct on back, although fainter, in palest specimens. Fins pale grayish brown.

Distribution. *Osteochilus kerinciensis* has been

Table 4. Morphometric data of holotype and 5 paratypes of *Osteochilus kerinciensis*.

	holotype	paratypes				
	MZB 10711	ZRC 42288		ZRC 43002		
Standard length (mm)	129.4	144.0	135.5	212.0	169.8	169.5
In percent of standard length						
Head length	22.6	22.3	22.5	21.8	22.0	22.7
Total length	133.5	131.7	134.4	137.8	132.5	134.1
Predorsal length	46.4	44.0	46.5	44.3	46.3	45.5
Prepelvic length	50.1	48.9	50.0	49.9	48.5	49.3
Preanal length	74.3	74.1	76.7	76.4	73.9	74.3
Head width	13.7	13.8	13.1	12.2	12.6	13.3
Head depth	16.5	16.9	16.3	16.0	16.3	16.8
Body depth at dorsal-fin origin	28.9	28.9	28.2	25.9	28.6	28.0
Body depth at anus	19.6	20.7	19.6	19.3	21.5	21.1
Depth of caudal peduncle	12.0	11.5	11.7	11.7	12.7	12.4
Length of caudal peduncle	17.5	18.0	19.4	17.7	19.6	17.6
Length of dorsal-fin base	28.4	27.3	24.8	27.1	26.7	27.3
Length of anal-fin base	10.2	10.4	10.3	9.5	10.9	9.7
Length of pelvic fin	20.4	19.1	18.3	18.6	19.1	19.1
Length of pectoral fin	19.1	18.4	18.7	17.4	17.9	18.3
Length of upper caudal lobe	34.5	33.8	37.2	39.8	36.6	34.7
Length of lower caudal lobe	33.3	31.9	33.7	38.7	33.5	33.3
Snout length	10.6	10.1	10.0	9.7	10.1	9.9
Eye diameter	4.5	4.2	4.6	3.5	4.1	4.0
Interorbital width	11.0	10.7	10.8	10.2	10.1	9.5
In percent of head length						
Head depth	71	76	73	73	74	74
Head width	59	62	58	56	57	58
Snout length	46	45	45	44	46	44
Eye diameter	19	19	21	16	19	17
Interorbital width	47	48	48	47	46	42



Fig. 30. *Osteochilus kerinciensis*; Sumatra: Kerinci: Danau Lingkat; **a,** MZB 10711, holotype, 129.4 mm SL; **b,** about 150 mm SL, fresh, not preserved (June 1996).

collected in the upper part of the Batang Hari drainage. The bulk of our material is from Lakes Kerinci and Lingkat; a single specimen was obtained at Sungai Dareh.

Etymology. Named for Lake Kerinci.

Remarks. Besides the characters mentioned in the diagnosis, *O. kerinciensis* is distinguished from *O. waandersii* (as discussed below) by: mouth subinferior (vs. inferior), in ventral view, snout slightly or not protruding beyond upper lip (vs. conspicuously protruding); cheek appearing less deep (not quantified, compare figures 30 and 34); head shorter (21.8-22.8 % SL, vs. 23.0-25.8); snout with blunt tip and transverse groove, appearing as if pushed upwards (vs. deep, broadly rounded, without transverse groove); and dorsal head profile about as slanted as ventral one (vs. clearly steeper).

Osteochilus kerinciensis differs from *O. flavicauda* Kottelat & Tan, 2009 by: snout with a transverse fold and tip pushed upwards (vs. rounded, without transverse fold); fins red (vs. yellow); three tubercles at tip of snout (vs. a single tubercle); midlateral stripe faint, especially anteriorly, with unsharp edges (vs. very contrasted throughout, with sharply marked edges); and body with longitudinal rows of spots [pigments on scale pockets] (vs. no longitudinal rows of spots).

Osteochilus scapularis

Remarks. Our material agrees with Karnasuta's (1993: 31) and Roberts' (1989: 47) descriptions of *O. enneaporos* (Bleeker, 1852). But their descriptions and illustrations do not agree with Bleeker's ones. Bleeker (1852c: 596) described the species on the basis of a single specimen from Padang (Sumatra); the holotype is figured natural size in the Atlas (1863-64: 70, pl. 112 fig. 2). Our material is distinguished from Bleeker's in having a much darker body, greater body depth (32.1-37.2 % SL, vs. 28.4 on figure), very falcate dorsal fin (when folded backwards, tip reaching beyond base of last ray, vs. reaching base of 11th branched ray [out of 12½] ray), anal fin strongly falcate (reaching caudal-fin base, vs. reaching about halfway between base of last anal ray and caudal-fin base), midlateral stripe faint, not contrasted against background (vs. contrasted), snout blunt-



Fig. 31. *Osteochilus scapularis*; Sumatra: Batang Hari drainage: Kiliran Jao; **a,** ZRC 49882, 184.4 mm SL; **b,** ZRC 49882, 184.4 mm SL, fresh (December 2003).



Fig. 32. *Osteochilus enneaporos*, BMNH 1866.5.2.172, holotype, 196 mm SL; Sumatra: Padang.

er, more rounded, and 3 tubercles at tip of snout (vs. 9 main tubercles). Specimens over 150 mm have the lower caudal-fin lobe shorter than the upper and rounded, which probably results from damages caused by the substrate (several rays show signs of regrowth) (Fig. 31).

The holotype of *O. enneaporos* (Fig. 32) agrees with the data in Bleeker's text and figure and most of the above characters are confirmed. Its present length is 196 mm SL, the body depth is 28.9 % SL. The dorsal fin has 12½ branched rays; the tip of the last simple ray is broken but reach-

es about the base of the 10th branched ray. The midlateral stripe is still faintly distinct on the remaining lateral line scales of the overal discolered specimen. Most scales are missing, but based on the scale pockets it had about 32-34 + 2 lateral line scales. The tubercles at tip of snout are missing but the sockets are clearly distinct. The 9 tubercles reported by Bleeker in fact are the 3 large tubercles observed in many species of *Osteochilus* and two rows of 3 very small ones immediately above and below.

At this stage, we have not yet been able to identify any fresh material as Bleeker's *O. enneaporos*. If the locality data (Padang) is accurate, then this is not surprising as the numerous small coastal drainages of the Indian Ocean slope of Sumatra seem to be inhabited by their own endemics and they have not yet been surveyed (or the results remain unpublished).

Our material agrees with the original description and figure of *O. scapularis* Fowler, 1939, which had been treated as a synonym of *O. enneaporos* by Karnasuta (1993) and Roberts (1989). Fowler's (1939) figure and description show a deep-bodied fish, with a high, rounded snout, a midlateral stripe distinct only posteriorly and long and falcate dorsal and anal fins. We treat *O. scapularis* as the valid name of the species called *O. enneaporos* by Karnasuta & Roberts. It is distributed in Malay Peninsula (from Trang southwards), Borneo (Kapuas, Sarawak) and Sumatra (Batang Hari).

Osteochilus vittatoides Popta, 1904 (see also Popta, 1906: 94) (Fig. 33), originally described from the Mahakam and Kayan drainages in eastern Borneo, has been treated as a synonym of *O. enneaporos* by Karnasuta (1993: 31) and Roberts (1989: 47) (our *O. scapularis*). Popta's original description largely disagrees on a number of points with our material of *O. scapularis*. Recent material from the Kayan agrees well with Popta's description and we can confirm that *O. vittatoides* differs from *O. scapularis* as follows: dorsal fin concave (vs. very falcate), first branched ray reaching at most base of last one (vs. reaching beyond), more slender body (depth 27.2-29.8 % SL, vs. 32.1-37.2), several very small tubercles on tip of snout (vs. 3 large tubercles), shorter snout (10.3-11.6 % HL, vs. 11.1-13.6; 44-49 % HL, vs. 47-53), more slender caudal peduncle (depth 11.5-12.7 % SL, vs. 13.5-14.8; depth 1.35-1.65 times in its length, vs. 1.11-1.36), tip of first branched anal-fin ray not reaching base of caudal fin (vs. reaching beyond), all fins pale yellowish brown (vs. orange to red), and black midlateral stripe faint and inconspicuous in large adults, and with irregular edges (vs. distinct and with more discrete edges). While all examined *O. vittatoides* have 11½ branched dorsal-fin rays, *O. scapularis* has 11-13½. *Osteochilus vittatoides* is a valid species restricted to eastern Borneo drainages.

Osteochilus vittatoides is distinguished from *O. enneaporos* as described by Bleeker (1852c) by: having the lateral stripe extending to tip of median caudal rays (vs. ending at caudal-fin base), 11½ branched dorsal-fin rays (vs. 12½), yellowish brown fins (vs. reddish-orange).

Material. *Osteochilus enneaporos*: BMNH 1866.5.2.172, holotype, 196 mm SL; Sumatra: Padang.

Osteochilus scapularis: ZRC 49882, 3; CMK 20839, 2; 91.9-184.4 mm SL; Sumatra: Sumatera Barat: Kiliran Jao, H. H. Tan et al., Dec 2003.

Osteochilus vittatoides: ZRC 49883, 11; CMK 18916, 5; 64.5-118.7 mm SL; Borneo: Kalimantan Timur: Kayan drainage, Sungai Mutai; H. H. Tan et al., Nov 1999.

Osteochilus vittatus

Remarks. *Rohita vittata* Valenciennes (in Cuvier & Valenciennes, 1842: 267) and *R. hasseltii* Valenciennes (in Cuvier & Valenciennes, 1842: 274) are simultaneous subjective synonyms. The species has long been known as *O. hasseltii* (at least since Weber de Beaufort, 1916) and therefore Kottelat (1989: 9) gave precedence to *R. hasseltii*. Unfortunately, there is an earlier first reviser act: Guibé & Spillmann (1958: 463) had already realised the synonymy and given precedence to *R. vittata*. Therefore the valid species name is *O. vittatus*.

Weber & de Beaufort (1916: 139) recorded *O. kappenii* (Bleeker, 1857) from Jambi. This species is otherwise known only from the Kapuas drainage, where it replaces *O. vittatus* (Roberts, 1989: 49; Karnasuta, 1993: 66; Kottelat & Widjanarti, 2005: 151). The record from the Baram (Sarawak) by Fowler (1905) refers to *O. kahajanensis* (see Karnasuta, 1993: 66). We have not seen *O. kappenii* in the Batang Hari drainage and we do not include it in our list and we hypothesise that it is a misidentification of *O. vittatus*.

Osteochilus waandersii

Remarks. The Batang Hari collections include two species which key out as *O. waandersii* using Karnasuta's (1993) key. They were obtained in the foothills and highlands. Fresh specimens of

both have a golden to yellowish body with a conspicuous black lateral line reaching to the end of the median caudal-fin rays and orange to reddish fins. One of them is identified as *O. waandersii* and the other, distinguished by its shorter head and with different habitat preferences, is described above as *O. kerinciensis*.

Bleeker (1852d: 733) described *O. waandersii* on the basis of a single specimen 191 mm TL from Bangka, which he figured natural size in the Atlas (Bleeker, 1863-64: 63, pl. 110 fig. 2). Although there are slight differences, the specimens we identify as *O. waandersii* largely agree with Bleeker's holotype, figure and description. The holotype (BMNH 1866.5.2.169; Fig. 34a) has a pointed and less deep snout (vs. blunt in our fresh material; but the snout is less pointed in the actual holotype than on Bleeker's figure); ½6 scales between the dorsal-fin origin and the lateral line (vs. ½5); the cheek appears less deep (not quantifiable, but compare Figures 34b-c). Although the head of our material appears longer than the head of the holotype figured by Bleeker (23.0-25.8 % SL, vs. 21.6), we measure it as 23.9 % SL in the actual holotype.

Our attempts to collect *O. waandersii* on Bangka Island (the type locality) failed. Out of the two Batang Hari species, *O. kerinciensis* is presently known only from the upper part of the drainage and Lake Kerinci; *O. waandersii* was found in the foothills and is also known throughout the Sunda Shelf around Bangka (the Malay Peninsula, Borneo and Java; see, i.a., Kottelat et al., 1993: pl. 13), in similar habitats and we presently have no reason to doubt that the Bangka holotype is conspecific.

Bleeker (1863-64: 68, pl. 113 fig. 2) recognized a second species of *Osteochilus* with a conspicuous black midlateral stripe extending to the end of the median caudal-fin rays under the name *Rohita vittata*, a species originally described by Valenciennes (in Cuvier & Valenciennes, 1842). Karnasuta (1993: 81) treated *R. vittata* as a junior synonym of *O. hasseltii* (see also Kottelat, 1989: 9, see also above). He further commented that *O. vittatus* of Bleeker is mis-identified and in fact is *O. microcephalus*, a point on which we disagree. Bleeker's plate unambiguously shows the black midlateral stripe reaching the posterior extremity of the median caudal rays (as in our material) while it does not extend on the caudal fin in *O. microcephalus*. Bleeker's figure of *O. vittatus* also shows the deep snout and the anterior extremity of the midlateral stripe at upper extremity of the gill opening and at level of upper margin of eye, characters diagnostic of *O. waandersii* as recognized here. We note, however, some variability within the Sundaic material that we identify as *O. waandersii*. Some specimens (including the holotype and the Batang Hari material) are relatively deeper-bodied and with a less contrasted stripe, while others have a more slender and more yellowish body with a more contrasted stripe, more closely resembling the figure of *R. vittata* in Bleeker (1863-64: pl. 113 fig. 2) (see figure in Kottelat et al., 1993: pl. 13). This suggests that two species might be involved, but we are unwilling to be definitive on this issue before seeing topotypes of *O. waandersii*.

In the attempt to clear the identity of *O. waandersii*, we examined various material from the Malay Peninsula earlier identified as *O. waandersii*, *O. microcephalus* 'yellow fins' or *O. enneaporos* 'yellow fins' (e.g., Zakaria-Ismail, 1987; Ng & Tan, 1999). This materials is described elsewhere as *O. flavicauda* Kottelat & Tan, 2009. The specimen from Pattani (Thailand) illustrated as *O. waandersii* by Karnasuta (1993: 30, fig. 13) apparently belongs to *O. flavicauda*, as does the fish figured by Smith (1945: 216, pl. 6) as *O. vittatus*. The material from the Mekong drainage identified as *O. waandersii* by Kottelat (1998: 45; 2001: 66) should now be compared with the Sundaic material. Should it turn out to represents a distinct species, the name *O. soplaoensis* (Fowler, 1934) is available for it.

Material. BMNH 1866.5.2.169, holotype, 152 mm SL; Indonesia: Bangka: Toboali Prov. – ZRC 49884, 1, 204 mm SL; Sumatra: Sumatra Barat; Kiliran Jao. – ZRC 45535, 8, 32.8-90.0 mm SL; Kalimantan Timur: Kayan. – ZRC 38886, 1, 64.1 mm SL; CMK 11865, 4, 56.0-72.3 mm SL; Kalimantan Tengah: Barito. – ZRC 42782, 1, 127.3 mm SL; Malaysia: Johor: Sungai Kahang. – ZRC 42642, 6, 51.8-112.6 mm SL; Malaysia: Pahang: Sungai Kinchin. – ZRC 1889, 1, 183 mm SL; Malaysia: Perak: Bukit Mehra Reservoir. – ZRC 41861, 1, 131.3 mm SL; CMK 8130, 1, 49.9 mm SL; Malaysia: Terengganu: Sungai Brang.

Pectenocypris micromysticetus, new species
(Figs. 35a-c)

Holotype. MZB 10993, 43.0 mm SL; Sumatra: Jambi: Danau Semangkat, a lake connected to Batang Hari by Sungai Bangko, opposite Kampung Senaning; M. Kottelat, 6 June 1994.



Fig. 33. *Osteochilus vittatoides*, ZRC 49883, 118.7 mm SL; Borneo: Kayan drainage (right side, reversed).



Fig. 34. *Osteochilus waandersii*; **a,** BMNH 1866.5.2.169, holotype, 152 mm SL (right side, reversed); Bangka; **b,** ZRC 42642, 103.7 mm SL; Malaysia: Pahang: Ulu Kinchin; **c,** ZRC 49884, 204 mm SL; Sumatra: Batang Hari drainage, Kiliran Jao, fresh (December 2003).



Fig. 35. *Pectenocypris micromysticetus*; **a,** MZB 10993, holotype, 43.0 mm SL; Sumatra: Batang Hari drainage, Danau Semangkat; **b,** ZRC 51759, fresh, about 36 mm SL, Sumatra: Batang Hari drainage: Danau Arang Arang (July 1997); **c,** ZRC 38675, 41.7 mm SL, opercle removed to show gill rakers (right side, reversed).

Paratypes. ZRC 38675, 48; MZB 6001, 10; CMK 11248, 40; 31.8-44.9 mm SL; same data as holotype. – ZRC 51758, 46, 31.7-43.2 mm SL; Sumatra: Jambi, Pijoan, Danau Souak Padang; H. H. Tan et al., 8 Jun 1996.

Additional material (non types)**.** ZRC 38670, 27; CMK 11242, 27; 14.4-22.6 mm SL; Sumatra: Jambi: Danau Kiri, a lake connected to Batang Hari by Sungai Bangko, opposite Kampung Senaning; M. Kottelat, 6 June 1994. – ZRC 38532, 11; CMK 11092, 10; 11.5-25.5 mm SL; Sumatra: Jambi: Danau Arang Arang; M. Kottelat & H. H. Tan, 29 May 1994.

Diagnosis. *Pectenocypris micromysticetus* is distinguished from *P. korthausae* Kottelat, 1982 in having more gill rakers on the anterior gill arch (45-70 + 120-170, vs. 20-35 + 75-100; see also Remarks) and an elongate blotch at middle of caudal-fin base and end of caudal peduncle (vs. rounded to triangular, occupying ½-⅔ of depth of caudal peduncle). It shares the high number of gill rakers with *P. balaena* Roberts, 1989, from which it is distinguished by the absence of or only very faint midlateral stripe on the body (vs. presence) and the presence of a conspicuous, elongated black

blotch at caudal-fin base (vs. no blotch or only a small blackish dot terminating the mid-lateral stripe).

Description. See Figs. 35a-b for overall appearance, and Table 5 for morphometric data of holotype and 9 paratypes. Body slender, compressed. Body depth about equal to head depth. Dorsal outline of body slightly arched; ventral outline straight to slightly convave between head and anus, then slanted and straight to caudal-fin base. Mouth terminal, lower jaw slightly projecting. Gill rakers long, very thin, very densely set and difficult to count with accuracy. Counted in 4 specimens: ZRC 38675, 44.9 mm SL, about 70+170; ZRC 38675, 41.7 mm SL (Fig. 35c), about 67+160; ZRC 38675, 32.5 mm SL, about 55+150. In ZRC 38532, 25.4 mm SL, at least 45+120. Number of gill-rakers possibly increasing with SL.

Dorsal fin with 2 simple and 6 or 7 branched rays; last ray short (not easily distinguishable), slender, not branched, not articulating on same pterygiophore as ray 6; origin above pelvic-fin origin. Pectoral fin short, rounded, reaching about ⅔ of distance to pelvic-fin base, with 12-14 rays; no axillary lobe. Pelvic fin triangular, slightly pointed, reaching to or almost to anus, with 8 rays; axillary scale present, not significantly longer than other scales. Anal with 3 simple and 5½ branched rays; posterior edge concave. Caudal fin deeply forked, with pointed lobes, with 10+9 principal rays, 9+8 of them branched. Caudal peduncle 1.8-2.1 times longer than deep.

Scales fragile, many missing in preserved specimens. Lateral line incomplete, perforating 7 or 8 scales; lateral line row scales 28-29 + 2-3. 11-12 predorsal scales, ½8½ scales in transverse line (counted 2 scale rows in front of pelvic-fin base), ½5½ scales in transverse line on caudal peduncle, 1 scale between lateral line row and pelvic-fin origin.

Table 5. Morphometric data of holotype (MZB 10993) and 9 paratypes (ZRC 38675) of *Pectenocypris micromysticetus*. Holotype values included in range. H, holotype.

	H	range	mean
Standard length (mm)	43.0	40.7-44.9	
Total length (mm)	55.3	53.1-57.3	
In percent of standard length			
Head length	27.8	26.4-28.9	27.6
Predorsal length	52.7	52.2-55.7	53.9
Prepelvic length	51.8	51.7-56.0	53.4
Pre-anal length	72.7	71.9-76.3	73.8
Head depth	16.0	15.3-16.6	16.0
Body depth at dorsal-fin origin	17.9	17.8-19.2	18.3
Depth of caudal peduncle	10.6	9.8-10.7	10.2
Length of caudal peduncle	20.7	19.0-21.2	20.2
Snout length	8.0	6.8-8.7	7.8
Eye diameter	8.0	7.2-8.6	7.8
Interorbital width	9.4	8.7-9.4	9.0
Dorso-hypural distance	49.0	45.1-49.0	47.0
In percent of head length			
Snout length	29	24-31	28.1
Eye diameter	29	26-31	28.2
Interorbital width	34	30-34	32.7

Coloration. After fixation in formalin and storage in ethanol. Body yellowish brown, darker on dorsal half. Somewhat darker in middle of body, resulting in a very vague stripe, sometimes distinct on caudal peduncle, margined above by a paler stripe (after storage in ethanol, midlateral area of anterior part of body appears darker but this is mostly an artefact; because of dehydration due to ethanol, a pleat is formed in this area and the shade appears as a stripe). A thin black axial streak from caudal-fin base forwards until vertical of dorsal fin. A thin black mid-dorsal stripe from head to caudal-fin base. A thin black stripe from anus to caudal-fin base, running along anal-fin base and mid-ventral outline of caudal peduncle. Head yellowish brown, darker dorsally, with an unpigmented area forming a semi-circular patch around lower half of eye.

A conspicuous black blotch at posterior extremity of caudal peduncle and caudal-fin base, elongate, about twice longer than deep, occupying about ¼ of depth of caudal peduncle. Blotch surrounded by a paler, reddish area, more conspicuous above and below. Fins hyaline, with scattered black pigments in proximal areas of rays, and along edges of rays.

In life. Body greyish brown. An iridescent stripe above axial streak, between gill opening and caudal blotch.

Distribution. *Pectenocypris micromysticetus* is presently known only from the Batang Hari drainage. It is common in oxbow lakes and still pools in open or recently flooded areas.

Etymology. From the Greek μικρος (mikros), small, μύσταξ (mustax), moustache, and κήτος (kêtos), sea monster (by extension, the Latin *cetus*,

large sea-animal, gave rise to the biological word ceatacea, the whales). Allusion to the numerous gillrakers appearing like baleen plates of mysticete whales. A noun in apposition.

Remarks. We have several samples of small-size *Pectenocypris*, which we tentatively refer to *P. micromysticetus*. The gill-rakers are very difficult to count, but specimens around 15-20 mm SL have about 70-120 gill rakers on the upper limb of the first gill arch (ZRC 38670, CMK 11242). The data reported above suggest that there is some increase of the number of gill rakers with size, but it is not clear if this increase could be as large as from about 70-120 at 15-20 mm SL to about 150-170 at 32-45 mm SL.

The lowest gill-raker counts are within the range known in larger, adult *P. korthausae* (20-35 + 75-100 at 20-30 mm SL; Kottelat, 1982; Roberts, 1989; pers. obs.) but these specimens are not *P. korthausae*. Compared side by side with topotypes of *P. korthausae* of about similar size they have a different head and body shape, with the head depth at nape greater than depth at dorsal-fin origin (vs. about identical or somewhat smaller in *P. korthausae*), body outline between head and pelvic-fin base slightly concave or straight (vs. slightly convex), a more rounded dorsal outline of head, and a stouter caudal peduncle (deeper; not quantified). Subjectively, these specimens give the impression of juveniles while at a similar size (about 18-22 mm SL) *P. korthausae* gives an 'adult' impression. To date, *P. korthausae* is not known to exceed 35 mm SL (45 in *P. micromysticetus*); it is known only from Kalimantan Tengah.

Comparison material. *Pectenocypris balaena*: ZRC 51757, 49, 26.5-37.5 mm SL; Borneo: Kalimantan Barat: Kapuas drainage: Lake Sentarum area: Danau Lebuyan.

Pectenocypris korthausae: ZRC 22856, 5, 21.1-29.3 mm SL; Borneo: Kalimantan Tengah: Mentaya drainage. – ZRC 51755, 51; CMK 20819, 52; 22.2-27.2 mm SL; Borneo: Kalimantan Tengah; Kahayan drainage.

Puntius sp. 'Bertam'

Remarks. A member of the *P. binotatus* group, known from Sumatra and Malay Peninsula (Kottelat & Lim, in prep.).

Puntius sp. 'Kerinci'

Remarks. A member of the *P. binotatus* group, endemic to the Indragiri and Batang Hari drainages, found primarily in volcanic lakes Danau di Atas, Gunung Tujuh and Kerinci (Kottelat & Lim, in prep.). This species and *Homaloptera gymnogaster* are the highest altitude fish in Sumatra, found in Danau Gunung Tujuh at 1950 m a.s.l.

Raiamas guttatus

Remarks. New record for Sumatra (see Fig. 36). Restricted to headwaters and foothill rivers.

Material. ZRC 51776, 1, 212.0 mm SL; Sumatra: Sumatra Barat, Kiliran Jao. – ZRC 51784, 2, 86.4-126.0 mm SL; Sumatra: Sumatra Barat, Sungai Dareh.

Rasbora brittani

Remarks. New record for Sumatra and first record since original description. The species was based on aquarium specimens, reportedly from Johor River at Segamat, Malaysia (Axelrod, 1976), where, despite several attempts, we have not been able to find it. We cannot exclude that these locality information are erroneous.

The generic placement of this species requires confirmation. It is missing the symphysal knob in the lower jaw, which is otherwise known in all other rasborines.

Rasbora sumatrana

Remarks. This species is found at the foot of Gunung Tujuh and is the species of *Rasbora* found in the highest altitude in Sumatra (Fig. 37). As re-diagnosed in Kottelat et al. (1993: 48 [65], pl. 20), *R. sumatrana* is restricted to the fast flowing streams of the interior of Sumatra. It is recorded only from the Batang Hari and Indragiri drainages. Even so, the identity of the various populations of *R. sumatrana* is not yet clear. We observe variability between populations, but the number of populations available for study is too small to reach conclusions and we tentatively retain all in the same species. The type locality is Solok, in the Indragiri drainage.

The name *R. sumatrana* has been used for a variety of species in Southeast Asia. The Indochinese *'R. sumatrana'* are now recognised as *R. paviana* Tirant, 1885 (see Kottelat, 2001), those from the Malay Peninsula as *R. vulgaris* Duncker, 1904 and *R. notura* Kottelat, 2005. Examination of fresh



Fig. 36. *Raiamas guttatus*, ZRC 51776, 212.0 mm SL, fresh (December 2003); Sumatra: Batang Hari drainage, Kiliran Jao.



Fig. 37. *Rasbora sumatrana*; **a,** ZRC 42289, 57.0 mm SL; Sumatra: Batang Hari drainage, Danau Lingkat; **b,** CMK 4642, 66.6 mm SL; Sumatra: Indragiri drainage: Solok.

material from Sarawak and Kalimantan Barat shows that they differ from *R. sumatrana* s.s. as follow: the pelvic-fin origin is separated from the lateral line scale row only by the axillary scale (vs. by one scale row plus the axillary scale); the tip of the anal fin is pointed (vs. blunt); the interorbital area is almost flat (vs. convex in *R. sumatrana*); in lateral view, the dorsal profile of the head is straight to slightly concave, with the tip of the snout often slightly turned upwards (vs. convex, with the snout pointed forwards); the midlateral stripe is often incomplete (when complete then usually not very contrasted, or faint anteriorly), running below the axial streak and separated from it by a pale area at the level of the dorsal-fin origin, and ending in a faint widened



Fig. 38. *Rasbora hosii*; **a,** BMNH 1894.8.3.65, lectotype, 80.2 mm SL; Borneo: Sarawak: Baram River (copyright: Natural History Museum, London); **b,** CMK 10920, 48.2 mm SL; Borneo: Sarawak: Sungai Semabang.

patch at the end of the caudal peduncle (vs. beginning above the pelvic-fin origin, running along or over the axial streak for all its length, ending in a small vertically elongated black dot at caudal-fin base); the scales below the midlateral stripe have a dark pocket and a black edge forming a reticulated pattern, but they are not covered by pigments (vs. at least half of the exposed part of the scales immediately under the anterior extremity of the midlateral stripe dark brown, sometimes even appearing as a diffuse brownish blotch); the caudal fin has a black margin and in many populations the tip of the lobes is black (vs. no black marking on caudal fin); and 17-18 + 15-17 = 33-35 vertebrae (vs. 17 + 14-16 = 31-33 [Kottelat & Vidthayanon, 1993]).

In most aspects, the Sarawak *'R. sumatrana'* agrees with the description of *R. hosii* Boulenger, 1895, but it disagrees in having the pectoral fin reaching the pelvic fin (vs. not) and 24-25 + 2 lateral line scales (vs. 28-29). We have examined photographs and radiographs of the syntypes of *R. hosii* (BMNH 1894.8.3.65-66). The 80.2 mm SL (BMNH 1894.8.3.65) syntype (here designated as lectotype; Fig. 38a) shares all the diagnostic characters of our Sarawak *R. 'sumatrana'*, except for the colour marks, which are all faded or missing on the broken caudal fin. Some scales still have the distinct black posterior edge. The pectoral fin is broken but was probably not reaching the pelvic-fin base. There are 26+2 lateral line scales. The 86.3 mm SL paralectotype is less well preserved and more scales are missing. We conclude that *R. hosii* is the valid name of the Sarawak *R. 'sumatrana'* (Fig. 38b). The type locality of *R. hosii* is the Baram River (Sarawak) and we have examined material from adjacent drainages in Brunei. The Sabah material listed by Kottelat & Vidthayanon (1993) as *R.* cf. *sumatrana* is an unnamed species (Kottelat & Tan, in prep.).

Material. *Rasbora hosii*: ZRC 39379, 2, 49.9-61.9 mm SL; Borneo: Sarawak: Kuap (1°25'08.9"N 110°20'52.9"E). – CMK 10920, 2; Borneo: Sarawak: Sungai Semabang. – ZRC 42725, 20, 19.1-76.9 mm SL; Borneo: Brunei Darus-

salam: Belait District: Sungai Ingei. – ZRC 38826, 6, 36.9-62.2 mm SL; CMK 11685, 25, 33.6-75.5 mm SL; Borneo: Kalimantan Barat: Sungai Lanjak. – ZRC 39385, 15, 43.0-74.7 mm SL; Borneo: Sarawak: Matang: Sungai Cina Matang.

Rasbora sumatrana: ZRC 42289, 20, 16.6-58.4 mm SL; Sumatra: Kerinci, Danau Lingkat. – ZRC 42279, 4, 37.9-45.6 mm SL; Sumatra: Kerinci: Sungai Seli. – ZRC 42273, 2, 22.7-42.1 mm SL; Sumatra: Kerinci: Sungai Jalnei Dalam, at base of Gunung Tujuh. – CMK 4642, 10; Sumatra: Sumatera Barat: Solok.

Schismatorhynchos heterorhynchos

Remarks. *Schismatorhynchos heterorhynchos* is restricted to headwater and foothill rivers in Sumatra (Indragiri, Batang Hari, Musi) and Kalimantan Barat (Upper Kapuas) (Siebert & Tjakrawidjaja, 1998; pers. obs.). The juveniles have a violet sheen on the body with reddish fins (Fig. 39a) and adults are dark purple-grey with grey fins (Fig. 39b).

Tor tambroides

Remarks. *Tor tambroides* is cultivated in Kerinci (apparently grown up in cages from wild caught juveniles) and is a popular food fish, but local populations have declined due to overfishing.

Trigonostigma hengeli

Remarks. *Trigonostigma heteromorpha* (Duncker, 1904) is found from the Indragiri drainage northwards and *T. hengeli* is known from the Batang Hari drainage and possibly occurs further south. *Trigonostigma hengeli* was recently obtained from the area of Pontianak, Kalimantan Barat, Borneo (Kottelat & Witte, 1999). We have examined material of all named species and all known populations of *Trigonostigma* and for the time being retain *T. hengeli* as the name of the species occuring in the Batang Hari drainage in Sumatra and the coastal peat swamps of Kalimantan Barat.

Family Balitoridae

Homaloptera gymnogaster

Remarks. Highland species relatively common in riffles and quiet waters of Sumatra. Highest altitude balitorid in Sumatra, found at 1950 masl in Danau Gunung Tujuh.

Neohomaloptera sp.

Remarks. Differs from *N. johorensis* chiefly in body coloration and longer nasal barbel. The Batang Hari collections include a single specimen 14.9 mm SL from Sungai Ayer Merah, near Pijoan.

Family Nemacheilidae

Nemacheilus cf. *kapuasensis*

Remarks. Obtained only from upstream area. We have only one sample of five specimens in poor state that we tentatively refer to *N. kapuasensis*. They do not belong to any of the nominal species of the genus known from Sumatra. The identity of *N. jaklesii* (Bleeker, 1852c) is still not clear, but the present specimens do not belong to *N. jaklesii*. Bleeker (1852c) described *N. jaklesii* with 11 or 12 bars and in 1863-64 he figured it with 12 very narrow and widely spaced bars, while the present specimens have 11-13 bars wider than the interspaces or a row of saddles along the back more or less connected to a row of blotches along the lateral line.

Material. ZRC 41561, 5, 48.7-54.3 mm SL; Sumatra: Sumatera Barat: Sungai Dareh, Pulau Punjung market (bridge – 0°57'53.9"S 101°30'18.9"E).

Nemacheilus longipinnis

Remarks. The Batang Hari collections include a single specimen with totally white body except for a faint midlateral stripe and a black spot at middle of caudal-fin base. This is the colour pattern of large individuals of *N. lactogeneus* Roberts, 1989 as figured by Kottelat et al. (1993: pl. 25). The original description and illustration do not mention or show the faint stripe, but as the material figured by Kottelat et al. (1993) comes from the same area (Kapuas River upstream of Sintang) we consider this as intraspecific variation. We also have seen material conspecific with the Bornean one from Sumatra (unfortunately with unprecise locality data: Seberida, either in Indragiri or Kampar Kiri drainages).

Nemacheilus longipinnis Ahl, 1922 was described from central Sumatra (without precise locality data) on the basis of a single, poorly preserved specimen without any colour pattern (Kottelat et al., 1993: 55 [76], fig. 139). The species has not been reported since (see Kottelat, 1984).

The holotype is noteworthy for its very large eye (15 times in SL, 3.2 times in HL). In our specimen, the eye diameter is 15.7 times in SL and 3.3 times in HL (SL 34.5 mm, HL 7.3 mm, eye diameter 2.2 mm) and with the limited available material we identify it as *N. longipinnis*. In the three Seberida specimens the eye diameter is 15.1-19.8 times in SL and 3.6-3.9 times in HL and we conclude that they are conspecific with the Jambi specimen. Roberts (1989: 107) records that the eye diameter is 18.9-19.8 times in SL for the two types of *N. lactogeneus*. Our only three adult and subadult specimens from the Kapuas drainage have the eye diameter 14.6-18.4 times in SL and 3.4-4.2 times in HL. The comparison of our small samples suggests that the Kapuas material too (*N. lactogeneus*) might be conspecific with *N. longipinnis*. The only difference we observed is that the eyes are slightly more dorsally located eyes and the interorbital area is flat (vs. slightly convex) in the Kapuas material.

Material. ZRC 42303, 1, 34.5 mm SL; Sumatra: Jambi: Sungai Alai. – CMK 8354, 3, 51.5-61.2 mm SL; Sumatra: Riau: vicinity of Seberida. – CMK 6890, 37, 13.2-53.4 mm SL; Borneo: Kalimantan Barat: Kapuas River mainstream at Teluk Ujung Bayur. – CMK 10462, 5, 16.7-51.8 mm SL; Borneo: Kalimantan Barat: Sungai Kapuas at Nanga Al-Fazal.

Nemacheilus papillos, new species
(Figs. 40-41)

Holotype. MZB 10994, 55.3 mm SL; Sumatra: Sumatera Selatan: Sungai Sentang near Desa Sukajaya, about 5 km from road (turn-off at about 12 km on road from Bayung Lencir to Jambi; H. H. Tan, 27 July 1997.

Paratypes. ZRC 43096, 6, 47.3-55.7 mm SL; ZRC 51760, 1, 56.5 mm SL; same data as holotype. – ZRC 42398, 15, 17.6-40.2 mm SL; CMK 13019, 4, 37.5-39.1 mm SL; Sumatra: Jambi: Sungai Pijoan main confluence; before entry in Danau Souak

Table 6. Morphometric data of holotype (MZB 10994) and 4 paratypes (ZRC 43096) of *Nemacheilus papillos*.

	holotype	paratypes			
Standard length (mm)	55.3	55.7	52.4	52.8	50.4
In percent of standard length					
Total length	133.1	136.4	135.9	134.1	134.9
Head length	20.1	20.1	19.8	20.3	25.0
Predorsal length	47.0	47.9	46.6	47.3	48.4
Prepelvic length	49.9	50.1	49.4	50.6	49.0
Preanal length	76.5	78.3	76.3	78.2	77.8
Head width	13.7	13.1	12.8	13.1	13.9
Body depth at dorsal-fin origin	14.5	15.3	15.3	20.3	14.3
Body width at dorsal-fin origin	9.8	10.1	11.3	9.5	9.1
Depth of caudal peduncle	11.4	12.0	12.2	11.2	12.1
Length of caudal peduncle	12.8	16.2	13.9	13.1	14.9
Length of base of dorsal fin	20.6	21.2	22.1	19.7	21.8
Length of base of anal fin	8.5	10.4	11.1	11.6	11.3
Length of pelvic fin	15.9	17.8	18.1	18.4	17.7
Length of pectoral fin	25.5	22.6	23.5	22.7	26.0
Length of upper caudal lobe	35.4	33.9	38.2	34.7	–
Length of median caudal rays	19.9	22.4	18.1	18.4	17.7
Length of lower caudal lobe	32.0	–	34.2	33.7	34.7
Snout length	8.9	9.3	9.2	9.1	9.3
Eye diameter	5.2	5.2	4.6	4.7	5.4
Interorbital width	6.7	7.0	6.5	6.4	6.9
In percent of head length					
Head width	69	65	64	65	56
Snout length	44	46	46	45	37
Eye diameter	26	26	23	23	21
Interorbital width	33	35	33	32	28



Fig. 39. *Schismatorhynchos heterorhynchos*; Sumatra: Batang Hari drainage, Kiliran Jao; **a,** ZRC 51777, about 100 mm SL, fresh (Dec 2003); **b,** ZRC 51777, about 240 mm SL, fresh (Dec 2003).

Padang; H. H. Tan et al., 8 Jun 1996. – ZRC 43034, 14, 20.6-28.1 mm SL; Sumatra: Jambi: Leibong Sepbaju, stream in swampforest; H. H. Tan, 21 Nov 1996.

Diagnosis. *Nemacheilus papillos* is distinguished from the other species of the genus on the Sundaic area by having strongly papillated lips (Fig. 41), the anterior nostril at the tip of a short tube and the colour pattern consisting in 10-11 bars, much wider at level of lateral line, bars behind dorsal-fin origin fused at level of lateral line. The following characters are useful for identification, although none is unique to the species: no acuminated scales on caudal peduncle; black bar across eye; black blotch at base of anterior dorsal-fin rays; caudal forked, upper lobe longer than lower one; no sexual dimorphism; caudal-fin with 9+8 branched rays.

Description. See Figure 40 for general appearance and Table 6 for morphometric data of holotype and 4 paratypes. A moderately elongate nemacheiline with body depth about equal from nape to caudal-fin origin, only sligthly tapering on caudal peduncle. Interorbital area flat, in lat-



Fig. 40. *Nemacheilus papillos*, MZB 10994, holotype, 55.3 mm SL; Sumatra Selatan: Sungai Sentang (right side, reversed).

eral view eye flushed with dorsal profile of head. Head slightly compressed; body slightly compressed anteriorly to compressed posteriorly. Pectoral fin reaching or almost reaching pelvic-fin base. Axillary pelvic lobe present. Pelvic fin almost reaching anus, which is about one eye diameter in front of anal-fin origin; origin under base of branched ray 2. Caudal fin forked, upper lobe clearly longer than lower one. Low ventral and dorsal adipose crests at posterior extremity of caudal peduncle which is 1.18-1.31 times longer than deep. Distal margin of dorsal fin straight. Largest recorded size 56 mm SL.

D 4/9½. A 3/5½. C /9+8/. P 15. V 7.

Body covered by small embedded scales, except belly in front of pectoral-fin base. Lateral line complete, with about 94-111 pores (difficult to count with accuracy). Cephalic lateral line system with 6 supraorbital, 4+12 infraorbital, 9-10 preoperculo-mandibular and 3 supratemporal pores.

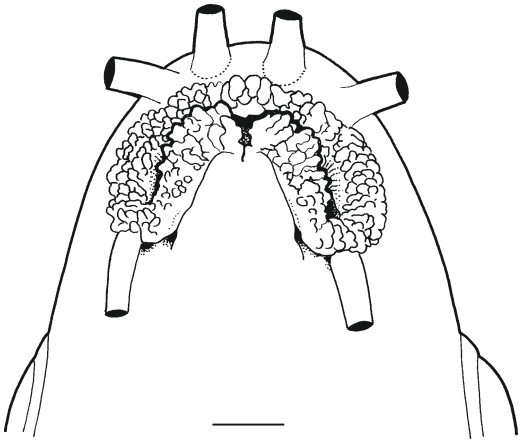


Fig. 41. *Nemacheilus papillos*, ZRC 43096, 54.1 mm SL; mouth. Scale bar 1 mm (drawing by Kelvin Lim).

Anterior nostril at tip of a short tube. Mouth gape about 2 times wider than long (Fig. 41). Both lips strongly papillated. A narrow median interruption in lower lip. Processus dentiformis present, pointed. No median notch in lower jaw. Inner rostral barbel reaching vertical through middle of eye; both outer rostral and maxillary barbels reaching about midway between eye and posterior margin of opercle. Intestine with a loop immediately behind stomach.

Sexual dimorphism. None observed.

Coloration. Colour pattern is shown on Figure 40. Body yellowish to light brown. Ten to 11 dark brown bars on body, wider than interspaces, wider at level of lateral line, bars behind vertical of dorsal-fin origin fused on lateral line, anterior bars sometimes vertically split below lateral line; bars joining across dorsal midline, not joining across ventral midline. Black marking at caudal-fin base (sometimes faint) made of a round or vertically elongated black spot at extremity of lateral line, a spot at base of lowermost principal rays and an elongated, oblique blotch along base of upper rudimentary rays. Two or three bars across top of head, anterior one across eye and continuing on cheek. Snout dark brown.

All fins hyaline. Dorsal fin with a large dark grey blotch at base of anterior rays and two or three irregular rows of spots on rays. Caudal fin with 3-5 irregular rows of spots on rays. In a few of the largest specimens, pelvic and anal fins sometimes with a faint row of spots, pectoral fin with blackish 2-3 anterior rays.

In juveniles (about 20-30 mm SL), bars narrower, as wide as interspaces, not connected at level of lateral line; pattern at caudal-fin base distinct.

Distribution. *Nemacheilus papillos* is presently known only from the lower Batang Hari drainage and the adjacent Sungai Lalang (or Lalan, depending of maps) in the Musi drainage.

Etymology. Papilla (Latin), bud; os, oris (Latin), mouth. A noun in apposition.

Remarks. *Nemacheilus papillos* is distinguished from all species of *Nemacheilus* in having papillated lips (vs. smooth or slightly plicated). It is also distinguished from most in having the anterior nostril at the tip of a short tube (vs. in the anterior side of a small flap-like tube); this last character is shared with *N. selangoricus* Duncker, 1904, *N. spiniferus* Kottelat, 1984, *N. longipectoralis* Popta, 1905, *N. tuberigum* Hadiaty & Siebert, 2001 and *N. pfeifferae* (Bleeker, 1853a). The pattern of black marks at the base of the caudal fin is shared only with *N. saravacensis* Boulenger, 1894, from which it is distinguished by having 9+8 branched caudal-fin rays (vs. 8+8) and the colour pattern of 10-11 bars connected at the level of the lateral line (vs. 13-17 irregular blotches along lateral line, more or less connected with saddles along the dorsal midline; see Kottelat et al., 1993: pl. 26).

Nemacheilus papillos also has similarities with *N. selangoricus* and *N. spiniferus* (elongated upper caudal lobe, colour pattern on caudal and dorsal fins, black bar across eye), but it is distinguished in missing the acuminated scales on the caudal peduncle, in missing the suborbital flap in male, and in having a black pattern at caudal-fin base made of an upper, a median and a lower spots (vs. lower and median spots continuous).

Nemacheilus papillos is also distinguished from *N. tuberigum* in missing the acuminated scales on the caudal peduncle and in missing the suborbital flap in male (data for *N. tuberigum* from Hadiaty & Siebert, 2001).

Modigliania papillosa Perugia, 1893 is a species of the genus *Nemacheilus* whose identity is still unclear. It is distinguished from *N. papillos* by the presence of a suborbital flap (vs. absence) (Kottelat, 1984).

Nemacheilus jaklesii was originally described from Payakumbuh (Indragiri drainage, Sumatra). As described and figured by Bleeker (1852c: 604; 1863-64: 7, pl. 103 fig. 5), it has a colour pattern (13-20 regular bars on body) and the black basal caudal marks somewhat similar to that of *N. fasciatus*.

See Kottelat (1984) for comparison material. Besides, we have examined 23 additional samples of *Nemacheilus* from throughout Sumatra and have not observed any with papillated lips. The examined material includes topotypes of *N. pfeifferae* and *N. papillosa* and localities in the area of the type locality of *N. jaklesii*.

Nemacheilus pfeifferae

Remarks. Highland species only known from Sumatra (Kottelat et al., 1993). On caudal peduncle, on each side of lateral line, a row of ovoid

scales, each with a tubercle at tip of exposed part; a less developed form of the acuminate scales of *N. selangoricus* and *N. spiniferus* but similar to the condition described in *N. tuberigum* by Hadiaty & Siebert (2001). On the flank, between the lateral line and the base of the pelvic fin, there are several rows of scales in which each scale has a small tubercle.

Family Botiidae

Syncrossus reversus

Remarks. Bleeker's figure of *S. hymenophysa* in the Atlas (1863-64: pl. 102 fig. 3) shows a fish with 10 branched rays and no blotch at tip of dorsal fin, which actually is *S. reversus*. The original description of *S. hymenophysa* (Bleeker, 1852c) is based on a single specimen from Palembang (which is in the lowlands) with 12 or 13 branched dorsal-fin ray and thus is not *S. reversus*, which has 10-11 branched rays and inhabits the uplands areas.

Family Cobitidae

Pangio atactos, new species
(Fig. 42)

Holotype. MZB 10995, 41.2 mm SL; Sumatra: Jambi: Danau Kamining near Kampung Trasos, ca. 5 km to southwards on unpaved road turning-off from Muara Bungo – Muara Tebo road at km 36; M. Kottelat & H. H. Tan, 31 May 1994.

Paratypes. MZB 10996, 2, 22.1-33.0 mm SL; ZRC 51763, 5, 23.3-44.5 mm SL; CMK 11132, 5, 18.9-45.6 mm SL; same data as holotype. – ZRC 51764, 2, 48.6-50.6 mm SL; Sumatra: Jambi: Sungai Pijoan, upriver of Pijoan; from aquarium fish collectors; M. Kottelat, 8 June 1994. – ZRC 42421, 2, 17.5-44.5 mm SL; second stream on road towards Muara Bulian, near junction at crossroads towards Palembang, Muara Bulian and Jambi (1°47'44.4"S 103°25'16.1"E); H. H. Tan et al., 7 June 1996.

Diagnosis. *Pangio atactos* is distinguished from all other congeners by its distinctive body colour pattern consisting of 7-9 irregular triangular saddles along the dorsal midline alternating with a row of spots or blotches on the middle or lower half of the body. Each saddle usually has a pale rounded or transverse central area on dorsal midline. It has similarity only with *P. superba* in which the saddles are divided by a longitudinal pale area forming a more or less continuous pale stripe from the head to the base of the caudal fin.

Description. General body shape and appearance are shown in Figure 42. All large size specimens are strongly arched, so that measurements are difficult to duplicate. Morphometric data of holotype (41.2 mm SL) are given here, only with indicative value: total length 47.2 mm; head length 6.4 mm (15.5 % SL); predorsal length 26.1 mm (63.3 % SL); prepelvic length 22.4 mm (54.4 % SL); preanal length 31.8 mm (77.2 % SL); body depth at dorsal origin 4.0 mm (9.7 % SL); depth of caudal peduncle 3.6 mm (8.7 % SL); length of caudal peduncle 8.8 mm (21.4 % SL) (2.4 times its depth); body width 2.5 mm (6.1 % SL); length of pelvic fin 4.0 mm (9.7 % SL); length of pectoral fin 4.6 mm (11.2 % SL); snout length 2.3 mm (5.6 % SL, 36 % HL); eye diameter 0.9 mm (2.2 % SL, 14 % HL).

Dorsal fin inserted between pelvic and anal fins, with 2 rudimentary, 1 simple and 6 branched rays (and sometimes an additional simple ray); first dorsal pterygiophore inserted behind neural spine of vertebrae 28-30 (mode 29). Pectoral fin with 8 rays. In males, pectoral fin curled upwards, second ray 2-3 times thicker than other rays. Pelvic fin with 7 rays, origin of first ray below vertebral centra 25-27 (mode 26). Anal fin inserted shortly behind behind vent, with 2 rudimentary, 1 simple and 5 or 5½ branched rays; first pterygiophore inserted behind hemal spine of vertebrae 34-36 (mode 35). Caudal truncate or emarginate, with 8+8 principal rays (7+7 branched).

Body entirely scaled, except belly between pectoral fins. Head naked. Suborbital spine bifid, outer branch straight, inner branch slightly curved, longer and stronger than outer one. Three pairs of barbels, one rostral, one maxillary and one at each angle of mouth, reaching to eye. Lower lip interrupted medially, each half with an inner thickened lobe, not ending in a barbel-like pointed tip; margin of membrane connecting this lobe and barbel at corner of mouth entire. Anterior nostril at tip of a short conical tube, not barbel-like.

Vertebrae: 34 + 15 = 49 (1), 34 + 16 = 50 (1), 35 + 14 = 49 (2), 35 + 15 = 50 (3), 36 + 15 = 51 (1).



Fig. 42. *Pangio atactos*, MZB 10995, holotype, 41.2 mm SL; Sumatra: Batang Hari drainage, Danau Kamining.

Vertebrae 5 to 25-27 (mode 26) with pleural ribs.

Coloration. Body yellow to orange in life, with black markings. Three bars on head, first immediately in front of eye, second immediately behind eye, connected by a black area around eye; third bar through posterior part of opercle. Sometimes a black spot at tip of snout, not obvious. 7-9 saddles along back, irregularly shaped, continued ventrally by a narrower vertical bar (or triangular) extending into lower half of body but not reaching ventral midline. Usually a pale rounded or transverse central area on dorsal midline in each saddle. A row of spots or blotches on lower half of flank (occasionally some on middle of flank), irregularly shaped, positioned alternating with saddles on back, opposite to spaces between saddles, reaching ventral midline on caudal peduncle. Last bar forming a large black blotch at posterior extremity of caudal peduncle and at base of caudal fin . A broad black bar about in middle of caudal fin, in most largest specimens branched at both extremities. A row of black spots at midlength of dorsal-fin rays and membranes; black saddles along dorsal-fin base extending onto fin. Dark pigments in distal areas of rays and membranes of anal, pelvic and pectoral fins.

Juveniles (below about 27 mm SL) with more contrasted pattern; bars thinner, saddles triangular, without the median pale area, and spots in lower half of body small or absent.

Distribution. *Pangio atactos* is presently known from three localities only in the Batang Hari drainage.

Etymology. From the ancient Greek ataktos, meaning undisciplined, irregular, disorderly, not in battle-order; allusion to the irregular disposition of the body markings. An adjective.

Remarks. With its irregular barred pattern on the body and the black bar in the middle of the caudal fin, *P. atactos* belongs to the *P. shelfordii* (Popta, 1903) group of Kottelat & Lim (1993). In this group, only *P. superba* (Roberts, 1989) has saddles with an elongate projections below the lateral midline and a row of dark marks in the lower part of the body (not always present). Large specimens of *P. atactos* and *P. superba* are distinguished by the number and shape of saddles (7-9, triangular, vs. 6-7, longitudinally elongated in lateral view; count does not include the expanded third bar of head, located on the opercle and nape). The saddles are well individualised in *P. atactos* while they are often almost in contact in *P. superba*. On the dorsal midline, each saddle has a pale rounded or transverse central area in *P. atactos* while in *P. superba* they are divided by a longitudinal pale area forming a more or less continuous pale stripe from the head to the base of the caudal fin. The marks on the lower half of the body are distinct along the whole body in *P. atactos*, each being a distinct blotch alternating with the saddles; in *P. superba*, these marks are



Fig. 43. *Pangio bitaimac*, MZB 10997, holotype, 81.8 mm SL; Sumatra: Batang Hari drainage, Sungai Alai (right side, reversed).

mostly behind the pelvic fins and do not have a distinct shape and position.

As recognised by Kottelat & Lim (1993), *P. shelfordii* in fact is an assemblage of several species; this will be discussed elsewhere. Anyway, none of them has an appearence similar to that of *P. atactos* and they are not discussed here.

Pangio alternans Kottelat & Lim, 1993, from the Mahakam drainage in Borneo also has a pattern of saddles alternating with blotches in the lower part of the body, but it has a much more compact appearance, the saddles are more irregularly shaped, the caudal fin is hyaline (vs. with a black bar in the middle in *P. atactos*), the tip of the snout has an obvious dark blotch, there is a single broad bar through eye and it has fewer vertebrae (32-34 + 13-15 = 45-48 vs. 34-36 + 14-16 = 49-51).

Comparison material. *Pangio superba*. CMK 11584, 6; ZRC 38787, 3, 30.8-44.1; Borneo: Kalimantan Barat: Kapuas drainage, Sungai Letang near near Jongkong.

See Kottelat & Lim (1993) for additional material.

Pangio bitaimac, new species
(Fig. 43)

Holotype. MZB 10997, 81.8 mm SL, female; Sumatra: Jambi: Sungai Alai; from aquarium fish collectors, 1 Oct 2007.

Paratypes. MZB 10998, 15; ZRC 51765, 22; CMK 20840, 15; 62.6-95.4 mm SL; same data as holotype. – ZRC 29161, 7, 52.0-80.4 mm SL; Sumatra: Jambi; from aquarium fish collectors; 10 Nov 1992. – ZRC 42036, 16; CMK 17813, 6; 49.7-79.6; Sumatra: Jambi: Sungai Alai; from aquarium fish collectors; H. H. Tan et al., July 1997. – ZRC 43230, 1, 77.3 mm SL; Sumatra: Jambi: Sungai Alai; from aquarium fish collectors; T. Sim, July 1998. – CMK 11189, 3, 34.8-68.7 mm SL; Sumatra: Jambi: Sungai Alai, km 28 on road from Muara Bungo to Muara Tebo; from aquarium fish collector, 2 June 1994.

Additional material (non types). ZRC 38237, 1, 84.9 mm SL; Malaysia: Johor: Kota Tinggi, Sungai Mupor; H. H. Tan et al., 21 Aug 1994.

Diagnosis. *Pangio bitaimac* belongs to the *P. anguillaris* group of Kottelat & Lim (1993), defined by a very elongate, worm-shaped body (body depth 14-21 times in SL) and 46-52 + 15-20 = 61-71 vertebrae. It is distinguished from the other species of this group by having the origin of the anal fin behind the base of the dorsal fin (vs. below). Further, it has 7+7 branched caudal-fin rays (vs. 6+6 in *P. doriae*), absence of scales on the cheek (vs. present in *P. doriae*), the tube of the anterior nostril developed into a nasal barbel (vs. not developed into a nasal barbel in *P. anguillaris*).

Description. General body shape and appearance are shown in Figure 43. All large size specimens are strongly arched, so that measurements are difficult to duplicate. Morphometric data of holotype (81.8 mm SL) are given here, only with indicative value: total length 86.9 mm (106.2 % SL); head length 7.9 mm (9.7 % SL); predorsal length 62.0 mm (75.8 % SL); prepelvic length 51.8 mm (63.3 % SL); preanal length 65.1 mm (79.6 % SL); body depth at dorsal-fin origin 5.2 mm (6.4 % SL); length of caudal peduncle 14.4 mm (17.6 % SL); depth of caudal peduncle 3.3 mm (4.0 % SL) (4.4 times in its length); body width 3.9 mm (4.8 % SL); length of pelvic fin 1.8 mm (2.2 % SL); length of pectoral fin 2.3 mm (2.8 % SL); snout length 3.1 mm (3.8 % SL, 39 %

HL); eye diameter 0.6 mm (0.7 % SL, 7 % HL).

Dorsal fin with 2 rudimentary, 1 simple, 6 branched and 1 unbranched rays, last 2 articulating on same pterygiophore; first pterygiophore inserted behind neural spine of vertebrae 43-45 (mode 44). Pectoral fin with 6-7 rays. In males, pectoral fin curled upwards, second ray about 3-4 times thicker than other rays. Pelvic fin with 5 rays, origin of first ray below vertebral centra 38-39. Anal fin inserted almost immediately behind vent, origin behind base of dorsal fin, with 2 rudimentary, 1 simple, 5 branched and 1 unbranched rays, last two articulating on same pterygiophore; first pterygiophore inserted behind hemal spine of vertebrae 46-48 (mode 47). Caudal truncate to very slightly emarginate, with 8+8 principal rays (7+7 branched).

Body entirely scaled, in some specimens naked between pectoral fins. Head naked. Suborbital spine bifid, outer branch straight, inner branch slightly curved, longer and stronger than outer one. Three pairs of barbels, one rostral, one maxillary and one at angle of mouth, reaching slightly behind eye. Lower lip interrupted medially, each half with an inner slightly thickened lobe, not ending in a barbel-like pointed tip; margin of membrane connecting lobe and barbel at corner of mouth entire, not fringed, without notches. Anterior nostril at tip of a short conical tube, posterior edge elongated into a nasal barbel, extending beyond eye.

Vertebrae: 46 + 16 = 62 (1), 47 + 14 = 61 (1), 47 + 15 = 62 (2), 47 + 16 = 63 (1), 48 + 15 = 63 (2), 48 + 16 = 64 (1). Kottelat & Lim (1993: 246) counted 46-49 + 15-17 = 63-64 in 7 additional specimens. Vertebrae 5 to 46-47 (mode 47) with pleural ribs.

Coloration. Preserved specimens: Body yellowish brown. Dorsal half of body and whole caudal peduncle usually very finely dotted (each dot being a dark greyish to black scale), denser on middle of body and forming a vague midlateral stripe. Stripe more conspicuous on caudal peduncle and above pectoral fin. Rest of body usually without pigments. Dorsal part of head plain yellowish brown. Tip of snout, part of space between nostrils, and between nostrils and mouth blackish. Cheek dotted. A short black stripe on both sides of groove of suborbital spine usually present. Caudal fin with black pigments on unbranched part of rays and on proximal area of all interradial membranes, resulting in a vertically elongated blotch. Black marks along dorsal-fin rays in some specimens. Other fins hyaline.

In life: violet.

Distribution. The species is presently known only from the Batang Hari drainage in Jambi province, Sumatra. We have examined a single specimen from near Kota Tinggi at the southern extremity of the Malay Peninsula (ZRC 38237), which is possibly conspecific. We have not collected the species ourself and cannot comment on the habitat. However, the violet live colour and the very reduced black pimentation on the flank, shared with a number of other fish species that live burried in the mud (e.g. *Caragobius urolepis*), suggest that *P. bitaimac* could have a similar mode of life.

Etymology. The name *bitaimac* is the Latinized form of bee tai mak, a kind of short and thick rice noodle, commonly consumed locally in Southeast Asia. A noun in apposition.

Remarks. Kottelat & Lim (1993: 246) recognised 4 species groups within *Pangio*, based on vertebrae counts, body shape and colour pattern. They recognised a *P. anguillaris* group including the species with a large number of vertebrae (46-52 + 15-17 = 61-71, vs. 31-40 + 12-16 = 45-55 in the other groups). They included three species in this groups: *P. anguillaris*, *P. doriae* and *P. pulla*. *Pangio pulla* is very distinctive in having a banded black and yellowish colour pattern (vs. plain brown) and a deeper body (11-12 times in SL, vs. 14-21) than the other species of the group. Its vertebrae count (46-48 + 15-16 = 61-62) is at the lower limit of the range observed in the group. We think that it does not belong to this group but cannot place it in any of the three other groups and it is probably better considered a group of its own. *Pangio pulla* is also distinguished by the absence of pelvic fins, but this character appears in different lineages of *Pangio* and can only be used for the diagnosis of some species, not lineages.

Material of *P. bitaimac* was identified as *P. doriae* (Perugia, 1892) by Kottelat & Lim (1993), but they already pointed to the difference in the number of branched caudal-fin rays between them and the remaining material of *P. doriae* (7+7, vs. 6+6). The availability of more material shows that these indeed are distinct species.

Besides the number of caudal-fin rays, *P. bitaimac* is distinguished from *P. doriae* by the colour

pattern at the base of the caudal fin (black pigments on proximal area of all interradial membranes, resulting in a vertically elongated blotch, vs. black pigments restricted to the interradial membranes between the 4 median rays, extending on most of membrane, resulting in a short stripe continuing the stripe on caudal peduncle), the shape of the caudal fin (truncate or very slightly emarginate, vs. distinctly emarginate), the origin of the anal fin clearly behind the base of the last dorsal-fin ray (vs. in front or below) and relatively shorter nasal barbel (the tube part of the anterior nostril is about ⅓ of the total length of the nasal barbel, vs. about ⅕-¼).

Pangio bitaimac differs from *P. anguillaris* (Vaillant, 1902) in having the anterior nostril modified into a nasal barbel (vs. at tip of a short tube); fewer vertebrae (46-49 + 14-17 = 61-67, vs. 50-52 + 19-20 = 69-71; Kottelat & Lim, 1993: 246) and related to a shorter distance between pelvic and anal fins (14.9-18.4 % SL, vs. 18.6-22.0; measured on 10 *P. bitaimac*, ZRC 51765 and 12 *P. anguillaris*, ZRC 38629, 38586, 34884, from Sumatra and Pahang), the origin of the anal fin behind the base of the last dorsal-fin ray (vs. in front), and by the colour pattern at the base of the caudal fin (black pigments on proximal area of all interradial membranes, resulting in a vertically elongated blotch, vs. black pigments restricted to the interradial membranes between the 4 median rays, extending on most of membrane, resulting in a short stripe continuing the stripe on caudal peduncle). Kottelat & Lim (1993: 214) erroneously report 6+6 branched caudal rays in *P. anguillaris*; we re-examined their material and observed 7+7 in all specimens.

Roberts (1989) and Kottelat & Lim (1993) considered *Cobitophis perakensis* Herre, 1940 (described from Perak, Malay Peninsula) as a synonym of *P. anguillaris*, based on the examination of the types and new material from the Malay Peninsula and Borneo. They also list *Acanthophthalmus vermicularis* Weber & de Beaufort, 1916 (described on the basis of a single specimen from the Kampar Kiri in Sumatra) as a synonym. This is the only record of *P. anguillaris* from Sumatra prior to our surveys. Weber & de Beaufort (1916: 34) record the presence of only 3 pairs of barbels (that is, no nasal barbels) and this excludes the possibility that *P. bitaimac* is identical with *A. vermicularis* (that is, *P. anguillaris*). We have not seen differences between our *P. anguillaris* from Borneo, Sumatra and the Malay Peninsula and we retain *P. vermicularis* and *P. perakensis* in the synonymy of *P. anguillaris*.

The *P. anguillaris* illustrated in Kottelat et al. (1993: pl. 28) and Kottelat & Lim (1993: 214) is a specimen from Nan (Chao Phraya drainage, Thailand). It is not certain that it is conspecific with the Sundaic populations.

Pangio lumbriciformis Britz & Maclaine, 2007 possibly also belongs to the *P. anguillaris* group. It shares the dark grey to black stripe on median caudal-fin rays. It differs from *P. bitaimac* in having fewer vertebrae (40-41 + 13-15 = 54-56, vs. 46-49 + 14-17 = 61-67).

Comparison material. *Pangio anguillaris*: ZRC 38629, 5, 56.3-65.1 mm SL; CMK 11187, 11, 56.7-62.0 mm SL; Sumatra: Jambi: Sungai Alai, near Muara Bungo. – ZRC 38586, 2, 40.2-47.2 mm SL; Sumatra: Jambi: Danau Kamining near Muara Bungo. – ZRC 34884, 5, 57.3-66.2 mm SL; Malaysia: Pahang: Sungai Salan at Jerantut. – ZRC 1442, 3 paratypes of *C. perakensis*, 50.3-54.7 mm SL; Malaysia: Perak: Chenderoh dam.

Pangio cf. *bitaimac*: ZRC 38237, 1, 86.3 mm SL; Malaysia: Johor: Kota Tinggi, Sungai Mupor.

Pangio doriae: ZRC 38793, 4, 40.2-55.9 mm SL; CMK 11632, 9, 40.4-61.1 mm SL; Borneo: Kalimantan Barat: Kapuas drainage: Sungai Embau.

Pangio semicincta

Remarks. Kottelat & Lim (1993: 229-230) tentatively considered *P. kuhlii* (Valenciennes, in Cuvier & Valenciennes, 1846) and *P. semicincta* as synonyms. Fresh material from Java shows that the two species have very distinctive colour patterns and Kottelat (1995b; Kottelat & Whitten, 1996a) recognised *P. kuhlii* endemic to Java and *P. semicincta* from Sumatra, Borneo and the Malay Peninsula. Fraser-Brunner (1940) described *P. sumatrana* on the basis of a single specimen from Lahat in the Musi drainage (Sumatera Barat Province). It has been tentatively placed in the synonymy of *P. kuhlii* by Kottelat & Lim (1993). We have now obtained material of *Pangio* from additional localities in the Musi drainage, including from the vicinity of Lahat (type locality of *P. sumatrana*). We did not observe differences between them and the populations of *P. semicincta* from elsewhere in Sumatra; therefore we consider them as synonyms. As they are simultaneous synonyms, we give precedence to *P. semicincta*.

Fraser-Brunner distinguished his *P. kuhlii sumatrana* from *P. k. kuhlii* on the basis of colour

pattern. The character that he mentioned (body with about 12 broad bands, narrowing somewhat below) corresponds to some of our Musi specimens. Besides, he distinguished *P. kuhlii* (including his *P. k. sumatrana*) from *P. semicincta* by having a smaller head (8 times in length, vs. 6.5), the pelvic fin "well behind" the middle of the length (vs. "in middle of length of fish, including caudal fin"), the dorsal fin with 7-8 branched rays (vs. 6), and the anal-fin origin slightly behind the end of the dorsal fin (vs. immediately below end of dorsal fin). This is contradicted by his drawings, which do not show difference in fin positions between his *P. semicincta* and *P. kuhlii sumatrana*. Our specimens from near the type locality of *P. sumatrana* have 6 ½ branched dorsal-fin rays as does *P. semicincta*, and the head length is 6.1-7.0 times in total length.

Material. ZRC 51766, 5; CMK 20538, 5; 29.0-48.0 mm SL; Sumatra: Sumatera Selatan: Musi drainage: Kikim River at Bunga Mas, about 40 km west of Lahat.

Family Osphronemidae

Trichopodus leerii
Trichopodus trichopterus

Remarks. These two species have usually been placed in *Trichogaster*. When originally created, *Trichogaster* Bloch (in Schneider, 1801: 164) included two nominal species, of which *Trichogaster fasciatus* Bloch (in Schneider, 1801: 164) was subsequently designated as type species by Jordan & Evermann (1917: 58). *Trichogaster fasciata* is a member of the genus usually called *Colisa* Cuvier (in Cuvier & Valenciennes, 1831: 359), and this makes *Trichogaster* the valid name of this genus. Contrary to comments by Derijst (1997: 222), *Colisa* is not available from Hamilton (1822) as this name is clearly not intended as a scientific name (Code art. 1.1 and Glossary).

The type species of *Trichopodus* La Cepède (1801: 125) is *Labrus trichopterus* Pallas (1770: 45), by subsequent designation by Bleeker (1879: 21) Contrary to statement in Derijst (1997: 223), Cuvier (in Cuvier & Valenciennes, 1831: 388) did not designate a type species for *Trichopodus*. He used the wording "le véritable trichopode" and this does not constitute a type species designation.

Family Tetraodontidae

Monotrete leiurus

Remarks. Material usually identified as *M. leiurus* exhibits a great variability and several nominal species earlier treated as synonyms have recently been revalidated and additional species have been described (Kottelat, 1995a, 2000; Roberts, 1998). It is still not clear how many species occur in Java, Sumatra and Borneo. *Monotrete leiurus* was described on the basis of 5 specimens from Batavia (now Jakarta) that have subsequently been mixed with other samples. The potential syntypes examined by Dekkers (1975) are in poor condition and have lost their colour pattern (a major diagnostic character within this group).

Bleeker (1851b: 97) described the type series from Batavia (Jakarta), in sea and estuaries. The species now identified as *M. leiurus* inhabits freshwater and has never since been recorded in estuaries or in the sea.

We examined recent specimens from western Java (MZB 1330, 1332; Fig. 44). They have a large round dark brown blotch on the flank, with a round reddish spot in the center, under the dorsal-fin origin, surrounded by a ring of somewhat smaller blotches, and the rest of the body is covered by similar, smaller, blotches. In specimens about 35 mm SL the blotches forming the outer ring are very close and in the smallest examined specimen (30 mm SL) they form a more or less continuous circle. There is usually a pale brown, unspotted patch in the upper part of the caudal peduncle and a broad pale brown band along the upper edge of the caudal fin. There is no marking on the belly. The snout is long, about twice the diameter of the eye. We observed the character states in material from Sumatra (Musi and Batang Hari drainages, Lampung) and the Malay Peninsula as far north as at least Pahang. The red spot of the ocellus becomes darker and less distinct with increasing size. It is missing in the 84.8 mm SL Batang Hari and the 76.0 mm SL Musi specimens and in all specimens above 60 mm SL in the Bogor material (MZB 1330); above this size the blotch is totally black. But it is still present in the 102.6 mm SL Pahang specimen, although very dark.

For the time being we consider these population groups (Java, Sumatra, Malay Peninsula) as conspecific and call them *M. leiurus*. This identi-



Fig. 44. *Monotrete leiurus*, MZB 1332, 54.1 mm SL; Java: Bogor (right side, reversed).

fication may have to be revised when more material (larger series) become available. On Borneo, the few samples we have seen from the Barito drainage are possibly conspecific, although they seem to have a well marked hump in the middle of the back. They differ in having the patterning of the blotches less regular in distribution (the ring about the subdorsal blotch is not as conspicuous as in the Javanese specimens), the blotches are less regularly shaped, in some specimens almost polygonal, with narrower spaces between the blotches. At least part of the material earlier reported as *Tetraodon leiurus* from the Mahakam drainage (eastern Borneo) is a distinct species, *M. hilgendorfii* (Popta, 1905; see Kottelat, 1995a). It is distinguished by the longitudinally elongated blotches on the belly and lower part of the flank; there is no ocellus and there is no conspicuous large black blotch under the origin of the dorsal fin.

In our material from the Kapuas drainage (western Borneo), small specimens (less than

about 50 mm SL) have black botches and a red ocellus, all poorly contrasted against a very dark background. In specimens around 90 mm SL, the body is almost plain greyish brown and the ocellus is no longer distinct. It has a very concave snout profile and apparently a larger eye than other populations. We tentatively retain it as a valid species, for which the name *M. bergii* (Popta, 1905; see also Popta, 1906: 215, pl. 10 fig. 44) is available.

The specimen figured as *M. leiurus* in Kottelat et al. (1993: pl. 84) is from the Tapi drainage (peninsular Thailand), photographed in 1983; it could not be re-examined for the present study. It belongs to a species distinguished in having a very dark flank and dorsum, without patterning, with sharp transition with the yellowish white belly and a few dark brown marks on belly. The ocellus is conspicuous, with a red spot, black ring, white ring and dark brown ring. In a 41.7 mm SL specimen, the ocellus is made of a red spot with a black edge and a circle of 7 round blackish and widely separated blotches of about same size as central one. We have seen similar specimens from Perak (Malay Peninsula) and Surat Thani (Thailand). We have not yet cleared the identity of this species.

Monotrete ocellaris (Klausewitz, 1957) is a third species from the Malay Peninsula, earlier treated as a synonym of *M. leiurus*. Its type locality is the "area of Pattalung" in southern Thailand. It is distinguished by its very short snout, large spots on the sides and the lower part of the flank (in some also very faint spots on belly), and a red eye, at least in freshly preserved specimens.

Monotrete brevirostris (Benl, 1957) is another species earlier synonymised under *M. leiurus*. It was described on the basis of aquarium-bred specimens, possibly from Thailand. The specimen identified as *M. cochinchinensis* (Steindachner, 1866) by Kottelat (2001: 167, fig. 479, bottom) seems to belong to *M. brevirostris* (CMK 13054; Thailand: Nong Khai: Bung Kan). It is distinguished by the very large eye, short snout, rounded black blotches on side, and red ocellus only present (and faint) in juveniles. We have seen it only in collections from the middle Mekong, upstream of Khone Falls. The upper specimen on the same figure 479, with a very long snout, is a juvenile of *M. cochinchinensis* (CMK 15007; Phitsanulok, Thailand). We presently identify as *M. cochinchinensis* a species with a long snout, more conspicuous ocellus, and blotches, especially those around the ocellus, more or less polygonal. We have seen material from the Mekong and Chao Phraya drainages.

Material. *Monotrete bergii*: CMK 11544, 1, 93.2 mm SL; CMK 11718, 2, 40.4-46.1 mm SL; ZRC 38832, 1, 43.6 mm SL; Borneo: Kapuas drainage.

Monotrete leiurus: MZB 1330, 30, 30.0-64.6 mm SL; Java: Cikeas Tegalan, Bogor. – MZB 1332, 1, 54.1 mm SL; Java: Tjimatuk, Parungbanjang, Bogor. – ZRC 40484, 1, 84.8 mm SL; Sumatra: Batang Hari. – ZRC 51774, 1, 76.0 mm SL; Sumatra: Musi drainage. – CMK 20541, 1, 39.7 mm SL; Sumatra: Musi drainage. – ZRC 30466, 1, 102.6 mm SL; Malaysia: Pahang: Sungai Jelai. – ZRC 2318, 2, 64.4-81.0 mm SL; Malaysia: Pahang: Ulu Jelai. – ZRC 2320, 2, 61.1-62.7 mm SL; ZRC 2321, 1, 47.2 mm SL; ZRC 2322, 1, 39.9 mm SL; ZRC 2319, 2, 47.9-61.3; ZRC 1983, 2, 10.5-15.7 mm SL; Malaysia: Pahang, Kuala Tahan. – ZRC 14312, 2, 15.4-20.6 mm SL; Malaysia: Pahang: Taman Negara, Sungai Keniam at Kuala-Perkai.

Monotrete cf. *leiurus* Tapi: CMK 5188, 1, 41.7 mm SL; Thailand: Surat Thani Prov.: Khlong Sok.

Monotrete cf. *leiurus* Borneo: MZB 11318, 6, 60.3-81.2 mm SL; MZB 11352, 3, 55.4-77.0 mm SL; CMK 11784, 2, 68.1-85.2 mm SL; CMK 11800, 1, 42.0 mm SL; CMK 11872, 1, 69.1 mm SL; ZRC 38889, 1, 62.1 mm SL; Barito drainage.

Monotrete ocellaris: CMK 16537, 3, 19.6-43.9 mm SL; Thailand: Nakhon Si Thammarat: Thale Noi drainage.

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