

FISHES OF THE RAJANG BASIN, SARAWAK, MALAYSIA

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ABSTRACT. – An annotated checklist of the fishes recorded from the Rajang basin in Sarawak, Malaysian Borneo, from its headwaters to the brackish waters near its mouth, is presented. At least 164 species are recorded, collected mainly by several recent expeditions to Belaga and the Balui River, Kapit and the Baleh River, and around Sibü. Sixty-four fish species are recorded for the first time in the Rajang basin, two of which (*Pangio piperata* and *Macragnathus circumcinctus*) are new records for Borneo. The list should be treated as preliminary as many areas in the Rajang system have not been sampled. The list fills a critical gap in our knowledge of the fishes of Sarawak and includes the first report on fishes of the Batang Balui, a headwater tributary of the Rajang.

KEY WORDS. – Fish diversity, species checklist, new records, Rajang basin, Sarawak, Borneo.

INTRODUCTION

Borneo is the world's third largest island with some 743,107 km² of land area. Owing to "...difficulties of access to the tropical rainforest of much of the interior, a lack of reliable dating of igneous rocks, poorly fossiliferous sedimentary rocks and an absence of a coherent stratigraphic scheme for many parts of the island" (Hall & Nichols, 2002: 5) the geology of Borneo is particularly poorly known. Knowledge of the Bornean fish fauna is similarly fragmentary as surveys of its major rivers such as the Barito, Kapuas, Mahakam and Rajang, are incomplete. The freshwater fish fauna of Sarawak and Brunei was reviewed briefly by Kottelat & Lim (1995), but the Sarawak ichthyofauna has been largely neglected in contrast to the other political divisions of Borneo for which detailed reviews and checklists have been prepared: Sabah (Inger & Chin, 1962, 1990; Lim & Wong, 1994; Kottelat, 2005, present volume; Martin-Smith & Tan, 1998), Kalimantan Barat (Roberts, 1989), Kalimantan Timur (Kottelat, 1994), and Brunei (Choy & Chin, 1994; Parenti & Meisner, 2003). An expedition from the Royal Ontario Museum (ROM) made extensive collections throughout the Baram River and compiled a preliminary checklist of 97 fish species from that system (Watson & Balon, 1984; E. J. Crossman, pers. comm., in 1991).

The Rajang (or Rejang) is the largest river in Malaysian

Borneo (Sarawak and Sabah) with a drainage basin about 50,000 km² in area covering about 40% of the land area of the state of Sarawak and about 7% of that of Borneo (Liechti, 1960; Staub et al., 2000). Headwaters in the central highlands drain the northern slopes of the Kapuas Hulu Range and western slopes of the Hose and Iran mountains (Fig. 1). From its headwaters, the main Rajang channel flows north and then southwest through 563 km (350 mi) of mountain ranges, through steep, rugged gorges and rapids, hilly countryside, and a large, complex delta through which it empties into the South China Sea (Liechti, 1960: 8-9; Staub et al., 2000). The watershed drains the Sarawak districts of Belaga, Kapit, Song, Julau, Kanowit, Sibü, Matu Daro, Binatang and Sarikei. The Rajang is tidal as far upstream as the town of Kanowit, 120 km upriver, and navigable by small steamers as far as the town of Kapit, 241 km (150 mi) upriver (Liechti, 1960:9; Staub et al., 2000).

Freshwater habitats of the Rajang include partially shaded forest streams with a bottom of mud or sand, leaf litter, and fallen branches (Fig. 3), the main river channel (Fig. 4), and rocky hill streams in the mountainous interior (Fig. 5). The delta plain covers some 6,500 km² in area and is marked by dense peat deposits up to 15 m thick, forming blackwater peat swamps around the towns of Sarikei, Sibü and Daro (Staub et al., 2000: Fig. 1). Material is reported on herein from peat swamps in and around Sibü with a pH as low as

4.5 (see Appendix 1). Peat swamps were traditionally thought to have poor fish faunas owing to their low dissolved oxygen and high acidity, but their diversity has been underestimated (Ng et al. 1994). Caves are another habitat in Southeast Asia that has been poorly studied for fishes. The first cave-dwelling catfish from Southeast Asia was described from Thailand by Ng & Kottelat (1998). Sarawak has a renowned cave system, best represented by the Mulu and Niah caves (Wilford, 1964). The extensive limestone cave system that characterizes much of coastal Sarawak is limited in the Rajang region, however (Wilford, 1964: Figs. 17, 70).

The complex pattern and process of the modern (= Cenozoic, last 60 Ma) formation of Borneo and other islands in the Indo-Australian archipelago is at the heart of current palaeogeographic research in Southeast Asia (Hall, 1996; Hall & Nichols, 2002). Borneo was formed via accretion of ophiolites, island arc crust and microcontinental fragments (Hamilton, 1979; Hutchison, 1996; Moss & Wilson, 1998; Hall & Nichols, 2002). At the end of the Cretaceous period (65 Ma), modern Borneo had not yet been assembled/accreted (Metcalf, 1996). The Schwaner Mountains of southwestern Borneo and the Meratus Mountains of southeastern Borneo had been accreted on to the southeastern tip of Eurasia by this time, whereas much of the area now recognised as northwestern Borneo was oceanic crust and/or marginal crust (see Metcalf, 1996; Wilson & Moss, 1999: Fig. 2). During the end of the Late Cretaceous/beginning of the Cenozoic, deepwater marine deposits were laid down upon the oceanic/marginal crust. Sediment for these turbidite deposits most likely originated in the west/northwest (mainland Southeast Asia) (see Hutchison, 1996; Moss, 1998; Hall & Nichols, 2002).

By the end of the Oligocene (~25 Ma), parts of central Borneo started to be uplifted, volcanism was common across the island, and large amounts of sediment were being eroded from

the centre of the island and redeposited in deltas fringing the island (for example the Baram, Mahakam, Tarakan). It is approximately at this time that the modern Rajang River started to be formed (S. Moss, pers. comm., in 1999). Outcrops of turbiditic rocks of the Late Cretaceous-Early Cenozoic Rajang Group are typical along the upper reaches of the modern Rajang River basin (Fig. 5).

Our goal is to provide the first comprehensive summary of the fish fauna of the Rajang basin from its headwaters to the brackish waters near its mouth. We were prompted by several recent expeditions that amassed large collections of fishes from near the Rajang headwaters to the coastal peat swamps. Such a comprehensive review of the fish fauna is long overdue and particularly timely as development and management of the river increases. The Rajang is of particular economic importance to Sarawak and the rest of Malaysia. Logging is a major source of income for Sarawak, and is the main activity along the Rajang that serves as the principal means of transportation (Fig. 2; Khoo et al., 1992: 180-181). Travel between Kapit and Belaga is mainly by speedboat or longboat through the Pelagus rapids, and above Belaga by longboat through the Bakun rapids to the Batang Balui, a major tributary (Lelek, 1983a: Fig. 1). An introduction to the Balui region, including geology, and a history of the founding of Belaga are provided by Maxwell (1987a, b). The Bakun Hydroelectric Project includes plans for a hydroelectric dam to be built across the river above Belaga which, when completed, will supply electrical power not only to Sarawak, but also to Peninsular Malaysia. It will also flood a large portion of the Rajang headwaters, including the Batang Balui. As far as we can determine, this is the first report on the fish fauna of the Batang Balui. Flooding of small streams in the headwaters following construction of the Bakun dam is expected to have a devastating effect on the ichthyofauna.

Knowledge of the Rajang ichthyofauna has come from

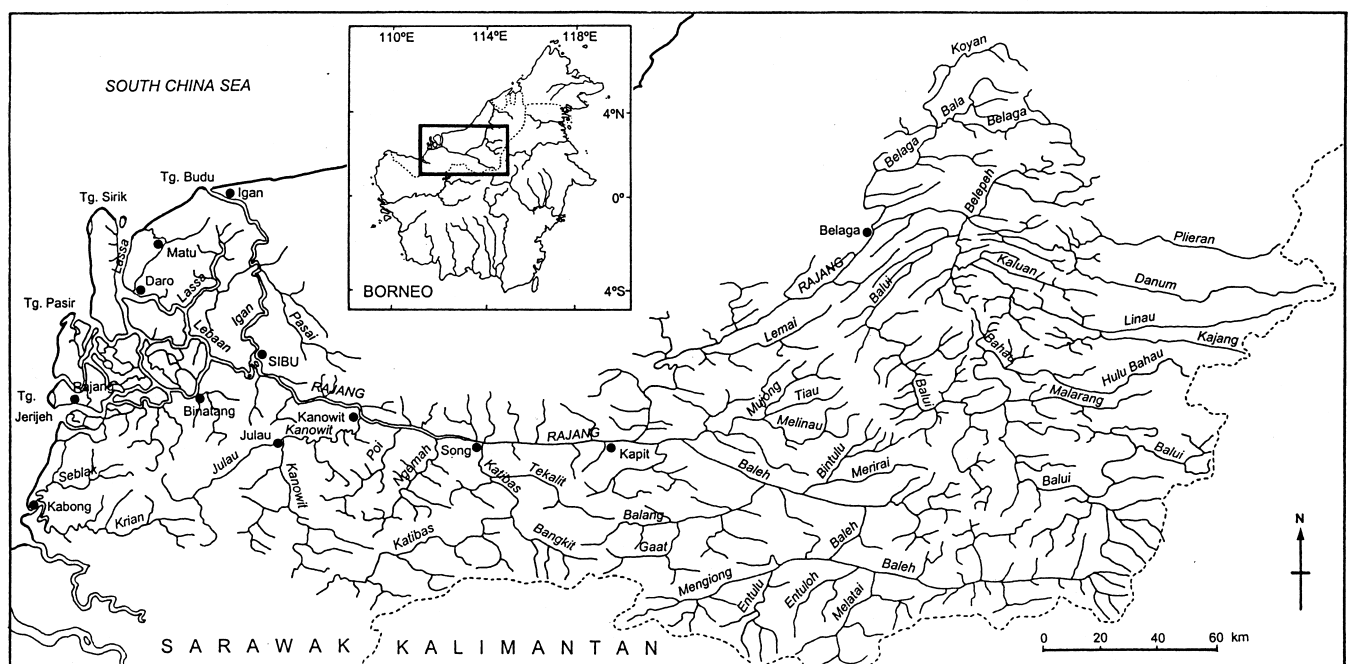


Fig. 1. The Rajang Basin, Sarawak - its major tributaries and major towns—and location in Borneo (inset).

isolated studies. Physical water parameters of the Rajang were summarised by Lelek (1983a) who also made recommendations for possible fishery development (Lelek, 1983b). Some fish species collected from the Rajang estuary were recorded by Blaber et al. (1997). The Lanjak-Entimau Wildlife Sanctuary is drained by tributaries of the Katibas River, one of the principal named tributaries of the Rajang that enters the main channel of the river at Song (Fig. 1). An unpublished list of fishes recorded from the Ulu Katibas within the Lanjak-Entimau Wildlife Sanctuary was compiled by Leh et al. (1997). A list of 18 freshwater fish species indigenous to Sarawak with aquaculture potential was compiled by Chang (1997), and most of these species are known from the Rajang basin. Gastromyzontine loaches were reviewed from a collection made in the Baleh River, a Rajang tributary near Kapit, from which *Gastromyzon fasciatus*, *G. punctulatus* and *G. (now Neogastromyzon) pauciradiatus* were described as new species (Inger & Chin, 1962). Fish species described recently from the Rajang basin include: *Gastromyzon megalepis* Roberts (1982a), *Chonerhinos silus* Roberts (1982b), *Parosphromenus allani* Brown (1987), *Betta brownorum* Witte & Schmidt (1992), *Osteochilus sarawakensis* Karnasuta (1993), *Carinotetraodon salivator* Kottelat & Lim (1995), *Rasbora kottelati* Lim (1995), *Schismatorhynchus holorhynchus* Siebert & Tjakrawidjaja (1998), *Clarias planiceps* Ng (1999a), *Hemibagrus chrysops*

Ng & Dodson (1999), *Kryptopterus platypogon* Ng (2004) and *Katibasia insidiosa* Kottelat (2004b). Taxa awaiting description include new species in the genera *Gastromyzon*, *Protomyzon*, *Pangasius*, and *Nagaichthys* (M. Kottelat, H. H. Tan and C. Vidthayanon, pers. comm. in 2004).

Our annotated list of the fish diversity recorded from the Rajang is far from complete as there are only preliminary records of the riverine fish fauna from brackish waters in tidal areas, and we list species that were collected from a few, select areas around Sibul (lower Rajang), Kapit and the Batang Baleh (middle Rajang), and Belaga and the Batang Balui (upper Rajang). Nonetheless, of the 164 species of fish listed here, 64 species are reported for the first time from the Rajang basin. The spiny eel, *Macrogathus circumcinctus*, and the eel-loach, *Pangio piperata*, appear to be first records for Borneo. These fill a critical omission in our knowledge of the fishes of Sarawak. A good, working knowledge of the native and introduced fishes of the Rajang is a necessary prerequisite to a conservation and development plan and will be of use to all who are interested in the natural history of Sarawak.

MATERIAL AND METHODS

Fish were collected using a variety of standard methods (see Baldwin et al., 1996, for a comprehensive review of fish



Fig. 2. Logging operation in the Rajang near Kapit, July, 1991.



Fig. 4. The Rajang River at Belaga, July 1991.



Fig. 3. Mud-bottomed tributary stream of the Baleh River (field station LRP91-7).



Fig. 5. Mud and gravel-bottomed, with outcrop, tributary stream of the Batang Balui (field station LRP91-28).

collecting methods), including seining, dip-netting, push-netting, electroshocking and an ichthyocide. Specimens were also purchased in local markets (Fig. 6) or obtained from local fishermen who used gillnets, castnets or hook-and-line. We report herein new material from five expeditions, listed chronologically and including a description of field stations (Appendix 1). We also include historical records of fishes from the Rajang basin in the Sarawak Museum and Field Museum of Natural History.

Material reported here is deposited in the following institutions and collections: BMNH - The Natural History Museum, London, United Kingdom; CAS - California Academy of Sciences, San Francisco, U.S.A.; CMK - Collection of Maurice Kottelat, Cornol, Switzerland; FMNH - Field Museum of Natural History, Chicago, USA; ITTO - International Timber Trade Organisation, Kuching, Sarawak, Malaysia; SFD - The Fisheries Department of Sarawak, Sarawak, Malaysia; SM - Sarawak Museum, Kuching, Sarawak, Malaysia; SMF - Senckenberg Museum, Frankfurt, Germany; SU - Stanford University collection, now at California Academy of Sciences, San Francisco, U.S.A.; USNM - National Museum of Natural History, Smithsonian Institution, Washington, D. C., U.S.A.; ZRC - Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore, Singapore; ZSM - Zoologische Staatssammlung, München, Germany.

A significant collection of fishes from the Balui branch of the Rajang at the Universiti Malaysia Sarawak made in the early 1990s as part of an environmental impact assessment prior to the building of the Bakun Dam has not yet been reported upon. As we have not examined any material from this collection, it is not discussed here. The checklist largely follows the systematic order adopted by Nelson (1994) and Eschmeyer (1998) and contains all fish species found in both freshwater and brackish-water. Species recorded for the first time from the Rajang basin are indicated by a *. ** indicates species recorded for the first time in Borneo. A list of species is given in Appendix 2.



Fig. 6. Fish from the Rajang River on sale at the market in Kapit town.

FISH FAUNA OF THE RAJANG BASIN

CLASS ACTINOPTERYGII

DIVISION TELEOSTEI

ORDER OSTEOGLOSSIFORMES

FAMILY OSTEOGLOSSIDAE

Scleropages formosus (Schlegel & Müller, in Müller & Schlegel, 1844) *

Material examined. – 1 ex. (BMNH 1906.10.29.3), Rajang.

Remarks. – The 500 mm SL specimen at BMNH was obtained by Charles Hose sometime before 1906. There appear to be no further records from the Rajang basin. Authority of the species follows Eschmeyer (1998). Pouyaud et al. (2003) reviewed the Asian arowanas and described three species that appear to have restricted distributions in Borneo and Sumatra: *Scleropages legendrei* in the Lake Sentarum area of the Upper Kapuas basin, *S. macrocephalus* in the Kapuas and Barito basins, and *S. aureus* in central Sumatra. *Scleropages formosus* is widespread and seems to live in sympatry with the other three species. Pouyaud et al. (2003) overlooked the Rajang specimen that is likely to be *Scleropages formosus*, the most widespread of the four species.

FAMILY NOTOPTERIDAE

Chitala borneensis (Bleeker, 1851a) *

Material examined. – 2 ex. (USNM 320968), LRP91-18.

Remarks. – The two USNM specimens measure 535 mm and 560 mm in SL. They have a uniform pale golden background colour, with small black spots on the caudal fin and the posterior portion of the body and the anal fin, and a black spot behind the pectoral-fin base. These specimens were purchased in the Belaga market and appear to have been taken on hook-and-line.

ORDER CLUPEIFORMES

FAMILY CLUPEIDAE

Sundasalanx microps Roberts, 1981 *

Material examined. – 1 ex. (USNM 322199), LRP91-12.

Remarks. – In placing *Sundasalanx* in Clupeiformes rather than Salmoniformes, as in the original description, we follow the most recent treatment of its relationships by Siebert (1997). Apparently this is the first record of the genus *Sundasalanx* for Sarawak.

***Tenualosa toli* (Valenciennes, in Cuvier & Valenciennes, 1847)**

Tenualosa toli - Blaber et al., 1996: 225-242 (Batang Lassa); 1997: 203 (Lassa).

Material examined. – None.

Remarks. – Blaber et al. (1996: 225-226, 1997: 203) consider the “terubok” to be “the most commercially and culturally important estuarine fish in Sarawak”.

FAMILY ENGRAULIDAE

***Lycothrissa crocodilus* (Bleeker, 1851b)**

Lycothrissa - Blaber et al., 1997: 205 (Lassa).

Material examined. – None.

***Setipinna breviceps* (Cantor, 1849)**

Setipinna breviceps - Blaber et al., 1997: 205 (middle and upper Lassa).

Material examined. – None.

***Setipinna taty* (Valenciennes, in Cuvier & Valenciennes, 1848)**

Setipinna taty - Blaber et al., 1997: 205 (middle and upper Lassa).

Material examined. – None.

***Setipinna tenuifilis* (Valenciennes, in Cuvier & Valenciennes, 1848)**

Setipinna tenuifilis - Blaber et al., 1997: 205 (middle and upper Lassa).

Material examined. – None.

***Stolephorus baganensis* Hardenberg, 1933**

Stolephorus baganensis - Blaber et al., 1997: 205 (Lassa).

Material examined. – None.

***Coilia* spp.**

Coilia - Blaber et al., 1997: 204 (Lassa).

Material examined. – None.

Remarks. – Blaber et al. (1997: 204) note that the larvae of six species of *Coilia* were collected “mainly from the Lupar

and Lassa estuaries”. They do not list the species that were obtained from the Lassa drainage, however. Although we have not seen material from the Rajang, the species that are likely to occur include *Coilia borneensis* Bleeker (1852a), *C. coomansi* Hardenberg (1934), *C. macrogathos* Bleeker (1852b), *C. neglecta* Whitehead (1967), and *C. rebentischii* Bleeker (1858a).

ORDER CYPRINIFORMES

FAMILY CYPRINIDAE

***Barbonymus collingwoodii* (Günther, 1868) ***

Puntius collingwoodi - Chang, 1997: 37 (Rejang); Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 1 ex. (FMNH 68314), RFI 6.8.56; 17 ex. (FMNH 68316), RFI 12.8.56; 39 ex. (FMNH 68911), FWK 15.12.62; 30 ex. (FMNH 68897), IGK 27.9.62; 140 ex. (FMNH 68313), RFI 5.8.56; 10 ex. (FMNH 68884), IGK 21.9.62; 205 ex. (FMNH 68315), RFI 8.8.56; 6 ex. (FMNH 103623), LRP91, no specified locality; 6 ex. (USNM 323843), LRP91-25; 11 ex. (USNM 323844), LRP91-22; 6 ex. (USNM 323845), LRP91-27; 4 ex. (USNM 323846), LRP91-28; 5 ex. (USNM 323847), LRP91-27; 1 ex. (USNM 323856), LRP91-7; 8 ex. (USNM 323857), LRP91-8; 1 ex. (USNM 323860), LRP91-14; 1 ex. (USNM 323861), LRP91-21; 2 ex. (USNM 323865), LRP91-16; 2 ex. (USNM 323866), LRP91-10; 3 ex. (USNM 323867), LRP91-26; 12 ex. (USNM 323850), LRP91-6; 1 ex. (ZRC), GYY026; 2 ex. (ZRC), GYY0483; 1 ex. (ZRC 37822), RS3; 1 ex. (ZRC 45893) Lanjak-Entimau Wildlife Sanctuary: Sg. Begua.

Remarks. – This and the next two species were previously classified in the genus *Barbodes* (see Kottelat, 1999: 594).

***Barbonymus gonionotus* (Bleeker, 1850) ***

Material examined. – 1 ex. (ZRC 45845), THH9803/4.

Remarks. – This common aquaculture species, known in English as the silver barb, appears to have been introduced in the Rajang river system. The natural distribution of *B. gonionotus* is discontinuous, being found in Southeast Asia and western Indonesia, and absent from peninsular Malaysia, north Sumatra and Borneo (McConnell, 2004: 665).

***Barbonymus schwanefeldii* (Bleeker, 1853a)**

Puntius schwanefeldii - Chang, 1997: 11-12 (Rejang).
Barbodes schwanefeldii - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 2 ex. (FMNH 68305), RFI 10.8.56; 9 ex. (FMNH 103624), LRP91-31; 4 ex. (USNM 323840), LRP91-34; 1 ex. (USNM 323848), LRP91-27; 15 ex. (USNM 323849), LRP91-7; 11 ex. (USNM 323851), LRP91-25; 10 ex. (USNM 323852), LRP91-31; 5 ex. (USNM 323853), LRP91-28; 1 ex. (USNM 323854), LRP91-30; 15 ex. (USNM 323855), LRP91-8; 5 ex. (USNM 323858), LRP91-10; 11 ex. (USNM 323859), LRP91-12; 8 ex. (USNM 323862), LRP91-9; 26 ex. (USNM 323863), LRP91-

35; 1 ex. (USNM 323864), LRP91-33; 2 ex. (USNM 323868), LRP91-29; 1 ex. (ZRC 45788), GYY048; 11 ex. (ZRC), THH9803/4.

Remarks. – Distinguished from *Barbonymus collingwoodii* in having 35 to 36 scales pierced by lateral line; eight scales between dorsal fin origin and lateral line; 13 predorsal scales; and red caudal, pelvic and dorsal fin (Kottelat et al., 1993: 33). Many of the USNM specimens, however, have a lower lateral line scale count of 32 or 33, and some have just seven scales between the dorsal origin and lateral line. Because their colour pattern - strongly defined black submarginal stripes on the caudal fin lobes, and red fins - conforms to that of *B. schwanefeldii*, we regard them as that species.

***Cosmochilus falcifer* Regan, 1906**

Cosmochilus falcifer - Weber & de Beaufort, 1916: 142 (Rajang); Roberts, 1989: 32 (Rejang); Kottelat & Lim, 1995: 229 (Rajang).

Material examined. – 1 ex. (SM-E 16 16.1), Rajang River, pres: C. Hose, i.1905.

***Cyclocheilichthys apogon* (Valenciennes, in Cuvier & Valenciennes, 1842)**

Cyclocheilichthys apogon - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 12 ex. (FMNH 68253), RFI 12.8.56; 3 ex. (FMNH 68895), IGK 22.9.62; 8 ex. (USNM 323838), LRP91-19; 1 ex. (USNM 323837), LRP91-27; 1 ex. (USNM 323839), LRP91-22; 2 ex. (USNM 325392), LRP91-21; 1 ex. (SM uncat.), LRP91-21.

***Cyclocheilichthys armatus* (Valenciennes, in Cuvier & Valenciennes, 1842)**

Cyclocheilichthys armatus - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 1 ex. (FMNH 69863), NSH 8.56; 8 ex. (FMNH 68252), RFI 7.8.56; 5 ex. (FMNH 68907), IGK 27.9.62; 16 ex. (FMNH 68251), RFI 5.8.56.

***Cyclocheilichthys repasson* (Bleeker, 1853b) ***

Material examined. – 1 ex. (FMNH 68271), RFI 5.8.56; 23 ex. (FMNH 68273), RFI 11.8.56; 2 ex. (FMNH 68272), RFI 8.8.56; 1 ex. (USNM 323870), LRP91-31; 1 ex. (USNM 323841), LRP91-30; 2 ex. (USNM 323869), LRP91-8; 1 ex. (USNM 323871), LRP91-7; 2 ex. (USNM 323872), LRP91-29; 1 ex. (ZRC), THH9807; 5 ex. (ZRC), THH9803/4; 2 ex. (ZRC), GYY0483.

***Garra borneensis* (Vaillant, 1902)**

Garra bornensis [sic.] - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – None.

***Hampala bimaculata* (Popta, 1905)**

(Fig. 7a)

Hampala bimaculata - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 1 ex. (FMNH 68511), RFI 12.8.56; 1 ex. (FMNH 68510), RFI 11.8.56; 1 ex. (FMNH 69859), NSH 8.56; 3 ex. (FMNH 69860), NSH 8.56; 5 ex. (FMNH 68918), FWK 15.12.62; 7 ex. (FMNH 68890), IGK 22.9.62; 1 ex. (FMNH 68883), IGK 21.9.62; 26 ex. (FMNH 68508), RFI 5.8.56; 55 ex. (FMNH 68899), IGK 27.9.62; 76 ex. (FMNH 68509), RFI 8.8.56; 1 ex. (USNM 323385), LRP91-19; 1 ex. (USNM 323373), LRP91-22; 2 ex. (USNM 323378), LRP91-24; 1 ex. (USNM 323381), LRP91-10; 6 ex. (USNM 323382), LRP91-21; 3 ex. (USNM 323387), LRP91-25; 1 ex. (USNM 323390), LRP91-26; 1 ex. (USNM 323391), LRP91-23; 2 ex. (USNM 323395), LRP91-31; 2 ex. (USNM 323476), LRP91-35; 5 ex. (USNM 323666), LRP91-36; 1 ex. (ZRC), GYY026.

***Hampala macrolepidota* (Valenciennes, in Cuvier & Valenciennes, 1842)**

Hampala macrolepidota - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 1 ex. (FMNH 105334), RFI 8.8.56; 5 ex. (USNM 323379), LRP91-8; 5 ex. (USNM 323380), LRP91-10; 5 ex. (USNM 323383), LRP91-14; 1 ex. (USNM 323384), LRP91-13; 5 ex. (USNM 323386), LRP91-27; 2 ex. (USNM 323388), LRP91-7; 3 ex. (USNM 323389), LRP91-19; 9 ex. (USNM 323392), LRP91-9; 8 ex. (USNM 323393), LRP91-22; 7 ex. (USNM 323394), LRP91-31; 45 ex. (USNM 323396), LRP91-35; 1 ex. (USNM 323397), LRP91-32; 2 ex. (USNM 323398), LRP91-21; 3 ex. (ZRC), GYY0483; 1 ex. (ZRC), GYY049; 1 ex. (ZRC), THH9807; 1 ex. (ZRC), THH9809; 1 ex. (ZRC), THH9805.

***Labiobarbus cf. leptocheilus* (Valenciennes, in Cuvier & Valenciennes, 1842)**

Labiobarbus cf. leptocheilus - Roberts, 1993a: 328.

Material examined. – 1 ex. (USNM 323730), LRP91-30; 2 ex. (USNM 323731), LRP91-29; 1 ex. (USNM 323732), LRP91-31; 1 ex. (USNM 323735), LRP91-12; 1 ex. (USNM 323737), LRP91-8.

Remarks. – Roberts (1993a: 328) observed that the Rajang material has faint brown submarginal stripes on the caudal fin lobes, and more scales in lateral series 41-46 versus the 33-44 (modally 38) of *Labiobarbus leptocheilus* from elsewhere. He suspects they may represent an undescribed taxon.

***Leptobarbus melanotaenia* Boulenger, 1894 ***

Material examined. – 2 ex. (USNM 323682), LRP91-21; 5 ex. (USNM 323683), LRP91-35; 7 ex. (USNM 323686), LRP91-19; 3 ex. (USNM 324996), LRP91-31; 1 ex. (USNM 325024), LRP91-26; 1 ex. (USNM 323681), LRP91-23; 1 ex. (USNM 323684), LRP91-32; 1 ex. (USNM 323685), LRP91-24.

Remarks. – The dark brown, mid-lateral stripe that runs along

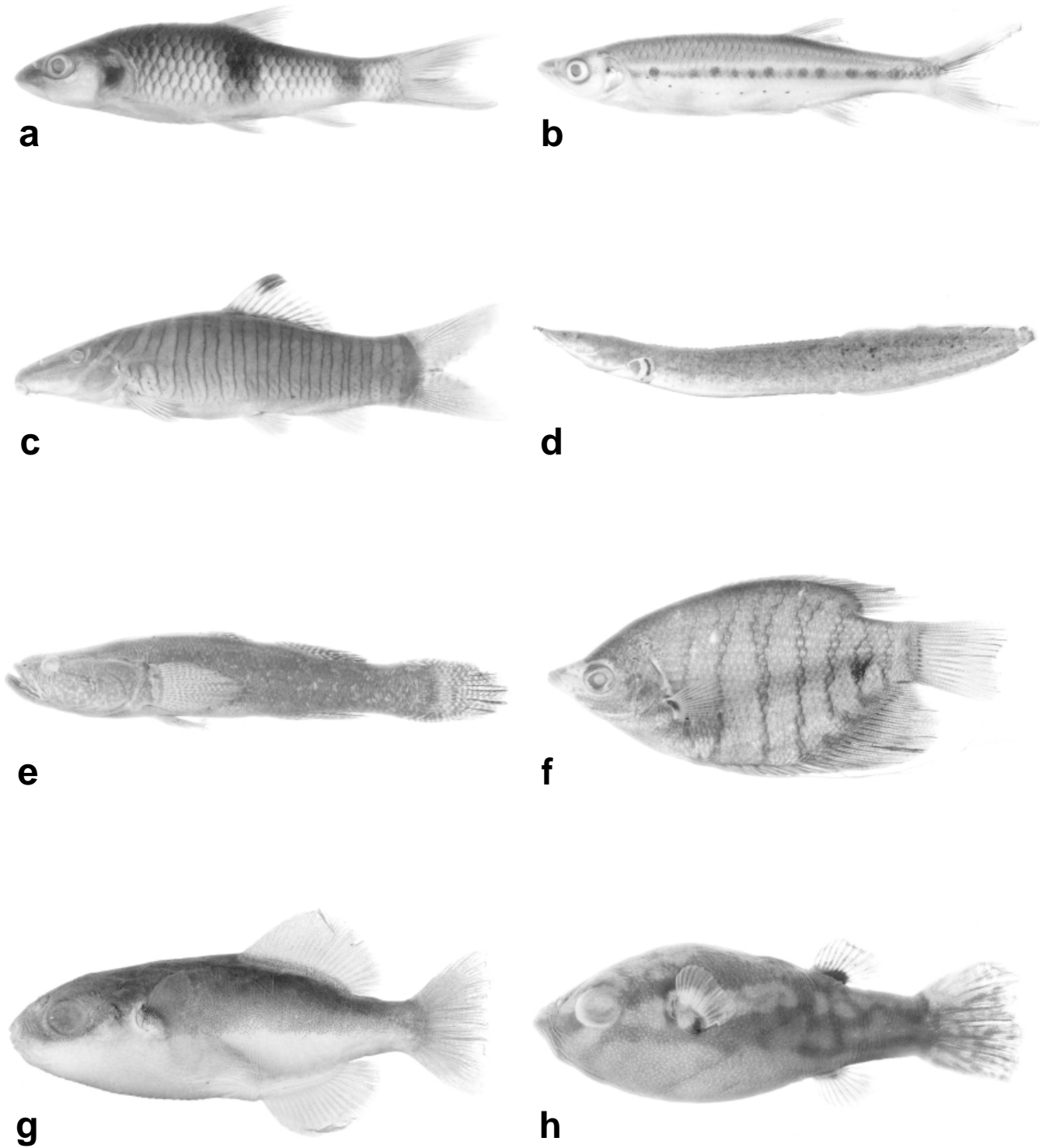


Fig. 7. a. *Hampala bimaculata*, 116.5 mm SL, USNM 323666; b. *Luciosoma setigerum*, 79.5 mm SL, USNM 320743; c. *Syncrossus hymenophysa*, 135.0 mm SL, USNM 323668; d. *Mastacembelus unicolor*, 260 mm SL, USNM 323670; e. *Eleotris melanosoma*, 91 mm SL, USNM 321251; f. *Osphronemus septemfasciatus*, 83 mm SL, USNM 323669; g. *Auriglobus silus*, 45 mm SL, USNM 323667; h. *Carinotetraodon salivator*, 40.5 mm SL, USNM 323665.

the edges of the scales from the opercle to the mid caudal base immediately above and over the lateral line is distinct in specimens under 75 mm SL. In fish beyond that size, the stripe is faint, but still discernible.

***Lobocheilos cf. bo* (Popta, 1904)**

Lobocheilus bo - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 4 ex. (FMNH 69847), NSH 8.56; 3 ex. (FMNH 69846), NSH 8.56; 2 ex. (FMNH 68529), RFI 12.8.56; 11 ex. (FMNH 69845), NSH 8.56; 215 ex. (FMNH 68528), RFI 8.8.56; 4 ex. (FMNH 68527), RFI 6.8.56; 2 ex. (FMNH 68872), RFI 3.8.56; 1 ex. (FMNH 68887), IGK 22.9.62; 1 ex. (FMNH 68885), IGK 21.9.62; 1 ex. (FMNH 68916), FWK 15.12.62; 154 ex. (FMNH 68526), RFI 5.8.56; 71 ex. (FMNH 69848), NSH 8.56; 9 ex. (FMNH 103618), LRP91-35; 1 ex. (USNM 325042), LRP91-7; 11 ex. (USNM 325342), LRP91-22; 13 ex. (USNM 325344), LRP91-31; 1 ex. (USNM 325345), LRP91-20; 1 ex. (USNM 325346), LRP91-13; 5 ex. (USNM 325347), LRP91-9; 2 ex. (USNM 325348), LRP91-36; 1 ex. (USNM 325349), LRP91-25; 10 ex. (USNM 325350), LRP91-35; 1 ex. (USNM 325351), LRP91-32; 1 ex. (USNM 325352), LRP91-14; 2 ex. (USNM 325353), LRP91-8; 2 ex. (USNM 325354), LRP91-10; 18 ex. (USNM 325355), LRP91-27; 6 ex. (USNM 325356), LRP91-12; 14 ex. (USNM 325418), LRP91-28; 7 ex. (USNM 325419), LRP91-34; 2 ex. (USNM 325420), LRP91-17; 1 ex. (SM uncat.), LRP 91-35; 1 ex. (ZRC 37827), RS3; 1 ex. (ZRC), GYY0483; 4 ex. (ZRC), GYY026.

Remarks. – *Lobocheilos bo* is characterised by having one pair of barbels, 16 circumpeduncular scales, and the pectoral fin at least as long as the head (Kottelat et al., 1993). The colour pattern of *Lobocheilos* material from the Rajang agrees with that described by Inger & Chin (1962: 84) for their specimens from Sabah. There is a blackish, round spot on the caudal peduncle that varies in intensity from solid black to almost indistinct. The fins are unmarked and each scale above the lateral line has a blackish margin. The photograph of *Lobocheilos bo* from the Kapuas in Roberts (1989: 42, Fig. 24, below) shows, and the diagnosis in Kottelat et al. (1993: 37) indicates, a distinct midlateral stripe which is not mentioned by Inger & Chin, nor present on our Rajang material. Maurice Kottelat and Heok Hui Tan (pers. comm. in 2004) have identified the Rajang material as an undescribed species.

***Lobocheilos falcifer* (Valenciennes, in Cuvier & Valenciennes, 1842) ***

Material examined. – 5 ex. (ZRC), THH9807.

Remarks. – Our specimens key out to *Lobocheilos falcifer* following Kottelat et al. (1993: 37), and are distinguished from *Lobocheilos bo* in having two pairs of barbels. There are five-and-one-half scales between the dorsal origin and the lateral line, and the head length is slightly less than the body depth.

***Lobocheilos cf. kajanensis* (Popta, 1904)**

Lobocheilus cf. kajanensis - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – None.

***Luciosoma setigerum* (Valenciennes, in Cuvier & Valenciennes, 1842) ***

(Fig. 7b)

Material examined. – 4 ex. (FMNH 68215), RFI 8.8.56; 5 ex. (FMNH 68408), RFI 5.8.56; 1 ex. (FMNH 68409), RFI 10.8.56; 1 ex. (FMNH 68216), RFI 12.8.56; 10 ex. (FMNH 68407), RFI 3.8.56; 10 ex. (FMNH 103619), LRP91-32; 7 ex. (USNM 320751), LRP91-7; 18 ex. (USNM 320743), LRP91-8; 5 ex. (USNM 320744), LRP91-9; 2 ex. (USNM 320746), LRP91-10; 31 ex. (USNM 320749), LRP91-14; 12 ex. (USNM 320745), LRP91-16; 10 ex. (USNM 320739), LRP91-19; 14 ex. (USNM 320747), LRP91-20; 5 ex. (USNM 320742), LRP91-21; 1 ex. (USNM 320740), LRP91-23; 27 ex. (USNM 320752), LRP91-24; 63 ex. (USNM 323374), LRP91-25; 32 ex. (USNM 320738), LRP91-26; 1 ex. (USNM 324979), LRP91-27; 57 ex. (USNM 320748), LRP91-27; 18 ex. (USNM 320972), LRP91-28; 1 ex. (USNM 320971), LRP91-29; 2 ex. (USNM 324997), LRP91-31; 1 ex. (USNM 325398), LRP91-31; 40 ex. (USNM 320750), LRP91-31; 30 ex. (USNM 320737), LRP91-32; 9 ex. (USNM 323673), LRP91-35; 111 ex. (USNM 320736), LRP91-35; 19 ex. (USNM 320735), LRP91-36.

Remarks. – This is one of the most common species of fish in the middle and upper Rajang basin, taken at 20 of the 32 stations in the July/August 1991 collection, including both the Rajang at Kapit and from the cooler waters above Belaga.

***Luciosoma spilopleura* Bleeker, 1855**

Luciosoma spilopleura - Weber & de Beaufort, 1916: 89 (Kapit); Kottelat & Lim, 1995: 230 (Kapit).

Material examined. – None.

Remarks. – Weber & de Beaufort's (1916: 89) record from Kapit needs to be checked for correct identification. *Luciosoma spilopleura* differs from *L. setigerum* in being smaller (to 82 mm SL), having a tuberculate snout and mandible, a pelvic fin that does not reach anal-in origin, and a caudal fin with blackish middle rays and a black submarginal stripe on each caudal lobe. It is also known from the Kapuas basin in Borneo and Sumatra.

***Macrochirichthys macrochirus* (Valenciennes, in Cuvier & Valenciennes, 1844) ***

Material examined. – 2 ex. (ZRC 47268), Kapit market.

***Nematabramis steindachneri* Popta, 1905 ***

Material examined. – 1 ex. (USNM 323675), LRP91-36; 1 ex. (USNM 323676), LRP91-6; 5 ex. (USNM 323677), LRP91-22; 4 ex. (USNM 323678), LRP91-19; 5 ex. (USNM 323679), LRP91-

26; 10 ex. (USNM 323680), LRP91-23; 2 ex. (USNM 325032), LRP91-35; 1 ex. (ZRC), GYY0483; 25 ex. (ZRC), THH9805.

***Osteochilus enneaporos* (Bleeker, 1852c) ***

Material examined. – 8 ex. (FMNH 103621), LRP91-20; 9 ex. (USNM 325372), LRP91-25; 2 ex. (USNM 325373), LRP91-24; 7 ex. (USNM 325374), LRP91-19; 2 ex. (USNM 325375), LRP91-34; 4 ex. (USNM 325376), LRP91-33; 8 ex. (USNM 325377), LRP91-32; 12 ex. (USNM 325378), LRP91-35; 1 ex. (USNM 325379), LRP91-36; 5 ex. (USNM 325380), LRP91-27; 26 ex. (USNM 325381), LRP91-31; 1 ex. (USNM 325382), LRP91-10; 7 ex. (USNM 325383), LRP91-21; 5 ex. (USNM 325412), LRP91-28; 8 ex. (USNM 325413), LRP91-20; 10 ex. (USNM 325414), LRP91-27; 1 ex. (ZRC 45791), GYY048; 4 ex. (ZRC 47266) Kapit market.

Remarks. – This common Rajang *Osteochilus* species is characterised by a dusky mid-lateral stripe of varying intensity from behind the opercle to the caudal base which does not extend onto the caudal fin, and three (in some specimens four) whitish tubercles on the snout. The largest (182 mm SL) specimen seen by us (ZRC) has bluish scales and lacks a mid-lateral stripe.

***Osteochilus hasseltii* (Valenciennes, in Cuvier & Valenciennes, 1842)**

Osteochilus hasseltii - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – None.

***Osteochilus intermedius* Weber & de Beaufort, 1916**

Osteochilus intermedius - Leh et al., 1997: 26 (Ulu Katibas in Lanjak-Entimau Wildlife Sanctuary).

Material examined. – None.

***Osteochilus kahajanensis* (Bleeker, 1857)**

Osteochilus kahajensis [sic.] - Chang, 1997: 31 (upper Rejang, Kapit).

Osteochilus kajanensis [sic.] - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 1 ex. (USNM 323842), LRP91-28; 1 ex. (USNM 323873), LRP91-8; 1 ex. (USNM 325415), LRP91-22; 1 ex. (ZRC 45790), GYY048.

Remarks. – This species is distinct among Rajang *Osteochilus* in having two whitish tubercles on the snout and a large round, blackish blotch on the caudal peduncle.

***Osteochilus melanopleura* (Bleeker, 1852b)**

Osteochilus melanopleura - Chang, 1997: 21 (Rejang).

Material examined. – None.

***Osteochilus microcephalus* (Valenciennes, in Cuvier & Valenciennes, 1842)**

Osteochilus vittatus (not of Valenciennes, in Cuvier & Valenciennes, 1842, in part?) - Chang, 1997: 35 (Rejang).

Osteochilus microcephalus - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – None.

***Osteochilus sarawakensis* Karnasuta, 1993**

Osteochilus sarawakensis Karnasuta, 1993: 55 (Baleh: type series in FMNH); Kottelat & Lim, 1995: 231 (Baleh).

Material examined. – 1 ex. (USNM 325000), LRP91-13; 5 ex. (USNM 325362), LRP91-21; 8 ex. (USNM 325363), LRP91-19; 2 ex. (USNM 325364), LRP91-32; 20 ex. (USNM 325365), LRP91-31; 5 ex. (USNM 325366), LRP91-22; 11 ex. (USNM 325367), LRP91-26; 5 ex. (USNM 325368), LRP91-27; 4 ex. (USNM 325369), LRP91-36; 1 ex. (USNM 325384), LRP91-20; 6 ex. (ZRC), GYY026.

***Osteochilus spilurus* (Bleeker, 1851c) ***

Material examined. – 5 ex. (ZRC 37839), MK94-5,24; 1 ex. (ZRC 37854), MK94-7,25; 1 ex. (ZRC 37962), MK94-55.

***Oxygaster anomalura* van Hasselt, 1823**

Oxygaster anomalura - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 12 ex. (FMNH 68191), RFI 5.8.56; 3 ex. (FMNH 68190), RFI 12.8.56; 1 ex. (FMNH 69862), NSH 8.56; 1 ex. (FMNH 68274), RFI 11.8.56; 1 ex. (FMNH 95203), RFI 8.8.56; 47 ex. (FMNH 68189), RFI 8.8.56; 3 ex. (USNM 323672), LRP91-14; 1 ex. (ZRC), THH9807.

***Paracrossochilus acerus* Inger & Chin, 1962**

Paracrossochilus acerus Inger & Chin, 1962: 100 (Baleh: type series in FMNH and SM); Roberts, 1989: 57 (Baleh River); Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 4 ex. (FMNH 95196), GIK 27.9.62; 1 ex. (FMNH 95192), GIK 27.9.62; 1 ex. (FMNH 68879), IGK 21.9.62; 1 ex. (FMNH 69857), NSH 8.56; 1 ex. (USNM 323882), LRP91-31; 4 ex. (USNM 323883), LRP91-27; 3 ex. (USNM 323884), LRP91-28; 1 ex. (USNM 323885), LRP91-22; 1 ex. (USNM 325002), LRP91-35; 3 ex. (ZRC), GYY049; 7 ex. (ZRC), GYY026; 2 ex. (ZRC), THH9809; 17 ex. (ZRC), THH9805.

***Paracrossochilus vittatus* (Boulenger, 1894)**

Paracrossochilus vittatus - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 2 ex. (FMNH 68546), RFI 6.8.56; 4 ex. (FMNH 69858), NSH 8.56; 9 ex. (FMNH 68901), GIK 27.9.62; 1 ex. (FMNH 95193), IGK 22.9.62; 15 ex. (FMNH 68547), RFI 8.8.56; 69 ex. (FMNH 68545), RFI 5.8.56; 19 ex. (FMNH 68547), RFI 8.8.56.

***Puntioplites bulu* (Bleeker, 1851d)**

Puntius bulu - Chin, 1990: 10, Fig. S9 (Ulu Belaga); Chang, 1997: 15 (Rejang).

Material examined. – 12 ex. (ZRC), THH9803/4.

***Rasbora argyrotaenia* (Bleeker, 1850)**

Rasbora vaillanti (not of Popta, 1905) - Weber & de Beaufort, 1916: 63 (Kapit); Herre, 1940: 29 (Rejang).

Rasbora argyrotaenia - Kottelat & Lim, 1995: 233 (Kapit); Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 52 ex. (FMNH 68888), IGK 22.9.62; 219 ex. (FMNH 68900), IGK 27.9.62; 116 ex. (FMNH 68919), FWK 15.12.62; 6 ex. (FMNH 69829), NSH 8.56; 7 ex. (FMNH 69830), NSH 8.56; 42 ex. (FMNH 68337), RFI 5.8.56; 130 ex. (FMNH 68338), RFI 8.8.56; 3 ex. (FMNH 68339), RFI 12.8.56; 1 ex. (FMNH 69831), NSH 8.56; 1 ex. (FMNH 95199), FWK 15.12.62; 1 ex. (USNM 325028), LRP91-8; 6 ex. (USNM 325003), LRP91-21; 6 ex. (USNM 325005), LRP91-22; 6 ex. (USNM 325004), LRP91-35; 3 ex. (USNM 325339), LRP91-24; 7 ex. (USNM 325041), LRP91-26; 5 ex. (USNM 325338), LRP91-23; 1 ex. (SM uncat.), LRP 91-23; 3 ex. (USNM 325025), LRP91-27; 1 ex. (USNM 325035), LRP91-19; 1 ex. (USNM 325019), LRP91-25; 1 ex. (USNM 325030), LRP91-32; 1 ex. (SM-E 16.17.6), Kapit, iv.1904; 5 ex. (ZRC), GYY026; 1 ex. (ZRC), THH9806.

***Rasbora bankanensis* (Bleeker, 1853c) ***

Material examined. – 9 ex. (ZRC 37942), MK94-26.

***Rasbora borneensis* Bleeker, 1860**

Rasbora bornensis [sic.] - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – None.

***Rasbora caudimaculata* Volz, 1903**

Rasbora caudimaculata - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – None.

***Rasbora dusonensis* (Bleeker, 1851b)**

Rasbora dusonensis - Roberts, 1989: 73 (Rejang).

Material examined. – 3 ex. (FMNH 68342), RFI 10.8.56; 10 ex. (USNM 325394), LRP91-21; 45 ex. (USNM 325410), LRP91-21; 11 ex. (USNM 324990), LRP91-14; 26 ex. (USNM 325340), LRP91-31; 12 ex. (USNM 325396), LRP91-27; 9 ex. (USNM 325037), LRP91-21; 4 ex. (USNM 325023), LRP91-33; 2 ex. (USNM 325001), LRP91-28; 1 ex. (USNM 325020), LRP91-34; 4 ex. (USNM 325029), LRP91-22; 11 ex. (USNM 325393), LRP91-35; 7 ex. (USNM 325040), LRP91-19; 3 ex. (USNM 324994), LRP91-12; 1 ex. (SM uncat.), LRP91-12; 1 ex. (ZRC), THH9803/4.

Remarks. – There are two scales between the lateral-line scales and pelvic-fin origin, and a stripe of concentrated melanophores below the lead-coloured stripe on the specimens we examined. The side of the abdomen is strongly reticulated but these reticulations do not extend above the lead-coloured stripe. The distal margin of the caudal fin is distinctly dark brown. One of the largest species in its genus, a specimen (in FMNH 68342) from the Ulu Baleh measures 191 mm SL.

***Rasbora cf. dusonensis* (Bleeker, 1851b) ***
(Fig. 8)

Material examined. – 7 ex. (FMNH 68341), RFI 3.8.56; 4 ex. (FMNH 68341), RFI 3.8.56; 3 ex. (FMNH 103625), LRP91-8; 1 ex. (USNM 324981), LRP91-14; 5 ex. (USNM 324988), LRP91-12; 6 ex. (USNM 325036), LRP91-8; 3 ex. (USNM 324992), LRP91-13; 3 ex. (USNM 324985), LRP91-10; 2 ex. (USNM 324983), LRP91-9; 2 ex. (USNM 324662), LRP91-7; 1 ex. (USNM 324971), LRP91-8; 1 ex. (SM uncat.), LRP91-8.

Remarks. – This form is distinguished from the aforementioned species in having one scale between the lateral-line scales and pelvic-fin origin, and a distinct broad stripe of melanophores running over and below the lead-coloured stripe. The side of the abdomen is plain white without reticulations, and the distal margin of the caudal fin is not distinctly dusky.



Fig. 8. *Rasbora cf. dusonensis*, 82.5 mm SL, USNM 324985.

***Rasbora ennealepis* Roberts, 1989**

Rasbora cf. ennealepis - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – None.

***Rasbora kottelati* Lim, 1995**

Rasbora kottelati Lim, 1995: 66 (Sibu: type series in ZRC).

Material examined. – 4 ex. (ZRC 37841), MK94-5,24; 1 ex. (ZRC 37848), MK94-6; 10 ex. (ZRC 37949), MK94-27; 3 ex. (ZRC 37856), MK94-7,25; 7 ex. (ZRC 37961), MK94-55; 3 ex. (ZRC 37969), MK94-56.

***Rasbora pauciperforata* Weber & de Beaufort, 1916 ***

Material examined. – 6 ex. (ZRC 37965), MK94-55.

***Rasbora sarawakensis* Brittan, 1951**

Rasbora sarawakensis - Brittan, 1954: 99 (Rejang: 3 ex. CAS-SU 33593); Roberts, 1989: 75 (Rejang).

Material examined. - 36 ex. (FMNH 69833), NSH 8.56.

***Rasbora cf. sumatrana* (Bleeker, 1852c) ***

Material examined. - 2 ex. (USNM 324973), LRP91-8; 1 ex. (USNM 324976), LRP91-25; 6 ex. (USNM 324980), LRP91-32; 2 ex. (USNM 324984), LRP91-22; 2 ex. (USNM 324987), LRP91-36; 4 ex. (USNM 324993), LRP91-10; 2 ex. (USNM 324995), LRP91-7; 3 ex. (USNM 324999), LRP91-9; 2 ex. (USNM 325022), LRP91-6; 9 ex. (USNM 325038), LRP91-23; 56 ex. (USNM 325043), LRP91-19; 14 ex. (USNM 325395), LRP91-26; 2 ex. (of USNM 325396), LRP91-27; 1 ex. (of USNM 325037), LRP91-21; 4 ex. (ZRC 37943), MK94-26; 4 ex. (ZRC), GYY049; 3 ex. (ZRC), THH9807; 15 ex. (ZRC), THH9808; 18 ex. (ZRC), THH9805.

Remarks. - The specimens we refer to have 12 circumpeduncular scales and about 26 scales pierced by the lateral line. The body has distinct reticulations above and below the axial streak, and a bold, dusky stripe above anal-fin base. The caudal fin has a distinctly dusky distal margin.

***Rasbora tornieri* Ahl, 1922**

Rasbora dusonensis (not of Bleeker, 1851b) - Brittan, 1954: 122 (Rejang: 1 ex. CAS-Stanford 33594); Roberts, 1989: 73 (Rejang: numerous ex. in SMF).

Rasbora tornieri - Kottelat & Lim, 1995: 234.

Material examined. - 2 ex. (ZRC), GYY0483; 3 ex. (ZRC), THH9803/4; 1 ex. (ZRC), THH9810; 1 ex. (ZRC), THH9811; 4 ex. (ZRC 47267), Kapit market.

Remarks. - The largest of the genus *Rasbora* in the Rajang. The largest specimen seen by us is 163.0 mm SL (from ZRC 47267).

***Rasbora trilineata* Steindachner, 1870 ***

Material examined. - 1 ex. (ZRC 37944), MK94-26.

***Rasbora volzii* Popta, 1905**

Rasbora voltzii [sic.] - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. - 23 ex. (FMNH 68891), IGK 22.9.62; 12 ex. (FMNH 68902), IGK 27.9.62; 5 ex. (FMNH 68376), RFI 12.8.56; 25 ex. (FMNH 68374), RFI 3.8.56; 23 ex. (FMNH 69837), NSH 8.56; 29 ex. (FMNH 68375), RFI 8.8.56; 5 ex. (of USNM 324980), LRP91-32; 2 ex. (of USNM 325038), LRP91-23; 3 ex. (USNM 324982), LRP91-21; 1 ex. (USNM 324998), LRP91-20; 1 ex. (ZRC 37819), RS1; 1 ex. (ZRC), GYY049; 1 ex. (ZRC), GYY0483.

***Schismatorhynchos holorrhynchos* Siebert & Tjakrawidjaja, 1998**

Schismatorhynchos holorrhynchos Siebert & Tjakrawidjaja, 1998: 104, Fig. 6 (confluence of Batang Balui & Batang Kerumo).

Material examined. - Holotype (USNM 325389), LRP91-28.

Paratypes - 12 ex. (USNM 346637), LRP91-28.

Others - 2 ex. (USNM 325391), LRP91-6; 2 ex. (USNM 324978), LRP91-7; 2 ex. (USNM 325359), LRP91-9; 2 ex. (USNM 325387), LRP91-8; 2 ex. (USNM 325388), LRP91-34; 18 ex. (USNM 325390), LRP91-27; 28 ex. (USNM 325411), LRP91-35; 1 ex. (SM uncat.), LRP91-28; 1 ex. (ZRC 37823), RS3.

***Sundadanio axelrodi* (Brittan, 1976) ***

Material examined. - 5 ex. (ZRC 37966), MK94-55; 6 ex. (ZRC 37970), MK94-56; 30 ex. (ZRC 37865), MK94-7,25.

Remarks. - Formerly in the genus *Rasbora*, but unique in being sexually dimorphic, the males having brighter colours, a more slender shape, and tubercles on the head (see Kottelat & Witte, 1999). This fish lives in peat swamp drainages in the vicinity of Sibuluan.

***Systemus banksi* (Herre, 1940)**

Puntius bansi [sic.] - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. - 30 ex. (FMNH 68283), RFI 5.8.56; 2 ex. (FMNH 68285), RFI 12.8.56; 9 ex. (FMNH 68284), RFI 8.8.56; 137 ex. (FMNH 69855), NSH 8.56; 977 ex. (FMNH 69856), NSH 8.56; 3 ex. (FMNH 103622), LRP91-23; 18 ex. (USNM 323470), LRP91-32; 1 ex. (USNM 323471), LRP91-7; 5 ex. (USNM 323472), LRP91-22; 10 ex. (USNM 323473), LRP91-36; 27 ex. (USNM 323474), LRP91-19; 1 ex. (USNM 323475), LRP91-25; 10 ex. (USNM 323477), LRP91-23; 2 ex. (USNM 323478), LRP91-21; 10 ex. (USNM 323479), LRP91-26; 2 ex. (USNM 323480), LRP91-20; 1 ex. (USNM 323481), LRP91-24; 1 ex. (SM uncat.), LRP91-19; 2 ex. (ZRC), GYY049; 14 ex. (ZRC), THH9808.

***Systemus johorensis* (Duncker, 1904) ***

Material examined. - 1 ex. (ZRC), 25.8 mm SL, THH9811.

***Systemus kuchingensis* (Herre, 1940)**

Puntius kuchingensis - Kottelat & Lim, 1995: 233 (Sarikei); Leh et al., 1997: 26 (Ulu Katibas).

Material examined. - 3 ex. (FMNH 68909), IGK 9.10.62; 1 ex. (FMNH 68321), RFI 12.8.56; 1 ex. (FMNH 68319), RFI 5.8.56; 4 ex. (FMNH 68320), RFI 8.8.56; 6 ex. (ZRC), GYY0483; 5 ex. (ZRC), THH9808; 2 ex. (ZRC), THH9805.

***Systemus orphoides* (Valenciennes, in Cuvier & Valenciennes, 1842) ***

Material examined. – 1 ex. (ZRC), 90.0 mm SL, THH9803/4.

***Systemus pentazona* (Boulenger, 1894)**

Puntius pentazona pentazona - Alfred, 1963: 138 (Sibu).

Puntius pentazona - Roberts, 1989: 65 (Sibu); Kottelat & Lim, 1995: 233 (Sibu).

Material examined. – 12 ex. (ZRC 37840), MK94-5,24; 3 ex. (ZRC 37971), MK94-56; 3 ex. (ZRC 37948), MK94-27; 4 ex. (ZRC 37963), MK94-55; 8 ex. (ZRC), THH9812; 2 ex. (ZRC), THH9810.

Remarks. – This species appears to be endemic to northwestern Borneo, and has a distribution similar to that of *Rasbora kottelati*. In the Kuching area, southwest of the Rajang basin, it is replaced by *Systemus hexazona* (Weber & de Beaufort, 1912) that lacks the black spot under the posterior base of the dorsal fin that is consistently present on its presumed close relative.

***Tor tambra* (Valenciennes, in Cuvier & Valenciennes, 1842)**

Tor douronensis - Chang, 1997: 3 (Rejang).

Tor tambra - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 11 ex. (FMNH 68905), IGK 27.9.62; 10 ex. (FMNH 68559), NSH 8.56; 15 ex. (FMNH 68903), IGK 27.9.62; 6 ex. (FMNH 68896), IGK 22.9.62; 11 ex. (FMNH 69842), NSH 8.56; 6 ex. (FMNH 69840), NSH 8.56; 3 ex. (FMNH 69839), NSH 8.56; 3 ex. (FMNH 68558), RFI 12.8.56; 1 ex. (FMNH 69841), NSH 8.56; 151 ex. (FMNH 68557), RFI 8.8.56; 648 ex. (FMNH 68556), RFI 5.8.56; 2 ex. (FMNH 68561), RFI 3.8.56; 2 ex. (FMNH 69843), NSH 8.56; 20 ex. (FMNH 69844), NSH 8.56; 3 ex. (FMNH 68561), RFI 3.8.56; 44 ex. (FMNH 68562), RFI 5.8.56; 43 ex. (FMNH 68560), RFI 8.8.56; 1 ex. (FMNH 95197), FWK 15.12.62; 2 ex. (FMNH 95123), IGK 22.9.62; 1 ex. (FMNH 68915), FWK 15.12.62; 5 ex. (USNM 323689), LRP91-27; 12 ex. (USNM 323690), LRP91-28; 10 ex. (USNM 323691), LRP91-36; 3 ex. (USNM 323692), LRP91-35; 6 ex. (USNM 323693), LRP91-25; 11 ex. (USNM 323694), LRP91-22; 6 ex. (USNM 323695), LRP91-23; 3 ex. (USNM 323696), LRP91-26; 1 ex. (USNM 323698), LRP91-31; 1 ex. (USNM 323700), LRP91-32; 1 ex. (USNM 324986), LRP91-25; 1 ex. (USNM 325343), LRP91-24; 1 ex. (USNM 325358), LRP91-21; 1 ex. (USNM 325399), LRP91-32; 1 ex. (ZRC 37826), RS3; 1 ex. (ZRC), GYY026.

Remarks. – *Tor douronensis* (Valenciennes, in Cuvier & Valenciennes, 1842) is considered a junior synonym (Roberts, 1993b: 22). See under *Tor tambroides* for additional remarks. According to Chang (1997: 3), the local peoples in Sarawak distinguish this species (Ikan Semah) from *Tor tambroides* (Ikan Empurau). Both are esteemed food fishes that fetch high prices in the market. Depending on the locality, they can cost RM40 or more per kilogramme. The Ikan Semah has been named the state fish of Sarawak.

***Tor tambroides* (Bleeker, 1854a)**

Tor tambroides - Chang, 1997: 6 (Rejang); Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 20 ex. (FMNH 69844), NSH 8.56; 3 ex. (FMNH 68561), RFI 3.8.56; 2 ex. (FMNH 68561), RFI 3.8.56; 2 ex. (FMNH 69843), NSH 8.56; 43 ex. (FMNH 68560), RFI 8.8.56; 44 ex. (FMNH 68562), RFI 5.8.56; 1 ex. (USNM 323688), LRP91-20; 1 ex. (USNM 323697), LRP91-23; 2 ex. (USNM 323699), LRP91-28.

Remarks. – The taxonomy of the Sundanian *Tor* spp. is confused. The length of the fleshy median lobe under the lower jaw distinguishes the two forms in the Rajang basin. *Tor tambra* has a short, rounded snout and a short, truncate median lobe that is restricted to the upper one-third of the lower lip. *Tor tambroides* has a relatively long, pointed snout and a longer lobe that extends onto the posterior half of the lower lip. Both species live syntopically in the Rajang basin. Apart from the shape of the snout and length of the median lobe, there does not seem to be any other external morphological character to differentiate the forms. The differences may be due to sexual dimorphism within a single species. All *Tor* under 30 mm SL examined by us resemble *T. tambra* and are here treated as that species. The elongate median lobe of *T. tambroides*, however, is present on specimens as small as 55 mm SL (from FMNH 68560). Several of the juveniles we examined have a round, black blotch on the caudal base, not present in adults. Some freshly caught *Tor* from the Baleh River at Long Singut are pictured in Chin (1990: 14, Fig. S13A). In Sarawak, *Tor tambroides* is known as Ikan Empurau, and is distinguished from the similar Ikan Semah, *Tor tambra*, not only by the long median lobe under the lower jaw, but also by its larger size and golden-yellow colour. The local peoples along the Rajang recognise three types of Ikan Empurau: Empurau Burak, Empurau Merah, and Empurau Chelum (Chang, 1997: 6).

Undescribed genus and species *

Material examined. – 9 ex. (ZRC 37853), MK94-7,25; 35 ex. (ZRC), THH9812.

Remarks. – These specimens represent a diminutive, pelagic danionine fish and do not exceed 12 mm SL. It is found largely in blackwater streams draining coastal peat swamp forests. Kai-Erik Witte (pers. comm.) is preparing the description of this genus that also lives in Peninsular Malaysia and Sumatra.

FAMILY COBITIDAE

***Acanthopsoides molobrion* Siebert, 1991**

Acanthopsoides molobrion Siebert, 1991: 108 (Baleh: 3 ex., FMNH 68156); Kottelat & Lim, 1995: 237 (Baleh).

Material examined. – None.

***Pangio anguillaris* (Vaillant, 1902)**

Pangio anguillaris [sic.] - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. - None.

Pangio piperata* Kottelat & Lim, 1993 *

(Fig. 9)

Material examined. - 26 ex. (ZRC) THH9809; 25 ex. (ZRC) THH9807; 1 ex. (USNM 321604), LRP91-7; 6 ex. (USNM 321605), LRP91-31; 2 ex. (USNM 321606), LRP91-19; 8 ex. (USNM 321608), LRP91-8; 2 ex. (USNM 321609), LRP91-10; 1 ex. (USNM 321882), LRP91-8.

Remarks. - *Pangio piperata* Kottelat & Lim (1993: 236) was described from Peninsular Malaysia, and is also known from Sumatra. The present specimens represent a new record for Borneo.

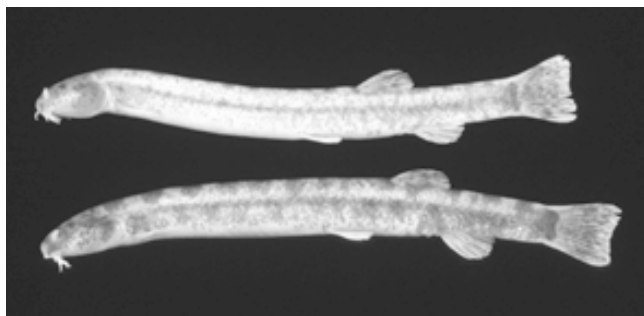


Fig. 9. *Pangio piperata*, 33.4 & 35.9 mm SL, ZRC uncat. from THH 9807.

***Pangio semicineta* (Fraser-Brunner, 1940)**

Acanthopthalmus kuhlii (not of Valenciennes, in Cuvier & Valenciennes, 1846) - BurrIDGE, 1992: 174, 181 (Rajang).

Material examined. - 22 ex. (ZRC), THH9807.

***Syncrossus hymenophysa* (Bleeker, 1852c) ***

(Fig. 7c)

Material examined. - 1 ex. (USNM 322213), LRP91-28; 1 ex. (USNM 323668), LRP91-27.

Remarks. - *Syncrossus hymenophysa*, known as a lowland species, was reported by Roberts (1989:103), as *Botia hymenophysa*, to be replaced by *S. reversa* in upland areas on the southern slopes of the Kapuas Hulu Range. Our specimens of *S. hymenophysa* were collected in upland areas. *Syncrossus reversa* has not been found in the Rajang and perhaps does not live there. It is distinguished from *S. hymenophysa* by having 9 to 11 (versus 12 to 13) branched rays and no (versus presence of a) blackish blotch on the dorsal fin. We follow Kottelat (2004a) in classifying this species in the genus *Syncrossus*.

FAMILY BALITORIDAE

***Gastromyzon fasciatus* Inger & Chin, 1961**

Gastromyzon fasciatus Inger & Chin, 1961: 173 (Baleh: type series in FMNH); Roberts, 1982a: 507 (Baleh); Kottelat & Lim, 1995: 235 (Baleh); Leh et al., 1997: 25 (Ulu Katibas).

Material examined. - holotype (FMNH 68119), RFI 8.8.56; 22 paratypes (FMNH 68115), RFI 8.8.56. Others - 8 ex. (FMNH 68936), RFI 27.9.62; 17 ex. (FMNH 68937), RFI 3.10.62; 5 ex. (FMNH 68946), RFI 10.9.62.

***Gastromyzon megalepis* Roberts, 1982a**

Gastromyzon borneensis (in part) - Inger & Chin, 1961: 176 (Baleh). *Gastromyzon megalepis* Roberts, 1982a: 510 (Baleh: type series in FMNH).

Gastromyzon borneensis (in part), *Gastromyzon megalepis* - Kottelat & Lim, 1995: 235 (Baleh).

Material examined. - holotype (FMNH 68126), RFI 5.8.56; 5 paratypes (FMNH 94593), RFI 5.8.56. Others - 1 ex. (ZRC 37818), RS1; 1 ex. (ZRC 27824), RS3.

***Gastromyzon punctulatus* Inger & Chin, 1961**

Gastromyzon punctulatus Inger & Chin, 1961: 173 (Baleh: type series in FMNH); Roberts, 1982a: 515 (Baleh); Kottelat & Lim, 1995: 235 (Baleh).

Material examined. - holotype (FMNH 68116), RFI 8.8.56; 7 paratypes (FMNH 68117), RFI 8.8.56. Others - 1 ex. (USNM 323723), LRP91-19; 2 ex. (USNM 323687), LRP 91-27; 2 ex. (ZRC 37825), RS3; 62 ex. (FMNH 68938), IGK 3.10.62; 1 ex. (FMNH 68154), NSH 8.56; 4 ex. (FMNH 68945), RFI 10.9.62.

***Gastromyzon* sp.**

Gastromyzon embalohensis nomen nudum (not of Rachmatika, 1998) - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. - 1 ex. (ZRC 47019), Lanjak Entimau Wildlife Sanctuary; Sg. Begua; 4 ex. (ZRC 47020), Ulu Katibas; 2 ex. (ZRC 37825), Ulu Katibas; Sg. Melinau.

Remarks. - This species is differentiated from its congeners in the Rajang by having red dorsal, caudal and anal fins as in *Gastromyzon embalohensis* Rachmatika (1998) from the upper Kapuas basin. It is morphologically distinct from that species, however, and will be described as a new taxon (H. H. Tan, pers. comm. in 2004).

***Glaniopsis* cf. *hanitschi* Boulenger, 1899**

Baleh *Glaniopsis* - Roberts, 1982a: 522 (Baleh: 24 ex. FMNH 68137, 68151-68153, 69868).

Material examined. – 1 ex. (FMNH 97442), IGK 27.9.62; 1 ex. (FMNH 68151), NSH 8.56; 2 ex. (FMNH 68137), RFI 3.8.56; 1 ex. (FMNH 68152), NSH 8.56; 18 ex. (FMNH 68153), NSH 8.56; 2 ex. (FMNH 69868), NSH 8.56; 1 ex. (FMNH 87077), RFI 5.8.56; 2 ex. (USNM 323881), LRP91-31.

Remarks. – Roberts (1982a: 522) recognises this possibly undescribed species as resembling *Glaniopsis hanitschi* but specimens differing ‘in their much smaller size, shorter barbels, ... seven instead of only six branched dorsal-fin rays, fewer scales, and other minor differences’. Members of the Borneo endemic genus *Glaniopsis* are found mainly in small mountain streams with clear, cool water.

***Homaloptera nebulosa* Alfred, 1969**

Homaloptera cf. *nebulosa* - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 1 ex. (USNM 323874), LRP91-35; 1 ex. (USNM 323876), LRP91-8; 4 ex. (USNM 323877), LRP91-35; 1 ex. (USNM 323880), LRP91-19; 1 ex. (ZRC), GYY049; 3 ex. (ZRC), GYY026; 3 ex. (ZRC), THH9809; 30 ex. (ZRC), THH9806; 2 ex. (ZRC), THH9808; 14 ex. (ZRC), THH9807; 18 ex. (ZRC), THH9805.

***Homaloptera orthogoniata* Vaillant, 1902 ***

Material examined. – 1 ex. (FMNH 68944), RFI 10.9.62; 3 ex. (FMNH 68941), RFI 3.10.62; 1 ex. (FMNH 68155), NSH 8.56; 2 ex. (ZRC), THH9806.

***Homaloptera wassinkii* Bleeker, 1853d ***

Material examined. – 1 ex. (FMNH 97441), IGK 3.10.62; 2 ex. (FMNH 68140), RFI 8.8.56; 2 ex. (USNM 323875), LRP91-36; 1 ex. (USNM 323878), LRP 91-22; 2 ex. (USNM 323879), LRP 91-26.

***Homaloptera* cf. *stephensi* Hora, 1932**

Homaloptera cf. *stephensi* - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – None.

***Homaloptera* sp. ***
(Fig. 10)

Material examined. – 3 ex. (ZRC), THH9806; 4 ex. (ZRC), THH9809.

Remarks. – A small species (largest specimen obtained was 29 mm SL) that resembles *Homaloptera nebulosa*, but differs in lacking the large dark-brown blotches over the dorsum. Its specific status awaits verification.

***Katibasia insidiosa* Kottelat, 2004**

Katibasia insidiosa Kottelat, 2004b: 303, fig. 2 (Ulu Katibas).

Material examined. – holotype (ZRC 49631), RS3; 4 paratypes (ZRC 49287), GYY026.

Remarks. – *Katibasia insidiosa* is distinguished from all other species of balitorids in Borneo, mainly in having its upper lip fused with the rostral cap anteriorly, between the rostral barbels (Kottelat, 2004b: 302).

***Nemacheilus kapuasensis* Kottelat, 1984**

Noemacheilus kapuasensis Kottelat, 1984: 244 (Baleh: non-type ex. FMNH).

Nemacheilus kapuasensis - Roberts, 1989: 107 (Rejang); Kottelat & Lim, 1995: 236 (Baleh).

Nemacheilus cf. *kapuasensis* [sic.] - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 3 ex. (USNM 320387), LRP91-26; 2 ex. (USNM 320388), LRP91-22; 1 ex. (USNM 320389), LRP91-25; 6 ex. (USNM 320390), LRP91-10; 4 ex. (USNM 320391), LRP91-27; 14 ex. (USNM 320392), LRP91-31; 8 ex. (USNM 320393), LRP91-21; 7 ex. (USNM 320394), LRP91-32; 27 ex. (USNM 320395), LRP91-8; 1 ex. (USNM 320396), LRP91-13; 14 ex. (USNM 320397), LRP91-7; 15 ex. (USNM 320398), LRP91-19; 30 ex. (USNM 320399), LRP91-9; 3 ex. (USNM 320400), LRP91-35; 5 ex. (ZRC), THH9809.

Remarks. – *Nemacheilus kapuasensis* is sometimes syntopic with *N. spiniferus* in the Rajang basin.

***Nemacheilus saravacensis* Boulenger, 1894**

Nemacheilus saravacensis - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – None.

***Nemacheilus spiniferus* Kottelat, 1984**

Noemacheilus spiniferus Kottelat, 1984: 250 (Belaga: 15 ex. SMF 17012).

Nemacheilus spiniferus - Kottelat & Lim, 1995: 236 (Rejang).

Material examined. – 1 ex. (of USNM 320396), LRP91-13; 6 ex. (ZRC), THH9807.



Fig. 10. *Homaloptera* sp., 28.1 mm SL, ZRC uncat. from THH 9806.

***Neogastromyzon cf. nieuwenhuisii* Popta, 1905**

Gastromyzon nieuwenhuisii - Inger & Chin, 1961: 175 (Rajang).
Neogastromyzon nieuwenhuisii - Kottelat & Lim, 1995: 236 (Rajang);
 Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 2 ex. (FMNH 68947), RFI 10.9.62; 126 ex. (FMNH 68131), RFI 5.8.56; 2 ex. (ZRC), GYY049; 1 ex. (ZRC), GYY026.

Remarks. – The Rajang population of *Neogastromyzon nieuwenhuisii* is distinct from that from the type locality (Kayan basin in Kalimantan), and represents an undescribed species (H. H. Tan, pers. comm. in 2004). It is tentatively recognised as *N. nieuwenhuisii* because it has a post-oral pouch, which is absent on *N. pauciradiatus*.

***Neogastromyzon pauciradiatus* (Inger & Chin, 1961)**

Gastromyzon pauciradiatus Inger & Chin, 1961: 174 (Baleh: type series in FMNH).
Neogastromyzon pauciradiatus - Kottelat & Lim, 1995: 236 (Baleh).

Material examined. – holotype (FMNH 68121), RFI 5.8.56; 21 paratypes (FMNH 68122), RFI 5.8.56. Others – 3 ex. (FMNH 68939), RFI 3.10.62; 4 ex. (FMNH 68935), RFI 27.9.62.

Remarks. – Both *Neogastromyzon* spp. are syntopic in the Rajang basin.

***Parhomaloptera microstoma* (Boulenger, 1899)**

Parhomaloptera microstoma - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – 2 ex. (FMNH 68942), IGK 3.10.62; 1 ex. (FMNH 68943), RFI 10.9.62; 5 ex. (FMNH 68130), RFI 8.8.56; 5 ex. (FMNH 68934), RFI 27.9.62; 4 ex. (FMNH 68134), RFI 3.8.56.

***Protomyzon griswoldi* (Hora & Jayaram, 1952)**

Protomyzon griswoldi - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. – None.

ORDER SILURIFORMES

FAMILY BAGRIDAE

***Bagrichthys macracanthus* (Bleeker, 1854a) ***

Material examined. – 2 ex. (ZRC), THH9803/4; 1 ex. (ZRC 47271), Kapit market.

***Bagroides melapterus* Bleeker, 1851d**

Bagroides melapterus - Weber & de Beaufort, 1913: 116 (Rajang);
 Kottelat & Lim, 1995: 238 (Rajang).

Material examined. – 1 ex. (SFD), middle Rajang.

***Hemibagrus nemurus* (Valenciennes, 1839) ***

Material examined. – 2 ex. (FMNH 68924), IGK 19.9.62; 9 ex. (FMNH 68058), RFI 11.8.56; 8 ex. (USNM 324566), LRP91-21; 10 ex. (USNM 324989), LRP91-7; 1 ex. (USNM 324991), LRP91-34; 1 ex. (USNM 325033), LRP91-25; 18 ex. (USNM 325039), LRP91-25; 3 ex. (USNM 325323), LRP91-36; 52 ex. (USNM 325324), LRP91-35; 3 ex. (USNM 325325), LRP91-24; 33 ex. (USNM 325326), LRP91-31; 1 ex. (SM uncat.), LRP91-31; 10 ex. (FMNH 103620), LRP91-31; 2 ex. (USNM 325327), LRP91-15; 1 ex. (USNM 325386), LRP91-32; 2 ex. (USNM 325397), LRP91-13; 1 ex. (USNM 325401), LRP91-20; 3 ex. (USNM 325403), LRP91-26; 2 ex. (USNM 325404), LRP91-23; 18 ex. (USNM 325405), LRP91-19; 158 ex. (USNM 325406), LRP91-9; 10 ex. (USNM 325407), LRP91-10; 18 ex. (USNM 325408), LRP91-8; 2 ex. (ZRC), THH9803/4; 5 ex. (ZRC), THH9813; 1 ex. (ZRC), THH9806; 2 ex. (ZRC), THH9807; 2 ex. (ZRC), GYY.

Remarks. – *Hemibagrus nemurus* is distributed widely throughout Thailand, Malay Peninsula, Sumatra, Java, as well as Borneo (Roberts, 1989:122). This bagrid is one of the most common species in the middle and upper Rajang basin, taken at 18 of the 32 stations in the 1991 collection, including both the middle Rajang at Kapit and upper Rajang, above Belaga.

***Hemibagrus bongan* (Popta, 1904)**

Mystus cf. planiceps - Roberts, 1989: 123 (Rejang, FMNH 68092).
Hemibagrus planiceps - Kottelat & Lim, 1995: 238 (Rejang).
Hemibagrus cf. bongan - Leh et al., 1997: 25 (Ulu Katibas).
Hemibagrus bongan - Ng & Rachmatika, 1999: 173 (Rajang basin).

Material examined. – 1 ex. (FMNH 68064), NSH 8.56; 4 ex. (FMNH 68084), RFI 5.8.56; 1 ex. (FMNH 68411), NSH 8.56; 17 ex. (FMNH 68920), FWK 15.12.62; 18 ex. (FMNH 68925), GIK 22.9.62; 7 ex. (FMNH 68063), NSH 8.56; 13 ex. (FMNH 68092), RFI 8.8.56; 1 ex. (USNM 324567), LRP91-22; 1 ex. (ZRC 40496), Kapit River, C. Leh, no date. See Ng & Rachmatika (1999: 173) for additional material from the Rajang.

***Hemibagrus chrysops* Ng & Dodson, 1999**

Hemibagrus chrysops Ng & Dodson, 1999 (Sibu).

Material examined. – 7 paratypes (ZRC 23008-23014), Sibu.

Remarks. – *Hemibagrus chrysops* resembles *H. nemurus* but differs from it in lacking a blackish mid-lateral stripe and by having a long, narrow head (head width 53.4 to 62.5 % in head length). Live or freshly dead examples are a bright golden-yellow. *Hemibagrus chrysops* lives mainly in the tidal reaches of the Rajang, around the Sibu area.

***Hemibagrus fortis* (Popta, 1904)**

? *Hemibagrus cf. nemurus* - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 1 ex. (ZRC 37709), Lanjak-Entimau Wildlife Sanctuary.

Remarks. – According to H. H. Ng (pers. comm. in 2004), *Hemibagrus fortis* is distinguished from *H. nemurus* and *H. chrysops* in having a long and low (versus a short and tall) adipose fin, a round (versus jagged) dorsal fin distal margin, and males with a relatively slender (versus thick) genital papilla.

***Hemibagrus wyckii* (Bleeker, 1858b) ***

Material examined. – 1 ex. (FMNH 68058), RFI 11.8.56; 1 ex. (USNM 325409), LRP91-33; 1 ex. (USNM 325328), LRP91-30; 1 ex. (ZRC), THH9803/4; 1 ex. (ZRC), GYY.

***Leiocassis micropogon* (Bleeker, 1852d)**

Leiocassis hosii Regan, 1906: 67 (Sibu: type series in BMNH).
Leiocassis hosii - Weber & de Beaufort, 1913: 360 (Sibu).
Leiocassis (Leiocassis) hosii - Jayaram, 1968: 351 (Sibu).
Leiocassis micropogon (in part) - Kottelat & Lim, 1995: 238 (Sibu).

Material examined. – 2 of 6 syntypes of *Leiocassis hosii* (BMNH 1906.10.29.18-22). Others – 3 ex. (FMNH 68004), RFI 8.8.56; 1 ex. (ZRC 37861), MK94-7,25.

Remarks. – Just dead specimens of this catfish have a distinct bright golden-yellow sheen over the body that fades after about a month in formalin. Roberts (1993: 27) tentatively synonymised *Leiocassis hosii* under *L. poecilopterus* (Valenciennes, in Cuvier & Valenciennes, 1840a), but these are distinct taxa. As seen from radiographs, *L. hosii* has the post-cranial process and pre-dorsal plate separated by a wide gap, which is characteristic of *L. micropogon*. These bones meet in *L. poecilopterus*.

***Mystus castaneus* Ng, 2002**

Mystus castaneus Ng, 2002: 165 (Rejang).

Material examined. – None.

***Mystus singaringan* (Bleeker, 1846) ***

Material examined. – 3 ex. (USNM 324972), LRP91-25; 9 ex. (USNM 324974), LRP91-19; 2 ex. (USNM 324975), LRP91-9; 1 ex. (USNM 325421), LRP91-30; 3 ex. (ZRC), THH9803/4.

Remarks. – This species was previously recorded as *Mystus nigriceps* (Valenciennes, in Cuvier & Valenciennes, 1840a) or *M. macronema* (Bleeker, 1846) (see Roberts, 1994a: 252).

***Pseudomystus fuscus* (Poopta, 1904) ***

Material examined. – 3 ex. (ZRC 37860), MK94-7,25.

***Pseudomystus inornatus* (Boulenger, 1894) ***

Leiocassis sp. 1 - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 1 ex. (SM), Lanjak-Entimau: Ulu Katibas.

Remarks. – This catfish is apparently endemic to western Borneo.

***Pseudomystus stenomus* (Valenciennes, in Cuvier & Valenciennes, 1840a) ***

Material examined. – 1 ex. (SM), Kapit.

FAMILY SILURIDAE

***Ceratoglanis scleronema* (Bleeker, 1862)**

Ceratoglanis scleronema - Ng, 1999b: 387 (Kapit).

Material examined. – 1 ex. (ZRC 42739), THH9803/4; 5 ex. (ZRC), THH.

***Hemisilurus heterorhynchus* (Bleeker, 1853a) ***

Material examined. – 7 ex. (ZRC), THH9803/4.

***Kryptopterus bicirrhis* (Valenciennes, in Cuvier & Valenciennes, 1840a) ***

Material examined. – 2 ex. (ZRC), GYY0483.

***Kryptopterus cryptopterus* (Bleeker, 1851c) ***

Material examined. – 1 ex. (USNM 322196), LRP91-10; 1 ex. (USNM 322200), LRP91-8; 10 ex. (USNM 323362), LRP91-15; 8 ex. (ZRC), GYY0483; 7 ex. (ZRC), THH9803/4; 1 ex. (ZRC), GYY0483; 1 ex. (ZRC), THH9803/4.

Remarks. – Two examples (one from GYY0483, the other from THH9803/4) have a relatively more tapered head, and more convex dorsal head profile than the others among the material examined by us.

***Kryptopterus hexapterus* (Bleeker, 1851d) ***

Material examined. – 8 ex. (ZRC 45833), THH9813; 1 ex. (ZRC), THH9813.

***Kryptopterus limpok* (Bleeker, 1852e) ***

Material examined. – 1 ex. (FMNH 68023), RFI 11.8.56; 3 ex. (USNM 323361), LRP91-29; 1 ex. (USNM 325357), LRP91-35.

***Kryptopterus macrocephalus* (Bleeker, 1858b)**

Kryptopterus macrocephalus - Kottelat & Lim, 1995: 240 (Sibu, Daro).

Material examined. – 5 ex. (ZRC 37960), MK94-55; 2 ex. (ZRC 37862), MK94-7,25.

***Kryptopterus platypogon* Ng, 2004**

Kryptopterus platypogon - Ng, 2004: 2 (Sibu).

Material examined. – holotype (ZRC 45838), THH9813.

***Micronema apogon* (Bleeker, 1851e) ***

Material examined. – 1 ex. (ZRC), GYY; 1 ex. (ZRC), THH; 12 ex. (ZRC), THH9813; 1 ex. (ZRC 45840), THH9803/4.

Remarks. – The generic placement of this species follows Rainboth (1996: 148).

***Ompok jaynei* Fowler, 1905**

Ompok jaynei - Tan & Ng, 1996: 535 (Sibu).

Material examined. – 1 ex. (ZRC.38354), MK94-55; 1 ex. (ZRC.38355), MK94-55.

***Silurichthys phaiosoma* (Bleeker, 1851a)**

Silurichthys phaiosoma - Ng & Ng, 1998: 312.

Material examined. – 4 ex. (ZRC 37847), 3 ex. (CMK 10871), MK94-5,24; 1 ex. (ZRC 37855), 1 ex. (CMK 10884), MK94-7,25; 1 ex. (ZRC 37958), MK94-55.

Remarks. – *Silurichthys marmoratus* Ng & Ng (1998: 310), described from southwestern Sarawak and also reported from Brunei (Parenti & Meisner, 2003), is likely to live in the Rajang basin. *Silurichthys marmoratus* is distinguished by its relatively short, emarginate caudal fin with upper lobe 1.1-1.2 times longer than the lower lobe, whereas *S. phaiosoma* has a long and forked caudal fin, the upper lobe 1.4-1.6 times longer than the lower.

***Wallago leerii* Bleeker, 1851a**

Wallago maculatus (not of Inger & Chin, 1959) - Chang, 1997: 25 (Rejang).

Material examined. – 1 ex. (ZRC), 530.0 mm SL, THH.

Remarks. – This is possibly the largest freshwater fish in Sarawak, with individuals occasionally reaching a length of two metres and weighing over 50 kilogrammes. Julau in the Rajang basin is one of the well-known spawning grounds of this esteemed food fish (Chang, 1997: 25).

FAMILY PANGASIIDAE

***Pangasius micronemus* Bleeker, 1847**

Pangasius micronema - Roberts & Vidthayanon, 1991: 131 (Rejang).

Material examined. – 3 ex. (ZRC), GYY; 2 ex. (ZRC 47270), Kapit market.

***Pangasius polyuranodon* Bleeker, 1852c**

Pangasius polyuranodon - Roberts & Vidthayanon, 1991: 137 (Rejang).

Material examined. – 1 ex. (USNM 325650), LRP91-15; 1 ex. (ZRC), THH.

***Pangasius nasutus* Bleeker, 1863**

Pangasius nieuwenhuisi (not of Popta, 1904) - Chang, 1997: 28-29 (Sg. Baleh, Kapit market).

Material examined. – 5 ex. (USNM 325416), LRP91-11 [purchased at the Kapit Town market, said to have been taken in the Pelagus rapids by cast net]; 1 ex. (USNM 322216), LRP91-15; 2 ex. (ZRC), GYY.

***Pangasius* sp. ***

Material examined. – 1 ex. (USNM 325417), LRP91-11.

Remarks. – This appears to be an undescribed species (Chavalit Vidthayanon, pers. comm. in 1993).

FAMILY SISORIDAE

***Glyptothorax major* (Boulenger, 1894)**

Glyptothorax major - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 14 ex. (FMNH 68013), RFI 5.8.56; 1 ex. (FMNH 68922), RFI 1.10.62; 3 ex. (ZRC), GYY049; 3 ex. (ZRC), GYY026; 6 ex. (ZRC), THH9805; 3 ex. (ZRC), THH9806.

***Glyptothorax platypogon* (Valenciennes, in Cuvier & Valenciennes, 1840b)**

Glyptothorax platypogon - Weber & de Beaufort, 1913: 264 (Rajang); Kottelat & Lim, 1995: 242 (Rajang).

Material examined. – 1 ex. (ZRC 37821), RS3.

FAMILY AKYSIDAE

Acrochordonichthys rugosus (Bleeker, 1847)

Acrochordonichthys rugosus - Ng & Ng, 2001: 411 (near Kanowit).

Material examined. – 1 ex. (SFD), middle Rajang near Kanowit.

FAMILY CLARIIDAE

Clarias leiacanthus Bleeker, 1851a*

Material examined. – 2 ex. (USNM 323726), LRP91-21; 1 ex. (ZRC 37820), RS2; 1 ex. (ZRC 37842), MK94-5,24; 1 ex. (ZRC 37950), MK94-27; 2 ex. (ZRC), THH9803/4.

Remarks. – The name *Clarias teijsmanni* Bleeker (1857), used widely for this species, is considered a synonym of *Clarias leiacanthus* (see Ng, 1999a).

Clarias planiceps Ng, 1999a

Clarias planiceps Ng, 1999a: 22 (Kapit: type series in ZRC, FMNH and USNM).

Material examined. – paratypes - 1 ex. (USNM 323727), LRP91-19; 1 ex. (USNM 323728), LRP91-36; 2 ex. (USNM 323729), LRP91-20; 2 ex. (USNM 323733), LRP91-24; 1 ex. (USNM 323734), LRP91-31; 1 ex. (USNM 323736), LRP91-32; 1 ex. (USNM 323738), LRP91-8. Others – 22 ex. (FMNH 68103), RFI 5.8.56; 26 ex. (FMNH 68932), GIK 27.9.62; 8 ex. (FMNH 68105), RFI 8.8.56. See Ng (1999a: 22) for additional material from the Rajang basin.

Remarks. – According to Ng (1999a), *Clarias planiceps* is distinguished from *Clarias leiacanthus* by its light purplish-brown colouration and small, pale yellow or whitish spots on the sides of the body; a relatively flat head (head depth 59–63.8% head width), and relatively large and distinct serrations on the anterior edge of the pectoral spine. It is also known from the Kapuas and Kayan rivers in Kalimantan.

Encheloclarias baculum Ng & Lim, 1993

Encheloclarias baculum - Ng & Tan, 2000: 538 (Sibu).

Material examined. – 2 ex. (ZRC 44215), Sibu: Sg. Kemayan.

FAMILY ARIIDAE

Hemipimelodus borneensis (Bleeker, 1851a) *

Material examined. – 1 ex. (ZRC), 121.5 mm SL, THH9813.

ORDER ATHERINIFORMES

FAMILY PHALLOSTETHIDAE

Phenacostethus smithi Myers, 1928 *

Material examined. – 11 ex. (USNM 325048), LRP91-14; 5 ex. (USNM 325049), LRP91-6; 1 ex. (ZRC), THH9808; 3 ex. (ZRC), THH9807.

Remarks. – The distribution and systematics of this and other phallostethid species in northwestern Borneo were discussed by Parenti (1986, 1996).

ORDER BELONIFORMES

FAMILY HEMIRAMPHIDAE

Hemirhamphodon kuekenthali Steindachner, 1901

Hemirhamphodon pogonognathus (not of Bleeker, 1853c) - Brown & Brown, 1987: 158 (Sibu).

Hemirhamphodon kuekenthali - Anderson & Collette, 1991:165 (Sibu); Kottelat & Lim, 1995: 244 (Sibu).

Material examined. – 3 ex. (USNM 320499), LRP91-10; 1 ex. (USNM 320503), LRP91-6; 1 ex. (USNM 321607), LRP91-7; 6 ex. (ZRC 37843), MK94-5,24; 4 ex. (ZRC 37945), MK94-26; 4 ex. (ZRC 37930), MK94-23; 8 ex. (ZRC 37864), MK94-7,25; 1 ex. (ZRC), GYY049; 2 ex. (ZRC), THH9808; 5 ex. (ZRC), THH9805.

ORDER GASTEROSTEIFORMES

FAMILY SYNGNATHIDAE

Doryichthys martensii (Peters, 1868) *

Material examined. – 1 ex. (FMNH 68417), RFI 11.8.56; 5 ex. (ZRC), THH9809; 19 ex. (ZRC), THH9807; 1 ex. (ZRC), THH9806.

ORDER SYNBRANCHIFORMES

FAMILY CHAUDHURIIDAE

Nagaichthys sp.*

Nagaichthys sp. - Kottelat & Lim, 1995: 250 (Sibu).

Material examined. – None.

Remarks. – *Nagaichthys* has been considered monotypic, containing solely *N. filipes* Kottelat & Lim, in Kottelat (1991), described from the Kapuas basin in Kalimantan Barat. Specimens from the Sibu area differ in having a distinctly forked caudal fin, and will be described as a new species (M. Kottelat, pers. comm. in 2004).

FAMILY MASTACEMBELIDAE

Macrognathus aculeatus (Bloch, 1786)

Macrognathus aculeatus - Leh et al., 1997: 26 (Ulu Katibas).

Material examined. - None.

Macrognathus circumcinctus (Hora, 1924) **
(Fig. 11)

Material examined. - 1 ex. (FMNH 68497), NSH 8.56; 1 ex. (FMNH 68495), RFI 3.8.56; 2 ex. (FMNH 68927), RFI 22.9.62; 1 ex. (FMNH 68928), RFI 27.9.62; 2 ex. (USNM 323674), LRP91-23; 1 ex. (ZRC), GYY049; 1 ex. (ZRC), THH9806; 1 ex. (ZRC), THH9805.

Remarks. - This species has not been previously reported from Borneo. One exceptionally large specimen (FMNH 68495) measures 220 mm TL. *Macrognathus circumcinctus* also lives in Thailand and Peninsular Malaysia.



Fig. 11. *Macrognathus circumcinctus*, 90.6 mm SL, ZRC uncat. from THH 9805 (right side reversed).

Macrognathus keithi (Herre, 1940)

Macrognathus keithi - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. - None.

Mastacembelus unicolor Cuvier, in Cuvier & Valenciennes, 1832
(Fig. 7d)

Mastacembelus unicolor - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. - 29 ex. (FMNH 68484), RFI 5.8.56; 30 ex. (FMNH 68485), RFI 8.8.56; 1 ex. (FMNH 68486), RFI 11.8.56; 1 ex. (FMNH 68929), RFI 27.9.62; 2 ex. (USNM 323670), LRP91-36; 2 ex. (ZRC), GYY049; 1 ex. (ZRC), GYY026; 5 ex. (ZRC), THH9806; 1 ex. (ZRC), THH9805.

ORDER PERCIFORMES

FAMILY CHANDIDAE

Parambassis wolffii (Bleeker, 1851b) *

Material examined. - 7 ex. (ZRC), THH9803/4.

Remarks. - Roberts (1994b: 289) confirms the presence of this species from the Chao Phraya and Mekong basins on continental Southeast Asia, Sumatra and the Kapuas, Mentaya, Barito and Kahajan basins of Borneo. He doubted a record from the Baram River without explanation.

FAMILY DATNIOIDIDAE

Datnioides quadrifasciatus (Sevastianof, 1809) *

Material examined. - 1 ex. (ZRC), THH9813.

Remarks. - Nomenclature follows Kottelat (2000: 93).

FAMILY POLYNEMIDAE

Polynemus hornadayi Myers, 1936

Polynemus hornadayi - Motomura et al., 2002: 309 (Kapit).

Material examined. - 3 ex. (ZRC), THH9813; 1 ex. (ZRC 46032), THH9803/4.

Remarks. - This species is known only from western Borneo (Motomura et al., 2002: 309).

Polynemus melanochir melanochir (Valenciennes, in Cuvier & Valenciennes, 1831) *

Material examined. - 6 ex. (ZRC), THH9813.

Remarks. - This river-dwelling threadfin is easily distinguished from its sympatric congener in the Rajang in having black pectoral fins. It is often sold in the markets of Sibul and Serian as a food fish. *Polynemus borneensis* Bleeker, 1857 and *P. hilleri* (Fowler, 1905) are considered junior synonyms (Motomura & Sabaj, 2002: 181, 184).

FAMILY NANDIDAE

Nandus nebulosus (Gray, 1835)

Nandus nebulosus - Ng et al., 1996: 18 (Sg. Tebu, Sibul).

Material examined. - 1 ex. (ZRC 37951), MK94-27; 2 ex. (ZRC 37959), MK94-55.

FAMILY PRISTOLEPIDAE

Pristolepis grootii (Bleeker, 1852d) *

Material examined. - About five individuals up to 15 cm TL were identified, but not collected, at the fish market in Kapit in June 2002 (H. H. Tan, pers. comm. in 2002).

FAMILY ELEOTRIDAE

Eleotris melanosoma Bleeker, 1852e *

(Fig. 7e)

Material examined. – 1 ex. (USNM 321249), LRP91-9; 11 ex. (USNM 321250), LRP91-10; 7 ex. (USNM 321255), LRP91-10; 5 ex. (FMNH 103628), LRP91-10; 12 ex. (USNM 321251), LRP91-7; 10 ex. (USNM 321252), LRP91-8; 3 ex. (USNM 321253), LRP91-13; 1 ex. (USNM 321254), LRP91-6; 2 ex. (ZRC 37946), MK94-26; 1 ex. (ZRC), THH9809; 2 ex. (ZRC), THH9807.

Remarks. – This widespread Indo-Pacific species has not been reported previously from Sarawak (Kottelat & Lim, 1995).

Oxyeleotris marmorata (Bleeker, 1852b) *

Material examined. – About three specimens up to 30 cm TL were identified, but not collected at the fish market in Kapit, in June 2002 (H. H. Tan, pers. comm. in 2002).

Oxyeleotris urophthalmoides (Bleeker, 1853b) *

Material examined. – 1 ex. (ZRC 47275), Kapit market.

Pogoneleotris heterolepis (Günther, 1869) *

Material examined. – 1 ex. (SFD), middle Rajang near Kanowit.

Remarks. – Little is known of the habits and ecology of this enigmatic, and seemingly rare species. It is apparently endemic to the lower reaches of large rivers in Sarawak, having been recorded from the Serian area, and here, from the middle Rajang.

FAMILY GOBIIDAE

Eugnathogobius siamensis (Fowler, 1934) *

Material examined. – 1 ex. (USNM 320753), LRP91-16; 1 ex. (USNM 320756), LRP91-14; 1 ex. (ZRC), THH9807; 1 ex. (ZRC), THH9807.

Eugnathogobius sp. *

Material examined. – 6 ex. (ZRC 37849), MK94-6; 4 ex. (ZRC 37947), MK94-26; 1 ex. (ZRC 37859), MK94-7,25.

Remarks. – These specimens represent an undescribed species characterised by striped cheeks and maroon pectoral fins, the description of which is being prepared by Helen Larson (pers. comm. in 2004; Larson, 2001: 66). It appears to be a freshwater species found generally in coastal peat swamps, and has also been collected in the area around Kuching.

Glossogobius celebius (Valenciennes, in Cuvier & Valenciennes, 1837) *

Material examined. – 1 ex. (ZRC), THH9806.

Remarks. – *Glossogobius celebius* may be endemic to Sulawesi, and specimens referred to this taxon that live elsewhere may represent several undescribed species (Douglass Hoese, pers. comm. in 2002).

Parawaous megacephalus (Fowler, 1905) *

Material examined. – 4 ex. (FMNH 68451), RFI 5.8.56; 3 ex. (FMNH 68452), RFI 8.8.56.

FAMILY ANABANTIDAE

Anabas testudineus (Bloch, 1792) *

Material examined. – Numerous individuals of about 10 cm TL were observed being sold alive from buckets in the fish market in Kapit, in June 2002 (H. H. Tan, pers. comm. in 2002).

FAMILY OSPHRONEMIDAE

Betta akarensis Regan, 1910 *

Material examined. – 8 ex. (ZRC 37845), MK94-5,24; 1 ex. (ZRC 37967), MK94-55; 1 ex. (ZRC 37972), MK94-56; 5 ex. (ZRC 37952), MK94-27; 2 ex. (ZRC 37929), MK94-23; 3 ex. (ZRC 37858), MK94-7,25; 10 ex. (ZRC), THH9812; 2 ex. (ZRC), THH9810; 2 ex. (ZRC), THH9808.

Remarks. – This common fighting-fish has often been referred to as *Betta climacura* Vierke (1988) which is currently regarded as a junior synonym (Tan & Kottelat, 1998: 43). It inhabits small streams in the swamp-forest and in the foothills.

Betta brownorum Witte & Schmidt, 1992

Betta brownorum Witte & Schmidt, 1992: 312 (Sibu: type series in ZSM).

Betta brownorum - Kottelat & Lim, 1995: 248 (Sibu).

Material examined. – None.

Luciocephalus pulcher (Gray, 1830)

Luciocephalus pulcher - Brown & Brown, 1987: 163 (Sibu); Kottelat & Lim, 1995: 247 (Sibu).

Material examined. – 2 ex. (ZRC 37844), MK94-5,24; 1 ex. (ZRC 37968), MK94-56; 3 ex. (ZRC 37956), MK94-55; 3 ex. (ZRC), THH9810.

Remarks. – Formerly in the Luciocephalidae, that family, along with Belontiidae (containing the genera *Betta*, *Parosphromenus*, *Sphaerichthys* and *Trichogaster* amongst others) are classified in the Osphronemidae by Britz (1994) and Britz et al. (1995).

***Osphronemus septemfasciatus* Roberts, 1992 ***
(Fig. 7f)

Material examined. – 2 ex. (FMNH 103627), LRP91-35; 1 ex. (FMNH 68446), RFI 11.8.56; 1 ex. (FMNH 68445), RFI 8.8.56; 7 ex. (FMNH 68444), RFI 5.8.56; 10 ex. (USNM 322198), LRP91-35; 1 ex. (USNM 322204), LRP91-26; 1 ex. (USNM 322205), LRP91-25; 2 ex. (USNM 322208), LRP91-31; 1 ex. (USNM 323669), LRP91-21; 5 ex. (SM uncat.), LRP91-35.

***Parosphromenus allani* Brown, 1987**

Parosphromenus allani Brown, 1987: 34 (Sibu); Brown & Brown, 1987: 158 (Sibu); Kottelat & Lim, 1995: 248 (Sibu).

Material examined. – 6 ex. (ZRC 37846), MK94-5,24; 17 ex. (ZRC 37863), MK94-7,25.

***Sphaerichthys osphromenoides* Canestrini, 1860**

Sphaerichthys osphromenoides - Kottelat & Lim, 1995: 248 (Daro).

Material examined. – 1 ex. (ZRC.37964), MK94-55.

***Trichogaster pectoralis* (Regan, 1910) ***

Material examined. – 1 ex. (ZRC 37850), MK94-6.

Remarks. – Native to Thailand where it is an important food fish in rice-growing areas, this species is introduced to many parts of Southeast Asia. Elsewhere in Borneo, it was recorded from Sabah by Inger & Chin (1962: 253), and observed in Brunei by Kottelat & Lim (1995: 249).

***Trichogaster trichopterus* (Pallas, 1770)**

Trichogaster trichopterus - Brown & Brown, 1987: 158 (Sibu); Kottelat & Lim, 1995: 249 (Sibu).

Material examined. – 1 ex. (ZRC 37857), MK94-7,25.

FAMILY CHANNIDAE

***Channa gachua* (Hamilton, 1822) ***

Material examined. – 1 ex. (FMNH 68418), RFI 5.8.56; 4 ex. (ZRC 47274), Kapit market.

***Channa lucius* (Cuvier, in Cuvier & Valenciennes, 1831)**

Channa lucius - Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – 1 ex. (FMNH 68421), RFI 12.8.56; 2 ex. (FMNH 68420), RFI 8.8.56; 2 ex. (USNM 320741), LRP91-7; 1 ex. (USNM 322183), LRP91-10; 3 ex. (USNM 322185), LRP91-21; 6 ex. (USNM 322194), LRP91-8; 1 ex. (USNM 322211), LRP91-10; 1 ex. (USNM 322217), LRP91-19; 1 ex. (ZRC 37957), MK94-55; 1 ex. (ZRC), THH9811; 1 ex. (ZRC), THH9812; 9 ex. (ZRC), THH9805; 1 ex. (ZRC), THH9808.

ORDER PLEURONECTIFORMES

FAMILY SOLEIDAE

***Achiroides leucorhynchus* Bleeker, 1851f ***

Material examined. – 1 ex. (SFD), middle Rajang.

***Achiroides melanorhynchus* (Bleeker, 1851b) ***

Material examined. – 1 ex. (SFD), middle Rajang.

ORDER TETRAODONTIFORMES

FAMILY TETRAODONTIDAE

***Auriglobus modestus* (Bleeker, 1851b)**

Chonerhinos modestus - Blaber et al., 1997: 205 (Lassa).

Material examined. – None.

Remarks. – According to Blaber et al. (1997: 205), *Auriglobus modestus* is present in the Lassa drainage of the Rajang estuary. As we have not seen specimens, we include it tentatively. This species has the scales anterior and ventral to the pectoral fin overlapping and projecting dorsally, as illustrated by Roberts (1982b: 3, Fig. 1b). Following Kottelat (1999: 597), *Auriglobus* is used in place of *Chonerhinos*.

***Auriglobus nefastus* (Roberts, 1982b)**

Chonerhinos nefastus Roberts, 1982b: 10 (Baleh: 3 paratypes FMNH); Roberts, 1989: 188 (Rejang); Kottelat & Lim, 1995: 250 (Baleh); Leh et al., 1997: 25 (Ulu Katibas).

Material examined. – None.

Remarks. – Among the specimens of *Auriglobus* we examined, none appears to have the scales anterior and ventral to the pectoral fin uniformly projected dorso-posteriorly as in the description of *Auriglobus nefastus*. We did not examine the three paratypes from the Baleh River.

***Auriglobus silus* (Roberts, 1982b)**

(Fig. 7g)

Chonerhinos silus Roberts, 1982b: 12 (Baleh: type series in FMNH and CAS); Kottelat & Lim, 1995: 250 (Baleh).

? *Chonerhinos remotus* - Blaber et al., 1997: 205 (Lassa).

Material examined. – holotype (FMNH 68477), RFI 3.8.56; 36 paratypes (FMNH 94598), RFI 3.8.56. Others – 10 ex. (FMNH 103629), LRP91-14; 1 ex. (USNM 322190), LRP91-5; 10 ex. (USNM 322191), LRP91-7; 4 ex. (USNM 322202), LRP91-16; 2 ex. (USNM 322207), LRP91-12; 2 ex. (USNM 322209), LRP91-9; 40 ex. (USNM 322212), LRP91-14; 2 ex. (USNM 322215), LRP91-8; 2 ex. (USNM 322192), LRP91-6; 15 ex. (USNM 322195), LRP91-7; 2 ex. (SM uncat.), LRP91-7; 4 ex. (USNM 322197), LRP91-12; 4 ex. (USNM 322210), LRP91-9; 46 ex. (USNM 323667), LRP91-14; 10 ex. (SM uncat.), LRP91-14; 11 ex. (USNM 322214), LRP91-16; 15 ex. (ZRC), THH9807.

Remarks. – Specimens in the USNM and ZRC conform to the description of *Auriglobus silus* in that the spines anterior and ventral to the pectoral fin do not overlap and appear to project dorso-posteriorly and dorsally, as illustrated by Roberts (1982b: 3, Fig. 1c). Blaber et al. (1997: 205) state that juvenile *Auriglobus modestus* and *A. remotus* were found in the Lassa estuary. The identification of *A. remotus* seems doubtful as this species is considered to be endemic to the Kinabatangan River in eastern Sabah (see Roberts, 1982b: 11). Likely candidates are *A. silus* or *A. nefastus*.

***Carinotetraodon borneensis* (Regan, 1903)**

Tetraodon lorteti - Dekkers, 1975: 99 (Sibu).

Carinotetraodon borneensis - Tan, 1999: 351 (Sibu).

Material examined. – 2 ex. (BMNH 1906.10.29:41-42), Sibu.

***Carinotetraodon salivator* Lim & Kottelat, 1995**

(Fig. 7h)

Carinotetraodon salivator Lim & Kottelat, 1995: 360 (Baleh, Kapit); Tan, 1999: 354 (Baleh, Kapit).

Material examined. – paratypes - 2 ex. (USNM 322184), LRP91-8; 2 ex. (USNM 322186), LRP91-7; 2 ex. (USNM 322187), LRP91-14; 3 ex. (USNM 322188), LRP91-16; 1 ex. (USNM 323665), LRP91-9; 2 ex. (ZRC 37831), MK94-7.25. Others – 1 ex. (FMNH 68478), RFI 3.8.56; 1 ex. (FMNH 68479), RFI 11.8.56; 1 ex. (FMNH 68921), RFI 21.9.62; 3 ex. (USNM 322189), LRP91-10; 1 ex. (SM uncat.), LRP91-10.

Remarks. – The largest known specimen (FMNH 68921) is 57.3 mm SL, from Kapit.

DISCUSSION

We report at least 164 species of fish from the Rajang basin. As for other freshwater habitats throughout Southeast Asia, a significant proportion of the species, here more than one-third (55 of 164, or 34%), are of the family Cyprinidae. All

ostariophysan fishes combined, 114 species, comprise the vast majority (70%) of species collected. The luciosomine cyprinid, *Luciosoma setigerum*, and the bagrid catfish, *Hemibagrus nemurus*, were two of the most common species collected by the 1991 expedition as judged by the large number of specimens, large number of collecting stations, and wide variety of habitats in which they were taken. The clupeiform *Sundasalanx microps* was among the rarest taxa, represented here by just one specimen collected at Kapit. It is, however, premature to assess relative abundance or rarity of species in the Rajang basin from this report as many portions of the river were not sampled, or were not sampled extensively. During July and August, 1991, Borneo was experiencing one of the most severe droughts on record (see also Kottelat, 1994). Rivers and streams were extremely low and river travel in the highlands was restricted and highly treacherous. Extensive collecting throughout the headwaters is necessary to compile a more comprehensive list of the fish species of the Rajang. Freshwater eels, family Anguillidae, are expected from the headwaters, as they have been reported from the Mahakam (Kottelat et al., 1993). Collecting throughout the complex Rajang delta in and around Sibu is expected also to add large numbers of taxa to our list, especially fishes in the families Gobiidae (gobies and gudgeons), Chandidae (glass-perches), Mugilidae (mulletts), Sciaenidae (croakers and drums), Clupeidae (herrings) and Engraulidae (anchovies) and other common estuarine fishes (see Blaber et al., 1996, 1997), as well as elasmobranchs. A landing of a sawfish of about five metres in length, identified as *Pristis microdon* Latham (1794) in the mid-1990s from the sea near Sibu, around the mouth of the Rajang was reported by Fowler (1998: 4). Although not considered in the present report, its occurrence in the lower reaches of the river is expected. Species of sharks (Carcharhinidae) and of whip-tailed stingrays (Dasyatidae) are also expected.

The freshwater fish fauna of northwestern Borneo, here comprising Sarawak, Sabah and Brunei, has been characterised as having a high degree of endemism (Parenti, 1996). It is difficult to accurately identify Rajang endemics as there are no general reviews of the Sarawak fish fauna apart from the preliminary checklist by Kottelat & Lim (1995). Early records often included nothing more specific than “Sarawak” as a locality. Absence of some taxa from the Rajang may be due to the lack of precise locality data associated with older material. We have recorded no synbranchid eels from the Rajang, yet there are specimens of *Ophisternon bengalense* McClelland (1844) recorded from “Sarawak” (Tyson Roberts, pers. comm., 2004). Taking the report by Kottelat & Lim (1995) as a baseline, however, we can identify some new records for Sarawak and the Rajang, as well as identify putative Rajang endemics. Species recorded here that have not been listed from Sarawak by Kottelat & Lim (1995), or described since that report, include: *Sundasalanx microps*, *Nematabramis steindachneri*, *Pangio piperata*, *Katibasia insidiosa*, *Bagrichthys macracanthus*, *Pseudomystus stenomus*, *Hemibagrus nemurus*, *Hemibagrus fortis*, *Hemibagrus bongan*, *Hemibagrus wyckii*, *Hemisilurus heterorhynchus*, *Kryptopterus hexapterus*, *Kryptopterus platypogon*, *Micronema apogon*, *Pangasius nasutus*,

Acrochordonichthys rugosus, *Macrognathus circumcinctus*, *Polynemus melanochir*, *Achiroides leucorhynchus*, *Achiroides melanorhynchus*, *Phenacostethus smithi*, and *Eleotris melanosoma*.

We have identified two exotic species, the gourami, *Trichogaster pectoralis*, reported previously from Sabah (Inger & Chin, 1962, 1990) and Brunei (Kottelat & Lim, 1995), and the silver barb, *Barbonymus gonionotus* (see McConnell, 2004). Both were apparently introduced as food fish. Native species with fisheries potential purchased in the local markets include the larger *Barbonymus* species, in particular *B. schwanefeldii*. Other species sold regularly in the markets are *Tor douronensis* and *T. tambroides*, *Pangasius nasutus*, *Hemibagrus* spp., *Lobocheilos* cf. *bo*, and *Chitala borneensis*. Larger species sold at market were said to have been collected using cast nets or gill nets. We also observed other local fishing methods such as basket or trap, scoop net, drift net, and hook-and-line. It was reported to us that electric generators and chemicals such as cyanide had once been used for fishing, but we did not observe these.

Despite some widespread species that were taken from broad portions of the Rajang, we note a marked contrast between the fish fauna around Kapit, where the river is still navigable by coastal steamers, and that of the Batang Balui, above Belaga, well above tidal influence. During the July/August 1991 expedition, for example, the freshwater pufferfish *Auriglobus silus* was abundant in and around Kapit, being taken in nine of 13 stations. That species, as well as other taxa, such as *Eleotris melanosoma*, *Carinotetraodon salivator*, *Phenacostethus smithi*, *Rasbora* cf. *dusonensis*, *Nemacheilus spiniferus*, *Kryptopterus kryptopterus*, *Hemirhamphodon kuekenthali*, *Oxygaster anomalura*, and *Sundasalanx microps*, that were less abundant, were found only around Kapit, and were absent above Belaga. In contrast, *Syncrossus hymenophysa*, *Cyclocheilichthys apogon*, *Leptobarbus melanotaenia*, *Tor tambroides*, *Tor tambra*, *Kryptopterus limpok*, *Clarias leiacanthus*, *Osphronemus septemfasciatus*, *Rasbora volzii*, *Paracrossochilus acerus*, *Homaloptera wassinkii*, *Gastromyzon punctulatus*, *Macrognathus circumcinctus*, *Mastacembelus unicolor*, and *Hemibagrus wyckii* were collected only above Belaga during the 1991 expedition. These restricted distributions undoubtedly reflect habitat differences, but also may be used to recognize preliminary areas of endemism for some taxa. Endemism among highland stream fishes is reflected in their specialised ecological requirements, such as cool, clear water and a low tolerance for sediments (viz. Scott & Helfman, 2001). In contrast, fishes from the middle and lower reaches are tolerant of higher sediment concentrations and temperature fluctuations (see also Kottelat, 2002). Increased logging activities in the highlands are likely to result in the extinction of portions of the endemic stream fish fauna and create conditions that are more favourable to the lowland fauna (Scott & Helfman, 2001). Building of the Bakun dam will also cause widespread extinction of stream fishes.

The absence of fish species expected or assumed to live in Borneo is noteworthy. The cyprinodontiform *Aplocheilus*

was expected from Borneo, as Myers (1931:250) included Borneo in the range of the Indo-Malayan aplocheiloids. Yet, *Aplocheilus panchax* (Hamilton 1822), broadly distributed in fresh and brackish waters from the Indian subcontinent through South Asia, the Malay Peninsula and Indonesia, including Sulawesi, has never been reported from Borneo. Similarly, the beloniform ricefishes, family Adrianichthyidae, are broadly distributed from the Indian subcontinent, throughout Asia to Indonesia as far east as Timor, but are not native to Borneo. The sole report of *Oryzias javanicus* (Bleeker, 1854b) from Pontianak, Kalimantan, by Iwamatsu et al. (1982) was treated by Roberts (1989) as an introduction. Other atherinomorphs sensu Rosen & Parenti (1981), the families Phallostethidae and Hemiramphidae, live in fresh and brackish water habitats suitable for *Aplocheilus* and *Oryzias* throughout northwestern Borneo (viz. Parenti, 1986, 1996). The silver barb, *Barbonymus gonionotus* (Bleeker, 1850), has a discontinuous natural distribution, being widespread and common in Southeast Asia and western Indonesia, and absent from peninsular Malaysia, north Sumatra and Borneo (McConnell, 2004: 658, 665). *Aplocheilus*, *Oryzias* and *B. gonionotus* may have never lived in Borneo, lived there and have subsequently gone extinct, or are still to be collected. Interestingly, *Aplocheilus* and *Oryzias* are both relatively primitive taxa in their respective orders, Cyprinodontiformes and Beloniformes (viz. Rosen & Parenti, 1981). This information, when combined with phylogenetic data from other taxa in the Southeast Asian biota and a better understanding of the geological history of Borneo, may ultimately lead to an historical biogeographic hypothesis for the distribution of Southeast Asian freshwater fishes and a hypothesis for the absence of these taxa from Borneo.

Our list may be used to make preliminary comparisons between the fish fauna of the Rajang and that of other northwestern Borneo watersheds. A survey of fishes of the Baram River was undertaken two decades ago (Watson & Balon, 1984; E. J. Crossman, pers. comm., in 1991). That extensive collecting effort revealed a fish fauna similar in many respects to that of the Rajang, that is, cyprinid species are common, but remarkably different for certain taxa. None of the three species of freshwater pufferfish, abundant in the middle Rajang, was reported from the Baram, for example. The phallostethid *Phenacostethus trewavasae* Parenti (1986) is distributed broadly throughout the Baram, whereas the family is represented by *Phenacostethus smithi* in the Rajang. These differences, when tested with additional collections, will allow recognition of distinct faunal areas throughout Sarawak. Finally, and perhaps most important, this review of the fishes of the Rajang fills a major gap in our understanding of the natural history of Sarawak.

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LITERATURE CITED

- Ahl, E., 1922. Einige neue Süßwasserfische des Indo-Malayischen Archipels. *Sitzungsberichte der Gesellschaft naturforschender Freunde*, Berlin, No. 1-2: 30-36.
- Alfred, E. R., 1963. Some colourful fishes of the genus *Puntius* Hamilton. *Bulletin of the National Museum*, Singapore, **32**: 135-142.
- Alfred, E. R., 1969. The Malayan cyprinoid fishes of the family Homalopteridae. *Zoologische Mededelingen*, Leiden, **43** (18): 213-237.
- Anderson III, W. D. & B. B. Collette, 1991. Revision of the freshwater viviparous halfbeaks of the genus *Hemirhamphodon* (Teleostei: Hemiramphidae). *Ichthyological Exploration of Freshwaters*, **2** (2): 151-176.
- Baldwin, C. C., B. B. Collette, L. R. Parenti, D. G. Smith & V. G. Springer, 1996. Collecting fishes. In: Lang, M. A. & C. C. Baldwin (eds.), *Methods and techniques of Underwater Research. Proceedings of the American Academy of Underwater Sciences Scientific Diving Symposium*. Smithsonian Institution, Washington, D.C. Pp. 11-33.
- Blaber, S. J. M., D. A. Milton, J. Pang, P. Wong, O. Boon-Teck, L. Nyigo & D. Lubim, 1996. The life history of the tropical shad *Tenuulosa toli* from Sarawak: first evidence of protandry in the Clupeiformes? *Environmental Biology of Fishes*, **46**: 225-242.
- Blaber, S. J. M., M. J. Farmer, D. A. Milton, J. Pang, O. Boon-Teck & P. Wong, 1997. The ichthyoplankton of selected estuaries in Sarawak and Sabah: composition, distribution and habitat affinities. *Estuarine Coastal and Shelf Science*, **45**: 197-208.
- Bleeker, P., 1846. Overzicht der siluroïden, welke te Batavia voorkomen. *Natuur- en Geneeskundig Archief voor Nederlandsch-Indië*, **3** (2): 135-184.
- Bleeker, P., 1847. Nieuwe bijdrage tot de kennis der Siluroïden van Java. *Verhandelinden van het Bataviaasch Genootschap*, **21**: 1-12.
- Bleeker, P., 1850. Bijdrage tot de kennis der ichthyologische fauna van Midden- en Oost-Java, met beschrijving van eenige nieuwe species. *Verhandelinden van het Bataviaasch Genootschap*, **23**: 1-23.
- Bleeker, P., 1851a. Vijfde bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **2**: 415-442.
- Bleeker, P., 1851b. Bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van 16 nieuwe soorten van zoetwatervisschen. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **1**: 1-16.
- Bleeker, P., 1851c. Nieuwe bijdrage tot de kennis der ichthyologische fauna van Borneo met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **1**: 259-275.
- Bleeker, P., 1851d. Vierde bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **2**: 193-208.
- Bleeker, P., 1851e. Derde bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **2**: 57-70.
- Bleeker, P., 1851f. Over eenige nieuwe soorten van Pleuronectoïden van den Indischen Archipel. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **1**: 401-416.
- Bleeker, P., 1852a. Bijdrage tot de kennis der Haringachtige visschen van den Soenda-Molukschen Archipel. *Verhandelinden van het Bataviaasch Genootschap*, **24**: 1-52.
- Bleeker, P., 1852b. Zesde bijdrage tot de kennis der ichthyologische fauna van Borneo. Visschen van Pamangkat, Bandjermassing, Praboekarta en Sampit. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **3**: 407-442.
- Bleeker, P., 1852c. Diagnostische beschrijvingen van nieuwe of weinig bekende vischsoorten van Sumatra. Tiental I - IV. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **3**: 569-608.
- Bleeker, P., 1852d. Bijdrage tot de kennis der ichthyologische fauna van Blitong (Billiton), met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **3**: 87-100.
- Bleeker, P., 1852e. Nieuwe bijdrage tot de kennis der ichthyologische fauna van Ceram. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **3**: 689-714.
- Bleeker, P., 1853a. Nieuwe tientallen diagnostische beschrijvingen van nieuwe of weinig bekende vischsoorten van Sumatra. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **5**: 495-534.
- Bleeker, P., 1853b. Diagnostische beschrijvingen van nieuwe of weinig bekende vischsoorten van Sumatra. Tiental V-X. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **4**: 243-302.
- Bleeker, P., 1853c. Nalezingen op de ichthyologische fauna van het eiland Banka. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **5**: 175-194.
- Bleeker, P., 1853d. Over eenige nieuwe soorten van *Homaloptera* v. Hass. (*Balitora* Gray) van Java en Sumatra. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **4**: 155-164.
- Bleeker, P., 1854a. Overzicht der ichthyologische fauna van Sumatra, met beschrijving van eenige nieuwe soorten. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **7**: 49-108.

- Bleeker, P., 1854b. Ichthyologische waarnemingen, gedaan op verschillende reizen in de residentie Banten. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **7**: 309-326.
- Bleeker, P., 1855. Nalezingen op de vischfauna van Sumatra. Visschen van Lahat en Sibogha. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **9**: 257-280.
- Bleeker, P., 1857. Tiende bijdrage tot de kennis der ichthyologische fauna van Borneo. Visschen van de rivieren Barito, Kahajan en Kapoeas. *Acta Societatis Regiae Scientiarum Indo-Neerlandicae*, **2**: 1-21.
- Bleeker, P., 1858a. Twaalfde bijdrage tot de kennis der vischfauna van Borneo. Visschen van Sinkawang. *Acta Societatis Regiae Scientiarum Indo-Neerlandicae*, **5** (7): 1-10.
- Bleeker, P., 1858b. De visschen van den Indischen Archipel. Beschreven en toegelicht. Siluri. *Acta Societatis Regiae Scientiarum Indo-Neerlandicae*, **4**: i-xii + 1-370.
- Bleeker, P., 1860. De visschen van den Indischen Archipel, Beschreven en Toegelicht. Deel II. *Acta Societatis Regiae Scientiarum Indo-Neerlandicae*, **7** (N. S. **2**): 1-492 + i-xiii.
- Bleeker, P., 1862. *Atlas ichthyologique des Indes Orientales Néerlandaises. Tome II. Siluroïdes, Chacoïdes et Hétérobranchoïdes*. Publié sous les auspices du Gouvernement colonial néerlandais, Amsterdam. 112 pp, Pls. 49-101.
- Bleeker, P., 1863. Description de trois espèces nouvelles de Siluroïdes de l'Inde archipélagique. *Nederlandsch tijdschrift voor de dierkunde*, **1**: 368-371.
- Bloch, M. E., 1786. *Naturgeschichte der ausländischen Fische*, Berlin, **2**: i-viii + 1-160, Pls. 145-180.
- Bloch, M. E., 1792. *Naturgeschichte der ausländischen Fische*, Berlin, **6**: i-xii + 1-126, Pls. 289-323.
- Boulenger, G. A., 1894. Descriptions of new freshwater fishes from Borneo. *Annals and Magazine of Natural History* (Ser. 6), **13** (75): 245-251.
- Boulenger, G. A., 1899. Descriptions of two new homalopteroid fishes from Borneo. *Annals and Magazine of Natural History* (Ser. 7), **4** (21): 228-229.
- Brittan, M. R., 1951. New cyprinid fishes of the genus *Rasbora* from Borneo and Bunguran Islands. *Proceedings of the California Zoological Club*, **2** (1): 1-5.
- Brittan, M. R., 1954. *Rasbora. A revision of the Indo-Malayan Freshwater fish genus Rasbora, with natural color photographs*. TFH Publications, Inc, Neptune, New Jersey, 224 pp.
- Brittan, M. R., 1976. *Rasbora axelrodi*, a new cyprinid from Indonesia. *Tropical Fish Hobbyist*, **25** (4): 92, 94-96, 98.
- Britz, R., 1994. Ontogenetic features of *Luciocephalus* (Perciformes, Anabantoidei) with a revised hypothesis of anabantoid intrarelationships. *Zoological Journal of the Linnean Society*, **112**: 491-508.
- Britz, R., M. Kokoscha & R. Riehl, 1995. The anabantoid genera *Ctenops*, *Luciocephalus*, *Parasphaerichthys*, and *Sphaerichthys* (Teleostei: Perciformes) as a monophyletic group: evidence from egg surface structure and reproductive behaviour. *Japanese Journal of Ichthyology*, **42**: 71-79.
- Brown, A. & B. Brown, 1987. A survey of freshwater fishes of the family Belontiidae in Sarawak. *Sarawak Museum Journal*, **37**: 155-170.
- Brown, B., 1987. Special announcement - two new anabantoid species. *Aquarist and Pondkeeper*, **1987** (June): 34.
- Burridge, M. E., 1992. Systematics of the *Acanthopthalmus kuhlii* complex (Teleostei: Cobitidae), with the description of a new species from Sarawak and Brunei. *Copeia*, **1992** (1): 172-186.
- Canestrini, G., 1860. Zur systematik und charakteristik der Anabatinen. *Verhandlungen der k.k. zoologisch-botanischen Gesellschaft*, Wien. Pp. 697-712.
- Cantor, T. E., 1849. Catalogue of Malayan fishes. *Journal of the Asiatic Society of Bengal*, **18** (2): i-xii + 983-1443, Pls. 1-14.
- Chang, W. S. W., 1997. *Features of Indigenous Fish Species having Potentials for Aquaculture*. Inland Fisheries Division of Department of Agriculture, Sarawak, 49 pp.
- Chin, P. K., 1990. The fresh-water fishes of North Borneo - supplementary chapter. In: Inger, R. F. & P. K. Chin, 1962. *The Fresh-water Fishes of North Borneo*. 1990 reprint by Sabah Zoological Society, 47 pp.
- Cuvier, G. & A. Valenciennes, 1831. *Histoire naturelle des poissons. Tome septième. Livre septième. Des Squamipennes. Livre huitième. Des poissons à pharyngiens labyrinthiformes*. Pitois-Levrault, Paris, xxix + 1-531, Pls. 170-208.
- Cuvier, G. & A. Valenciennes, 1832. *Histoire naturelle des poissons. Tome huitième. Livre neuvième. Des Scombroïdes*. Pitois-Levrault, Paris, xix + 5 pp. + 1-509, Pls. 209-245.
- Cuvier, G. & A. Valenciennes, 1837. *Histoire naturelle des poissons. Tome douzième. Suite du livre quatorzième. Gobioides. Livre quinzième. Acanthoptérygiens à pectorales pédiculées*. Pitois-Levrault, Paris, xxiv + 1-507 + 1 p., Pls. 344-368.
- Cuvier, G. & A. Valenciennes, 1840a. *Histoire naturelle des poissons. Tome quatorzième. Suite du livre seizième. Labroïdes. Livre dix-septième. Des Malacoptérygiens*. Pitois-Levrault, Paris, xxii + 2 pp. + 1-464 + 4 pp., Pls. 389-420.
- Cuvier, G. & A. Valenciennes, 1840b. *Histoire naturelle des poissons. Tome quinzième. Suite du livre dix-septième. Siluroïdes*. Pitois-Levrault, Paris, xxxi + 1-540, Pls. 421-455.
- Cuvier, G. & A. Valenciennes, 1842. *Histoire naturelle des poissons. Tome seizième. Livre dix-huitième. Les Cyprinoïdes*. Pitois-Levrault, Paris, xx + 472 pp., Pls. 456-487.
- Cuvier, G. & A. Valenciennes, 1844. *Histoire naturelle des poissons. Tome dix-septième. Suite du livre dix-huitième. Cyprinoïdes*. Pitois-Levrault, Paris, xxiii + 497 pp. + 2 pp., Pls. 487-519.
- Cuvier, G. & A. Valenciennes, 1846. *Histoire naturelle des poissons. Tome dix-huitième. Suite du livre dix-huitième. Cyprinoïdes. Livre dix-neuvième. Des Ésoques ou Lucioïdes*. Pitois-Levrault, Paris, xix + 2 pp. + 1-505 + 2 pp., Pls. 520-553.
- Cuvier, G. & A. Valenciennes, 1847. *Histoire naturelle des poissons. Tome vingtième. Livre vingt et unième. De la famille des Clupéoides*. Pitois-Levrault, Paris, xviii + 1 p. + 472 pp., Pls. 591-606.
- Cuvier, G. & A. Valenciennes, 1848. *Histoire naturelle des poissons. Tome vingt et unième. Suite du livre vingt et unième et des Clupéoides. Livre vingt-deuxième. De la famille des Salmonoides*. Pitois-Levrault, Paris, xiv + 1 p. + 536 pp., Pls. 607-633.
- Dekkers, W. J., 1975. Review of the Asiatic freshwater puffers of the genus *Tetraodon* Linnaeus, 1758 (Pisces, Tetraodontiformes, Tetraodontidae). *Bijdragen Tot de Dierkunde*, **45** (1): 87-141.
- Duncker, G., 1904. Die Fische der Malayischen Halbinsel. *Mitteilungen aus dem Naturhistorisches Museum*, Hamburg, **21**: 133-207, Pls. 1-2.
- Eschmeyer, W. N. (ed.), 1998. *Catalog of Fishes. Special publication No. 1 of the Center for Biodiversity Research and Information*. California Academy of Sciences, San Francisco, 2905 pp.
- Fowler, H. W., 1905. Some fishes from Borneo. *Proceedings of the Academy of Natural Sciences, Philadelphia*, **57**: 455-523.

- Fowler, H. W., 1934. Zoological results of the third De Schauensee Siamese Expedition, Part I. -Fishes. *Proceedings of the Academy of Natural Sciences*, Philadelphia, **86**: 67-163, Pl. 12.
- Fowler, S., 1998. Recent sawfish records. *Shark News*, **12**: 4.
- Fraser-Brunner, A., 1940. On some fishes of the genus *Acanthopthalmus*, with description of a new species. *Annals and Magazine of Natural History* (Ser. 11), **6** (32): 170-175.
- Gray, J. E., 1830-35. *Illustrations of Indian zoology; chiefly selected from the collection of Major-General Hardwicke, F.R.S.*, **1-2**, Pls. 1-202.
- Günther, A., 1868. Catalogue of the Physostomi, containing the families Heteropygii, Cyprinidae, Gonorhynchidae, Hyodontidae, Osteoglossidae, Clupeidae, ... [through]... Halosauridae, in the collection of the British Museum. *Catalogue of the Fishes in the British Museum*. **7**: i-xx + 1-512.
- Günther, A., 1869. Descriptions of two new species of fishes discovered by the Marquis J. Doria. *Annals and Magazine of Natural History*, **3** (18): 444-445.
- Hall, R., 1996. Reconstructing Cenozoic Southeast Asia. In: Hall, R. & D. Blundell (eds.), *Tectonic Evolution of Southeast Asia. Geological Society Special Publication no. 106*. The Geological Society, London. Pp. 153-184.
- Hall, R. & G. Nichols, 2002. Cenozoic sedimentation and tectonics in Borneo: Climatic influences on orogenesis. In: Jones, S.J. & L. Frostock (eds.), *Sediment flux to basins: Causes, Controls and Consequences*. Geological Society, London, Special Publications, **191**: 5-22.
- Hamilton, F., 1822. *An account of the fishes found in the river Ganges and its branches*. Edinburgh & London. vii + 1-405, Pls. 1-39.
- Hamilton, W. B., 1979. Tectonics of the Indonesian region. *Professional Papers of the U. S. Geological Survey*, **1087**: 1-338.
- Hardenberg, J. D. F., 1933. Notes on some genera of the Engraulidae. *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **93** (2): 230-256.
- Hardenberg, J. D. F., 1934. Some new or rare fishes of the Indo-Australian Archipelago. III. *Treubia*, Buitenzorg, **14**: 287-297.
- van Hasselt, J. C., 1823. Uittreksel uit een' brief van den Heer J. C. van Hasselt, aan den Heer C. J. Temminck, geschreven uit Tjecande, Residentie Bantam, den 29sten December 1822. *Algemeene Konst- en Letter-bode voor het jaar 1823*, **2**: 130-133.
- Herre, A. W. C. T., 1940. New species of fishes from the Malay Peninsula and Borneo. *Bulletin of the Raffles Museum*, **16**: 5-26, Pls. 1-20.
- Hora, S. L., 1924. Zoological results of a tour in the Far East. Fish of the Talé Sap, Peninsular Siam. Parts I, II. *Memoirs of the Asiatic Society of Bengal*, **6** (9): 461-501.
- Hora, S. L., 1932. Classification, bionomics and evolution of homalopterid fishes. *Memoirs of the Indian Museum*, **12** (2) : 263-330, Pls. 10-12.
- Hora, S. L. & K. C. Jayaram, 1952. On two new gastromyzonid fishes from Borneo. *Records of the Indian Museum*, Calcutta, **49** (2): 191-195.
- Hutchison, C. S., 1996. The 'Rajang accretionary prism' and 'Lupar Line' problem of Borneo. In: Hall, R. & D. Blundell (eds.), *Tectonic Evolution of Southeast Asia. Geological Society Special Publication no. 106*. The Geological Society, London. Pp. 247-261.
- Inger, R. F. & P. K. Chin, 1959. New species of fresh-water catfishes from North Borneo. *Fieldiana: Zoology*, **39**(27): 279-296.
- Inger, R. F. & P. K. Chin, 1961. The Bornean cyprinoid fishes of the genus *Gastromyzon* Günther. *Copeia*, **1961**: 166-176.
- Inger, R. F. & P. K. Chin, 1962. The fresh-water fishes of North Borneo. *Fieldiana: Zoology*, **45**: 1-268.
- Inger, R. F. & P. K. Chin, 1990. The fresh-water fishes of North Borneo. *Fieldiana: Zoology*, **45**: 1-268. Sabah Zoological Society reprint of 1962 monograph.
- Iwamatsu T, Imaki A, Kawamoto A, & A. Inden, 1982. On *Oryzias javanicus* collected at Jakarta, Singapore and West Kalimantan. *Annotationes Zoologicae Japonenses*, **55**: 190-198.
- Jayaram, K. C., 1968. Contributions to the study of bagrid fishes (Siluroidea: Bagridae). 3. A systematic account of the Japanese, Chinese, Malayan and Indonesian genera. *Treubia*, **27** (2-3): 287-386.
- Karnasuta, J., 1993. Systematic revision of southeastern Asiatic cyprinid fish genus *Osteochilus* with description of two new species and a new subspecies. *Kasetsart University Fishery Research Bulletin*, **19**: vi+105 pp.
- Khoo, K. K., Chua, L. S. L., Ismail, Y., Razak, Z., Lee, S. W. & A. Ponnampalam, 1992. *Rivers of Malaysia*. Design Dimension Sdn. Bhd, Selangor Darul Ehsan. 184 pp.
- Kottelat, M., 1984. Revision of the Indonesian and Malaysian loaches of the sub-family Noemacheilinae. *Japanese Journal of Ichthyology*, **31** (3): 225-260.
- Kottelat, M., 1991. Notes on the taxonomy and distribution of some western Indonesian freshwater fishes, with diagnoses of a new genus and six new species (Pisces: Cyprinidae, Belontiidae, and Chaudhuriidae). *Ichthyological Exploration of Freshwaters*, **2**(3): 273-287.
- Kottelat, M., 1996. The identity of *Puntius eugrammus* and diagnoses of two new species of striped barb (Teleostei: Cyprinidae) from Southeast Asia. *The Raffles Bulletin of Zoology*, **44** (1): 301-316.
- Kottelat, M., 1999. Nomenclature of the genera *Barbodes*, *Cyclocheilichthys*, *Rasbora* and *Chonerhinos* (Teleostei: Cyprinidae and Tetraodontidae), with comments on the definition of the first reviser. *The Raffles Bulletin of Zoology*, **47** (2): 591-600.
- Kottelat, M., 2000. The type species of the genus-group names *Coius* Hamilton, 1822 and *Damia* Cuvier, 1829 and the type-genus of the family-group name *Datnioididae* Bleeker, 1858. *Journal of South Asian Natural History*, **5**(1): 91-94.
- Kottelat, M., 2002. Aquatic systems: neglected biodiversity. In: Wikramanayake, E. D., E. Dinerstein, C. J. Loucks, D. M. Olson, J. Morrison, J. Lamoreux, M. McKnight, & P. Hedao (eds.), *Terrestrial ecoregions of the Indo-Pacific: a conservation assessment*. Island Press, Washington, D.C. Pp. 30-35.
- Kottelat, M., 2004a. *Botia kubotai*, a new species of loach (Teleostei: Cobitidae) from the Ataran River basin (Myanmar), with comments on botiinae nomenclature and diagnosis of a new genus. *Zootaxa*, **401**: 1-18.
- Kottelat, M., 2004b. On the Bornean and Chinese *Protomyzon* (Teleostei: Balitoridae), with descriptions of two new genera and two new species from Borneo, Vietnam and China. *Ichthyological Exploration of Freshwaters*, **15** (4): 301-310.
- Kottelat, M., 2005. Foreword. In: Kottelat, M. & D. C. J. Yeo (eds.), *Southeast Asian Freshwater Fish Diversity. The Raffles Bulletin of Zoology*, Supplement No. **13**: 1.

- Kottelat, M. & K. K. P. Lim, 1993. A review of the eel-loaches of the genus *Pangio* (Teleostei: Cobitidae) from the Malay Peninsula, with descriptions of six new species. *The Raffles Bulletin of Zoology*, **41**: 203-249.
- Kottelat, M. & K. K. P. Lim, 1995. Freshwater fishes of Sarawak and Brunei Darussalam: a preliminary annotated check-list. *Sarawak Museum Journal*. New series, **XLVIII** (69): 228-256.
- Kottelat, M. & K.-E. Witte, 1999. Two new species of *Microrasbora* from Thailand and Myanmar, with two new generic names for small Southeast Asian cyprinid fishes (Teleostei: Cyprinidae). *Journal of South Asian Natural History*, **4** (1): 49-56.
- Kottelat, M., A. J. Whitten, S. N. Kartikasari & S. Wirjoatmodjo, 1993. *Freshwater Fishes of Western Indonesia and Sulawesi*. Periplus Editions Ltd., Jakarta. xxxviii+221 pp., 84 color pls. Including 'Additions and Corrections' by M. Kottelat & A. J. Whitten, 1996. 8 pp.
- Larson, H. K., 2001. A revision of the gobiid fish genus *Mugilogobius* (Teleostei: Gobioidae), and its systematic placement. *Records of the Western Australian Museum. Supplement No. 62*: i-v + 1-233.
- Latham, J. F., 1794. An essay on the various species of sawfish. *Transactions of the Linnean Society of London*, **2** (25): 273-282, Pls. 26-27.
- Leh, C., I. Rachmatika, I. S. Abdullah, Mohd. Shahbuddin Sabky & Munau ak. Jawa, 1997. *The freshwater fish inventory of Bentuang Karimun National Park (TNBK), Kalimantan Barat, Indonesia and Lanjak-Entimau Wildlife Sanctuary (LEWS), Sarawak, Malaysia*. A BBE 1997 Fish Component Report (unpublished). 26 pp.
- Lelek, A., 1983a. Ökologische Aspekte der Stauung eines Flusses auf Borneo. *Natur und Museum*, **113**(11): 321-332.
- Lelek, A., 1983b. *Freshwater and swamp fishery focused on the Rajang River, Sarawak, East Malaysia*. Society of International Tropical Ecology, Kuala Lumpur.
- Liechti, P., 1960. The geology of Sarawak, Brunei and the western part of North Borneo: compiled from the work of the Royal Dutch Shell Group of companies in the British Territories in Borneo and from various published accounts. In association with F. W. Roe & N. S. Haile. *Geological Survey Department, British Territories in Borneo Bulletin*, **3**: 1-360.
- Lim, K. K. P., 1995. *Rasbora kottelati*, a new species of cyprinid fish from north-western Borneo. *The Raffles Bulletin of Zoology*, **43** (1): 65-74.
- Lim, K. K. P. & M. Kottelat, 1995. *Carinotetraodon salivator*, a new species of pufferfish from Sarawak, Malaysia (Teleostei: Tetraodontidae). *Japanese Journal of Ichthyology*, **41** (4): 359-365.
- Lim, K. K. P. & A. Wong, 1994. Fishes of the Kinabatangan basin, Sandakan District, Sabah, East Malaysia. *Sabah Museum Journal*, **1** (2): 39-71.
- McClelland, J., 1844. Apodal fishes of Bengal. *Journal of Natural History, Calcutta*, **5** (18): 151-226, Pls. 5-14.
- McConnell, S. K. J., 2004. Mapping faunal exchanges across the Sunda shelf, South-East Asia, using distributional and genetic data sets from the cyprinid fish *Barbodes gonionotus* (Bleeker, 1850). *Journal of Natural History*, **38**: 651-670.
- Martin-Smith, K. M. & H. H. Tan, 1998. Diversity of freshwater fishes from eastern Sabah: annotated checklist for Danum Valley and a consideration of inter- and intra-catchment variability. *The Raffles Bulletin of Zoology*, **46** (2): 573-604.
- Maxwell, A. R., 1987a. Balui reconnaissances: an introduction to the research. *Sarawak Museum Journal*, **37** (58): 1-14.
- Maxwell, A. R., 1987b. The second exploration of the Balui valley and the founding of Belaga: Hugh Brooke Low's diaries of 1882, 1883, and 1884. *Sarawak Museum Journal*, **37** (58): 15-74.
- Metcalfe, I., 1996. Pre-Cretaceous evolution of Southeast Asian terranes. In: Hall, R. & D. Blundell (eds.). *Tectonic Evolution of Southeast Asia. Geological Society Special Publication no. 106*. The Geological Society, London. Pp. 97-122.
- Moss, S. J., 1998. Embaluh Group turbidites in Kalimantan: evolution of a remnant oceanic basin in Borneo during the Late Cretaceous to Palaeogene. *Journal of the Geological Society*, London, **155**: 509-524.
- Moss, S. J. & M. E. J. Wilson, 1998. Biogeographic implications from the Tertiary paleogeographic evolution of Sulawesi and Boreno. In: Hall, R. & J. d. Holloway (eds.), *Biogeography and geological evolution of SE Asia*. Backhuys Publishers, Leiden. Pp. 133-163.
- Motomura, H., S. O. Kullander, T. Yoshino & Y. Iwatsuki, 2002. Review of seven-spined *Polynemus* species (Perciformes: Polynemidae) with designation of a neotype for *Polynemus paradiseus* Linnaeus, 1758. *Ichthyological Research*, **49**: 307-317.
- Motomura, H. & M. H. Sabaj, 2002. A new subspecies, *Polynemus melanochir dulcis*, from Tonle Sap Lake, Cambodia, and redescription of *P. m. melanochir* Valenciennes in Cuvier and Valenciennes, 1831 with designation of a neotype. *Ichthyological Research*, **49**: 181-190.
- Müller, S. & H. Schlegel, 1844. Beschrijving van een' nieuwen Zoetwater-visch van Borneo, *Osteoglossum formosum*. *Verhandelingen over de Natuurhijke Geschiedenis der Nederlandsche oerzeesche bezittingen, door de Leden der Natuurkundige commissie in Indie en andere Schrijvers, Temminck, C. J.*, Leiden, No. 2: 1-7, Pl. 1.
- Myers, G. S., 1928. The systematic position of the phallostethid fishes, with diagnosis of a new genus from Siam. *American Museum Novitates*, **295**: 1-12.
- Myers, G. S., 1931. The primary groups of oviparous cyprinodont fishes. *Stanford University Publications, University Series, Biological Sciences*, **6**(3): 243-245.
- Myers, G. S., 1936. Ichthyology. A new polynemid fish collected in the Sadong River, Sarawak, by D. William T. Hornaday, with notes on the genera of Polynemidae. *Journal of the Washington Academy of Sciences*, **26** (9): 376-382.
- Nelson, J. S., 1994. *Fishes of the World, 3rd Edition*. John Wiley & Sons Inc., New York. xvii+600 pp.
- Ng, H. H., 1999a. Two new species of catfishes of the genus *Clarias* from Borneo (Teleostei: Clariidae). *The Raffles Bulletin of Zoology*, **47** (1): 17-32.
- Ng, H. H., 1999b. A review of the Southeast Asian catfish genus *Ceratoglanis* (Siluriformes: Siluridae), with the description of a new species from Thailand. *Proceedings of the California Academy of Sciences*, **51** (9): 385-395.
- Ng, H. H., 2002. The identity of *Mystus nigriceps* (Valenciennes in Cuvier & Valenciennes, 1840), with the description of a new bagrid catfish (Teleostei: Siluriformes) from Southeast Asia. *The Raffles Bulletin of Zoology*, **50** (1): 161-168.
- Ng, H. H. 2004. *Kryptopterus platypogon*, a new silurid catfish (Teleostei: Siluridae) from Borneo. *Zootaxa*, **398**: 1-8.
- Ng, H. H. & J. J. Dodson, 1999. Morphological and genetic descriptions of a new species of catfish, *Hemibagrus chrysops*,

- from Sarawak, East Malaysia, with an assessment of phylogenetic relationships (Teleostei: Bagridae). *The Raffles Bulletin of Zoology*, **47** (1): 45-57.
- Ng, H. H. & M. Kottelat, 1998. *Pterocryptis buccata*, a new species of catfish from western Thailand (Teleostei: Siluridae) with epigeal and hypogeal populations. *Ichthyological Research*, **45** (4): 393-399.
- Ng, H. H. & P. K. L. Ng, 1998. A revision of the South-east Asian catfish genus *Silurichthys*. *Journal of Fish Biology*, **52**: 291-333.
- Ng, H. H. & P. K. L. Ng, 2001. A revision of the akysid catfish genus *Acrochordonichthys* Bleeker. *Journal of Fish Biology*, **58**: 386-418.
- Ng, H. H. & I. Rachmatika, 1999. The catfishes (Teleostei: Siluriformes) of Bentuang Karimun National Park, West Kalimantan, Indonesia. *The Raffles Bulletin of Zoology*, **47** (1): 167-183.
- Ng, H. H. & H. H. Tan, 2000. A new species of *Encheloclarias* from Sumatra. *Journal of Fish Biology*, **57**: 536-540.
- Ng, H. H., Vidthayanon, C. & P. K. L. Ng, 1996. *Nandus oxyrhynchus*, a new species of leaf fish (Teleostei: Nandidae) from the Mekong basin. *The Raffles Bulletin of Zoology*, **44** (1): 11-19.
- Ng, P. K. L., Tay, J. B., & K. K. P. Lim, 1994. Diversity and conservation of blackwater fishes in Peninsular Malaysia, particularly in the North Selangor peat swamp forest. *Hydrobiologia*, **285**: 203-218.
- Pallas, P. S., 1770. *Spicilegia Zoologica*, quibus novae imprimis et obscurae animalium species iconibus, descriptionibus atque commentariis illustrantur cura. Berolini, prostant apud Gottl. August. Lange. *Spicilegia Zoologica* **1** (fasc. 8): 1-56, Pls. 1-5.
- Parenti, L. R., 1986. Bilateral asymmetry in phallostethid fishes (Atherinomorpha) with description of a new species from Sarawak. *Proceedings of the California Academy of Sciences* (Ser. 4), **44**: 225-236.
- Parenti, L. R., 1996. Phylogenetic systematics and biogeography of phallostethid fishes (Atherinomorpha, Phallostethidae) of northwestern Borneo, with description of a new species. *Copeia*, **1996** (3): 703-712.
- Parenti, L.R. & A. D. Meisner, 2003. Fishes of the Belait River. *Brunei Museum Journal*, **10** [1995]: 17-54.
- Peters, W., 1868. Über eine neue Nagergattung, *Chiropodomys penicillatus*, so wie über einige neue oder weniger bekannte Amphibien und Fische. *Monatsberichte der Königlich Preussische Akademie des Wissenschaften zu Berlin*. Pp. 448-460, Pl. 2.
- Popta, C. M. L., 1904. Descriptions préliminaires des nouvelles espèces de poissons recueillies au Bornéo central par M. le Dr. A. W. Nieuwenhuis en 1898 et en 1900. *Notes from the Leyden Museum*, **24** (for 1902-04): 179-202.
- Popta, C. M. L., 1905. Suite des descriptions préliminaires des nouvelles espèces de poissons recueillies au Bornéo central par M. le Dr. A. W. Nieuwenhuis en 1898 et en 1900. *Notes from the Leyden Museum*, **25** (15): 171-186.
- Pouyaud, L., Sudarto & G. G. Teugels, 2003. The different colour varieties of the Asian arowana *Scleropages formosus* (Osteoglossidae) are distinct species: morphologic and genetic evidences. *Cybiurn*, **27** (4): 287-305.
- Rachmatika, I., 1998. *Gastromyzon embalohensis*, a new species of sucker loach (Teleostei: Balitoridae) from the Bentuang Karimun National Park, West Kalimantan, Indonesia. *The Raffles Bulletin of Zoology*, **46**: 651-659.
- Rainboth, W. J., 1996. *FAO species identification field guide for fishery purposes. Fishes of the Cambodian Mekong*. Rome, FAO. xi+265 pp., 27 colour plates.
- Regan, C. T., 1903. On the classification of the fishes of the suborder Plectognathi; with notes and descriptions of new species from specimens in the British Museum Collection. *Proceedings of the Zoological Society of London*, 1902, **2** (2): 284-303, Pls. 24-25.
- Regan, C. T., 1906. Descriptions of five new freshwater fishes from Sarawak, Borneo, collected by Dr. C. Hose. *Annals and Magazine of Natural History*, (Ser. 7) **18**: 66-68.
- Regan, C. T., 1910. The Asiatic fishes of the family Anabantidae. *Proceedings of the Zoological Society of London*, 1909 (4): 767-787, Pls. 77-79.
- Roberts, T. R., 1980. A revision of the Asian mastacembelid fish genus *Macrogathus*. *Copeia*, **1980** (3): 385-391.
- Roberts, T. R., 1981. Sundasalangidae, a new family of minute freshwater salmoniform fishes from Southeast Asia. *Proceedings of the California Academy of Sciences*, **42**: 295-302.
- Roberts, T. R., 1982a. The Bornean gastromyzontine fish genera *Gastromyzon* and *Glaniopsis* (Cypriniformes, Homalopteridae), with descriptions of new species. *Proceedings of the California Academy of Sciences*, **42**: 497-524.
- Roberts, T. R., 1982b. The southeast Asian fresh-water pufferfish genus *Chonerhinos* (Tetraodontidae) with descriptions of new species. *Proceedings of the California Academy of Sciences*, **43**: 1-6.
- Roberts, T. R., 1989. The freshwater fishes of western Borneo (Kalimantan Barat, Indonesia). *Memoirs of the California Academy of Sciences*, San Francisco, **14**. xii+210 pp.
- Roberts, T. R., 1992. Systematic revision of the southeast Asian anabantoid fish genus *Osphronemus*, with descriptions of two new species. *Ichthyological Exploration of Freshwaters*, **2** (4): 351-360.
- Roberts, T. R., 1993a. Systematic revision of the Southeast Asian cyprinid fish genus *Labiobarbus* (Teleostei: Cyprinidae). *The Raffles Bulletin of Zoology*, **41** (2): 315-329.
- Roberts, T. R., 1993b. The freshwater fishes of Java, as observed by Kuhl and van Hasselt in 1820-23. *Zoologische Verhandelingen*, **285**: 1-94.
- Roberts, T. R., 1994a. Systematic revision of Asian bagrid catfishes of the genus *Mystus* sensu stricto, with a new species from Thailand and Cambodia. *Ichthyological Exploration of Freshwaters*, **5** (3): 241-256.
- Roberts, T. R., 1994b. Systematic revision of tropical Asian freshwater glassperches (Ambassidae), with descriptions of three new species. *Natural History Bulletin of the Siam Society*, **42**: 263-290.
- Roberts, T. R. & M. Kottelat, 1994. The Indo-Pacific tigerperches, with a new species from the Mekong basin (Pisces: Cobiidae). *Ichthyological Exploration of Freshwaters*, **5**(3): 257-266.
- Roberts, T. R. & C. Vidthayanon, 1991. Systematic revision of the Asian catfish family Pangasiidae, with biological observations and descriptions of three new species. *Proceedings of the Academy of Natural Sciences*, Philadelphia, **143**: 97-144.
- Rosen, D. E. & L. R. Parenti, 1981. Relationships of *Oryzias*, and the groups of atherinomorph fishes. *American Museum Novitates*, **2719**: 1-25.

- Scott, M. C. & G. S. Helfman, 2001. Native invasions, homogenization, and the mismeasure of integrity of fish assemblages. *Fisheries*, **26** (11): 6-15.
- Sevastianof, A., 1809. Description de quelques nouvelles espèces d' animaux, du Musée Académique. Mémoires de L'Académie Imperial des Sciences de St. Petersburg, **1**: 443-449.
- Siebert, D. J., 1991. Revision of *Acanthopsoides* Fowler, 1934 (Cypriniformes: Cobitidae), with the description of new species. *Japanese Journal of Ichthyology*, **38** (2): 97-114.
- Siebert, D. J., 1997. Notes on the anatomy and relationships of *Sundasalanx* Roberts (Teleostei, Clupeidae), with descriptions of four new species from Borneo. *Bulletin of the Natural History Museum, London (Zoology)*, **63**(1): 13-26.
- Siebert, D. J. & A. H. Tjakrawidjaja, 1998. Revision of *Schismatorhynchus* Bleeker, 1855 (Teleostei, Cyprinidae), with the description of two new species from Borneo. *Bulletin of the Natural History Museum, London (Zoology)*, **64** (1): 97-109.
- Staub, J. R., H. L. Among, & R. A. Gastaldo, 2000. Seasonal sediment transport and deposition in the Rajang River delta, Sarawak, East Malaysia. *Sedimentary Geology*, **133**: 249-264.
- Steindachner, F., 1870. Ichthyologische Notizen (X). *Sitzungsberichte der Akademie der Wissenschaften, Wien*, **61**: 623-642, Pls. 1-5.
- Steindachner, F., 1901. Kükenthal's Ergebnisse einer zoologischen Forschungreise in den Molukken und Borneo. Fische. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, **25**: 409-464, Pls. 17-18.
- Tan, H. H., 1999. A new species of *Carinotetraodon* from Sumatra and Borneo; and validity of *C. borneensis* (Teleostei: Tetraodontidae). *Ichthyological Exploration of Freshwaters*, **10** (4): 345-354.
- Tan, H. H. & M. Kottelat, 1998. Two new species of *Betta* (Teleostei: Osphronemidae) from the Kapuas basin, Kalimantan Barat, Borneo. *The Raffles Bulletin of Zoology*, **46** (1): 41-51.
- Tan, H. H. & K. K. P. Lim, 1998. Freshwater elasmobranchs from the Batang Hari basin of central Sumatra, Indonesia. *The Raffles Bulletin of Zoology*, **46** (2): 425-429.
- Tan, T. H. T. & P. K. L. Ng, 1996. Catfishes of the *Ompok leiacanthus* (Bleeker, 1853) species group (Teleostei: Siluridae) from Southeast Asia, with description of a new species. *The Raffles Bulletin of Zoology*, **44** (2): 531-542.
- Vaillant, L. L., 1902. Résultats zoologiques de l'expédition scientifique Néerlandaise au Bornéo central. Poissons. *Notes from the Leyden Museum*, **24** (1): 1-166, Pls. 1-2.
- Vierke, J., 1988. *Betta climacura* n. sp. aus West-Borneo und Anmerkungen zu *Betta taeniata* Regan, 1910. *Das Aquarium*, **22**: 335-340.
- Volz, W., 1903. Neue Fische aus Sumatra. *Zoologischer Anzeiger*, **26** (703): 553-559.
- Watson, D. J. & E. K. Balon, 1984. Ecomorphological analysis of fish taxocenes in rainforest streams of northern Borneo. *Journal of Fish Biology*, **25**: 371-384.
- Weber, M. & L. F. de Beaufort, 1912. "Fische". *Maass, "Durch Zentral. Sumatra"*, **2**: 522-541, Pls. 11-12.
- Weber, M. & L. F. de Beaufort, 1913. *The Fishes of the Indo-Australian Archipelago. II. Malacopterygii, Myctophioidea, Ostariophysii: I Siluroidea*. E. J. Brill, Leiden. xx+404 pp.
- Weber, M. & L. F. de Beaufort, 1916. *The Fishes of the Indo-Australian Archipelago. III. Ostariophysii: II Cyprinoidea, Apodes, Synbranchi*. E. J. Brill, Leiden. xv+455 pp.
- Whitehead, P. J. P. 1967. Indian Ocean anchovies collected by the Anton Bruun and Te Vega, 1963-64. *Journal of the Marine Biological Association of India*, **9** (1): 13-37.
- Whitehead, P. J. P., G. Nelson, & T. Wongratana, 1988. FAO species catalogue. **7**. Clupeoid fishes of the world (suborder Clupeoidei). *An annotated and illustrated catalogue of the herrings, sardines, pilchards, sprats, shads, anchovies and wolf-herrings. Part 2 - Engraulididae*. *FAO Fisheries Synopsis* **125** (7, 2): 305-579.
- Wilford, G. E., 1964. The geology of Sarawak and Sabah Caves. *Geological Survey Department, British Territories in Borneo Bulletin*, **6**: 181 p.
- Wilson, M. E. J. & S. J. Moss, 1999. Cenozoic palaeogeographic evolution of Sulawesi and Borneo. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **145**: 303-337.
- Witte, K.-E. & J. Schmidt, 1992. *Betta brownorum*, a new species of anabantoids (Teleostei: Belontiidae) from northwestern Borneo, with a key to the genus. *Ichthyological Exploration of Freshwaters*, **2** (4): 305-330.

APPENDIX 1: List of sites for fish collection along the Rajang basin, Sarawak, Malaysia.**1. Ulu Baleh: 1956 (material at the FMNH)**

NSH 8.56	Baleh headwaters including Sg. Bunoh; coll: N. S. Haile, Aug.1956
RFI 3.8.56	tributary between Sg. Mujong and Sg. Gaat; coll: R. F. Inger, 3 Aug.1956.
RFI 5.8.56	between Sg. Entunau and Sg. Putai (Station 13); coll: R. F. Inger, 5 Aug.1956.
RFI 6.8.56	Sg. Putai camp, Sg. Dapu; coll: R. F. Inger, 6 Aug.1956.
RFI 7.8.56	Sg. Putai camp, Sg. Dapu; coll: R. F. Inger, 7 Aug.1956.
RFI 8.8.56	Sg. Putai camp, Sg. Dapu (Station 14); coll: R. F. Inger, 8 Aug.1956.
RFI 10.8.56	Sg. Putai camp; coll: R. F. Inger, 10 Aug.1956.
RFI 11.8.56	Sg. Putai camp; coll: R. F. Inger, 11 Aug.1956.
RFI 12.8.56	Sg. Putai; coll: R. F. Inger, 12 Aug.1956.

2. Ulu Baleh: 1962 (material at the FMNH)

RFI 10.9.62	Mengiong River, Nanga Tekalit Camp; coll: R. F. Inger et al., 10 Sep.1962.
IGK 19.9.62	Mengiong River, Nanga Tekalit Camp; coll: R. F. Inger, B. Greenberg and F. W. King, 19 Sep.1962.
IGK 21.9.62	Mengiong River, Nanga Tekalit Camp, Sg. Tekalit; coll: R. F. Inger, B. Greenberg and F. W. King, 21 Sep.1962.
RFI 21.9.62	Mengiong River (Station 5013); coll: R. F. Inger et al., 21 Sep.1962.
IGK 22.9.62	Mengiong River, Nanga Tekalit Camp, tributary of Sg. Tekalit; coll: R. F. Inger, B. Greenberg and F. W. King, 22 Sep.1962.
RFI 22.9.62	Mengiong River (Station 5116-19); coll: R. F. Inger et al., 22 Sep.1962.
IGK 27.9.62	Mengiong River, Nanga Tekalit Camp, Sg. Serbang; coll: B. Greenberg, R. F. Inger and F. W. King, 27 Sep.1962.
RFI 27.9.62	Mengiong River (Station 5179-87); coll: R. F. Inger et al., 27 Sep.1962.
RFI 1.10.62	Mengiong River (Station 5222); coll: R. F. Inger et al., 1 Oct.1962.
IGK 3.10.62	Mengiong River, Nanga Tekalit Camp; coll: R. F. Inger, B. Greenberg and F. W. King, 3 Oct.1962.
RFI 3.10.62	Mengiong River (Station 5285-90); coll: R. F. Inger et al., 3 Oct.1962.
IGK 9.10.62	Mengiong River, Nanga Tekalit Camp, Sg. Tekalit, 9 Oct.1962.
FWK 15.12.62	Mengiong River, Nanga Tekalit Camp, small stream on right of Mengiong River and 1/2 to 3/4 mile above Nanga Ensural; coll: F.W. King, 15 Dec.1962.

3. 1991. L. R. Parenti, M. Zakaria-Ismail, K. Luhut, A. Among, S. Surat (material in USNM, SM, FMNH):

LRP 91-5 through LRP 91-17: Main channel of the Rajang River and tributaries, principally the Baleh River, around Kapit (Fig. 3). Collections were made from the main channel and partially shaded to open streams through alluvial dipterocarp forest over a bottom of mud, gravel, fallen branches, and leaf litter (Fig. 4). Current swift to nil. Water clear to muddy. Streams relatively warm, recorded water temperature ranged from 28° to 30°C.

LRP91-5	Rajang River, wharf at main channel of river at Kapit (2°0'N, 112°55'E), mud; 24 Jul.1991.
LRP91-6	Baleh River, first mapped tributary east of Kapit (Sut River) about 2 km south of where Sut River enters the Baleh (1°59'N, 113°4'E), mud and gravel, current slight, pH 7, water temperature 30°C; 24 Jul.1991.
LRP91-7	Baleh River, tributary entering main part of river opposite Negara Bawai School (2°0'N, 113°3'E), mud and gravel, current swift, water temp. 29° C; 24 Jul.1991 (Fig. 3).
LRP91-8	Baleh River, creek entering southern bank, ca. 20 km east of Sut River (2°1'N, 113°6'E), silty mud with gravel and logs, current swift, pH 6.8, water temperature 29°C; 24 Jul.1991.
LRP91-9	Baleh River, creek entering northern bank, ca. 5 km east of Sut River (2°2'N, 113°7'E), mud, fallen logs and leaf litter, current swift with slower pools, water temperature 28°C; 25 Jul.1991.
LRP91-10	Baleh River, southern tributary stream opposite logging camp just east of the confluence of Baleh and Mujang Rivers (2°1'N, 113°8'E), mud and gravel, current swift with stagnant pools, water temperature 29°C; 25 Jul.1991.
LRP91-11	Kapit Town morning market (2°0'N, 112°55'E); 26 Jul.1991.
LRP91-12	Rajang River at Kapit wharf, east of main wharf area (2°0'N, 112°55'E), mud and gravel, current slight, water temperature 30°C; 26 Jul.1991.
LRP91-13	Baleh River, southern tributary just east of confluence of Mujang and Baleh Rivers (1°57'N, 113°13'E), mud, gravel, logs and leaf litter, current slight to swift, water temperature 29°C; 27 Jul.1991.
LRP91-14	Kapit River just south of where it enters Rajang River (1°59'N, 112°55'E), mud, gravel, and logs, current nil, water temperature 30°C; 27 Jul.1991.
LRP91-15	Kapit Town morning market (2°0'N, 112°55'E); 28 Jul.1991.
LRP91-16	Kapit River where it passes by Kapit Airport (1°58'N, 112°55'E), mud, gravel, logs, and large boulders, current slight to swift; 29 Jul.1991.
LRP91-17	Kapit wharf (2°0'N, 112°55'E); 29 Jul.1991.

LRP91-18 through LRP 91-36: Main channel of the Rajang River and tributaries, principally the Batang Balui, above Belaga (Fig. 5). Collections were made from the main channel and shaded to open streams through dipterocarp forest over a bottom of boulders and outcrops, mud, gravel and leaf litter (Fig. 6). Current slow to swift. Water clear to muddy. Streams generally cooler than those around Kapit, recorded water temperature ranged from 23° to 29°C.

- LRP91-18 Belaga Town, morning market (2°45'N, 113°46'E); 31 Jul.1991.
 LRP91-19 Batang Balui tributary stream Batang Belahui (2°30'N, 113°50'E), mud, boulders and leaf litter, current slight to swift, pH 7, water temperature 26°C; 1 Aug.1991.
 LRP91-20 Batang Balui tributary stream Batang Luan Paha (2°31'N, 113°50'E), boulders and outcrop, current slow to swift, pH 6.7, water temperature 26°C; 1 Aug.1991.
 LRP91-21 Batang Balui tributary stream Batang Kuro (2°29'N, 113°49'E), mud, gravel, boulders and leaf litter, current slow to swift, pH 7, water temperature 28°C; 1 Aug.1991.
 LRP91-22 Batang Balui tributary stream Jangan Aya, flowing into Batang Besua (2°25'N, 113°44'E), mud, rocks and leaf litter, current slow to swift, pH 7.3, water temperature 25°C; 2 Aug.1991.
 LRP91-23 Batang Balui tributary stream Jangan Umi, flowing into Batang Besua (2°24'N, 113°43'E), mud, gravel and leaf litter, current slow to swift, pH 7.2, water temperature 25°C; 2 Aug.1991.
 LRP91-24 Batang Balui tributary stream Batang Luan (2°25'N, 113°47'E), huge boulders, mud, rocks and gravel, current swift, pH 7.2, water temperature 25°C; 2 Aug.1991.
 LRP91-25 Batang Balui tributary stream Sungei Doh Leng (2°24'N, 113°45'E), boulders, outcrop, gravel, and leaf litter, current slow to swift, pH 7.2, water temperature 23°C; 3 Aug.1991.
 LRP91-26 Batang Balui tributary stream Kemtu (2°23'N, 113°45'E), boulders, outcrop, gravel, and mud, current slow to swift, pH 7.3, water temperature 24°C; 3 Aug.1991.
 LRP91-27 Batang Balui tributary stream Lut, that passes near farm where it enters Batang Balui (2°22'N, 113°46'E), boulders, leaf litter, and mud, current swift, pH 8.3, water temperature 29°C; 3 Aug.1991.
 LRP91-28 Batang Balui tributary stream Batang Kerumo where it enters Batang Balui (2°22'N, 113°45'E), boulders, outcrop, and mud, current swift, pH 8.2, water temperature 27°C; 3 Aug.1991 (Fig. 5).
 LRP91-29 Batang Balui tributary stream Batang Besua where it enters Batang Balui (2°26'N, 113°46'E), boulders and mud, current swift; 4 Aug.1991.
 LRP91-30 Batang Balui tributary stream Batang Besua where it enters Batang Balui (2°26'N, 113°46'E), boulders, outcrop and mud; 5 Aug.1991.
 LRP91-31 Batang Balui tributary stream Long Ulu (2°34'N, 113°53'E), mud, gravel and logs, current slow to swift, pH 7.3, water temperature 26°C; 5 Aug.1991.
 LRP91-32 Batang Balui tributary stream Long Tanyit where it enters Batang Balui (2°33'N, 113°52'E), mud, boulders and outcrop, current slight, pH 7.4, water temperature 27°C; 5 Aug.1991.
 LRP91-33 Batang Balui tributary stream Long Paha where it enters Batang Balui (2°32'N, 113°51'E), mud, outcrop and boulders, current swift, pH 7.2, water temperature 27°C; 5 Aug.1991.
 LRP91-34 Batang Balui tributary stream Batang Taman where it enters Batang Balui (2°22'N, 113°47'E), boulders and mud, current swift, pH 7.2, water temperature 27°C; 6 Aug.1991.
 LRP91-35 Batang Balui tributary stream Long Saan (2°20'N, 113°49'E), mud, boulders and leaf litter, current slow to swift, pH 7.8, water temperature 28°C; 6 Aug.1991.
 LRP91-36 Batang Balui tributary stream Long Tow where it enters Batang Balui just downstream from logging camp (2°25'N, 113°46'E), boulders and mud, current swift, pH 7.7, water temperature 26°C; 6 Aug.1991.

4. 1993. Robert Stuebing et al. (material in ITTO and ZRC):

- RS1 Sarikei District: Sg. Sekarang; 8 Oct.1993.
 RS2 Sarikei District: Sg. Brauh, branch of Sg. Sekarang; 10 Oct.1993.
 RS3 Song District: Ulu Katibas, Sg. Melinau; 23 Mar.1994.

5. 1994. M. Kottelat et al. (material in ZRC and CMK):

- MK94-5,24 Sibiu area: 4.2 km north of airport runway on Jalan Teku; 6,15 May.1994.
 MK94-6 Sibiu area: northern extremity of Sibiu airstrip; 6 May.1994.
 MK94-7,25 Sibiu area: Sg. Nibong, ca. 1 km north of Durin ferry on Sri Aman-Sibiu road; 7,15 May.1994.
 MK94-8 Sarikei area: water in Taman Selangkoi, 25 km south of Sarikei; 7 May.1994.
 MK94-23 Sibiu area: Sg. Teku north of airport runway end along Jalan Teku; 15 May.1994.
 MK94-26 Sibiu-Sarikei road, 6 km south of Durin ferry; 15 May.1994.
 MK94-27 Sibiu-Sarikei road, 2-3 km south of Durin ferry; 15 May.1994.
 MK94-55 Sg. Tebu at 8 km, Daro-Matu road; 14 Jun.1994.
 MK94-56 Parit Nyadok, 200 m off 10 km stone along Daro-Matu road; 14 Jun.1994

6. 1997. Y. Y. Goh (material in ZRC):

- GY026 Ulu Katibas, Sg. Begua; 14-15, 19 Nov.1997.
 GY048 From Sg. Rajang, purchased in market at Kapit; 27-28 Nov.1997.
 GY049 Fast-flowing rocky stream in bamboo forest at ca. 2 km upstream of Sg. Pelajau (bridge) and ca. 6 km behind Kapit Airport (1°57'54.9"N, 112°55'25.5"E), pH 7.9; xi.1997.

7. 1998. H. H. Tan & R. Kerle (material in ZRC):

- THH9803 From Sg. Rajang, purchased in market at Kapit; 28 Feb.1998.
 THH9804 From Sg. Rajang, purchased in market at Kapit; 1-3 Mar.1998.

- THH9805 Sg. Semaning (ca. 30 min. by road) downstream along Sg. Rajang from Kapit (1°57.52'N, 112°55.52'E); 1 Mar.1998.
 THH9806 Stream in bamboo forest (ca. 20 min. by road) downstream along Sg. Rajang from Kapit (1°56.25'N, 112°52.26'E); 1 Mar.1998.
 THH9807 Kapit area: Sg. Rajang near mouth (2°0.74'N, 113°1.66'E) of Sg. Melekon and within that tributary (ca. 30 min. by road upstream along Rajang) (2°0.64'N, 113°1.49'E), pH 7.5; 2 Mar.1998.
 THH9808 Kapit area: Sg. Ulu Selirik, ca. 20 min. by road upstream along Sg. Rajang from Kapit (2°0.01'N, 112°57.24'E), pH 7.6; 2 Mar.1998.
 THH9809 Kapit area: Sg. Kapit, ca. 15 mins. by road downstream along Sg. Rajang (2°0.12'N, 112°55.83'E); 2 Mar.1998.
 THH9810 Sibul area: Sg. Teku along Jalan Teku (2°21.13'N, 111°52.47'E), pH 4.5; 3 Mar.1998.
 THH9811 Sibul area: blackwater ditch between THH9810 and THH9812; 3 Mar.1998.
 THH9812 Sibul area: blackwater ditch near remnant peat swamp-forest behind old Sibul Airport (2°20.45'N, 111°50.11'E); 3 Mar.1998.
 THH9813 From Sg. Rajang, purchased in market at Sibul; 3-4 Mar.1998.

APPENDIX 2: A CHECKLIST OF THE FISHES OF THE RAJANG BASIN

CLASS ACTINOPTERYGII DIVISION TELEOSTEI

ORDER OSTEOGLOSSIFORMES

FAMILY OSTEOGLOSSIDAE

1. *Scelopages formosus* (Schlegel & Müller, in Müller & Schlegel, 1844) *

FAMILY NOTOPTERIDAE

2. *Chitala borneensis* (Bleeker, 1851a) *

ORDER CLUPEIFORMES

FAMILY CLUPEIDAE

3. *Sundasalanx microps* Roberts, 1981 *
4. *Tenualosa toli* (Valenciennes, in Cuvier & Valenciennes, 1847)

FAMILY ENGRAULIDAE

5. *Lycotrichsa crocodilus* (Bleeker, 1851b)
6. *Setipinna breviceps* (Cantor, 1849)
7. *Setipinna taty* (Valenciennes, in Cuvier & Valenciennes, 1848)
8. *Setipinna tenuifilis* (Valenciennes, in Cuvier & Valenciennes, 1848)
9. *Stolephorus baganensis* Hardenberg, 1933
10. *Coilia* spp.

ORDER CYPRINIFORMES

FAMILY CYPRINIDAE

11. *Barbonymus collingwoodii* (Günther, 1868) *
12. *Barbonymus gonionotus* (Bleeker, 1850) *
13. *Barbonymus schwanenfeldii* (Bleeker, 1853a)
14. *Cosmochilus falcifer* Regan, 1906
15. *Cyclocheilichthys apogon* (Valenciennes, in Cuvier & Valenciennes, 1842)
16. *Cyclocheilichthys armatus* (Valenciennes, in Cuvier & Valenciennes, 1842)
17. *Cyclocheilichthys repasson* (Bleeker, 1853b) *
18. *Garra borneensis* (Vaillant, 1902)
19. *Hampala bimaculata* (Popta, 1905)
20. *Hampala macrolepidota* (Valenciennes, in Cuvier & Valenciennes, 1842)
21. *Labiobarbus* cf. *leptocheilus* (Valenciennes, in Cuvier & Valenciennes, 1842)
22. *Leptobarbus melanotaenia* Boulenger, 1894 *
23. *Lobocheilos* cf. *bo* (Popta, 1904)
24. *Lobocheilos falcifer* (Valenciennes, in Cuvier & Valenciennes, 1842) *
25. *Lobocheilos* cf. *kajanensis* (Popta, 1904)
26. *Luciosoma setigerum* (Valenciennes, in Cuvier & Valenciennes, 1842) *
27. *Luciosoma spilopleura* Bleeker, 1855

28. *Macrochirichthys macrochirus* (Valenciennes, in Cuvier & Valenciennes, 1844) *

29. *Nematabramis steindachnerii* Popta, 1905 *

30. *Osteochilus enneaporos* (Bleeker, 1852c) *

31. *Osteochilus hasseltii* (Valenciennes, in Cuvier & Valenciennes, 1842)

32. *Osteochilus intermedius* Weber & de Beaufort, 1916

33. *Osteochilus kahajanensis* (Bleeker, 1857)

34. *Osteochilus melanopleura* (Bleeker, 1852b)

35. *Osteochilus microcephalus* (Valenciennes, in Cuvier & Valenciennes, 1842)

36. *Osteochilus sarawakensis* Karnasuta, 1993

37. *Osteochilus spilurus* (Bleeker, 1851c) *

38. *Oxygaster anomalura* van Hasselt, 1823

39. *Paracrossochilus acerus* Inger & Chin, 1962

40. *Paracrossochilus vittatus* (Boulenger, 1894)

41. *Puntioplites bulu* (Bleeker, 1851d)

42. *Rasbora argyrotaenia* (Bleeker, 1850)

43. *Rasbora bankanensis* (Bleeker, 1853c) *

44. *Rasbora borneensis* Bleeker, 1860

45. *Rasbora caudimaculata* Volz, 1903

46. *Rasbora dusonensis* (Bleeker, 1851b)

47. *Rasbora* cf. *dusonensis* (Bleeker, 1851b) *

48. *Rasbora ennealepis* Roberts, 1989

49. *Rasbora kottelati* Lim, 1995

50. *Rasbora pauciperforata* Weber & de Beaufort, 1916 *

51. *Rasbora sarawakensis* Brittan, 1851

52. *Rasbora* cf. *sumatrana* (Bleeker, 1852c) *

53. *Rasbora tornieri* Ahl, 1922

54. *Rasbora trilineata* Steindachner, 1870 *

55. *Rasbora volzii* Popta, 105

56. *Schismatorhynchus holohynchus* Siebert & Tjakrawidjaja, 1998

57. *Sundadanio axelrodi* (Brittan, 1976) *

58. *Systemus banksi* (Herre, 1940)

59. *Systemus johorensis* (Duncker, 1904)

60. *Systemus kuchingensis* Herre, 1940

61. *Systemus orphoides* (Valenciennes, in Cuvier & Valenciennes, 1842) *

62. *Systemus pentazona* (Boulenger, 1894)

63. *Tor tambra* (Valenciennes, in Cuvier & Valenciennes, 1842)

64. *Tor tambroides* (Bleeker, 1854)

65. Undescribed genus and species *

FAMILY COBITIDAE

66. *Acanthopsoides molobrion* Siebert, 1991

67. *Pangio anguillaris* (Vaillant, 1902)

68. *Pangio piperata* Kottelat & Lim, 1993 **

69. *Pangio semicincta* (Fraser-Brunner, 1940)

70. *Syncrossus hymenophysa* (Bleeker, 1852c) *

FAMILY BALITORIDAE

71. *Gastromyzon fasciatus* Inger & Chin, 1961

72. *Gastromyzon megalepis* Roberts, 1982a
 73. *Gastromyzon punctulatus* Inger & Chin, 1961
 74. *Gastromyzon* sp.
 75. *Glaniopsis* cf. *hanitschi* Boulenger, 1899
 76. *Homaloptera nebulosa* Alfred, 1969
 77. *Homaloptera orthogoniata* Vaillant, 1902*
 78. *Homaloptera wassinkii* Bleeker, 1853d *
 79. *Homaloptera* cf. *stephensoni* Hora, 1932
 80. *Homaloptera* sp. *
 81. *Katibasia insidiosa* Kottelat, 2004
 82. *Nemacheilus kapuasensis* Kottelat, 1984
 83. *Nemacheilus saravacensis* Boulenger, 1894
 84. *Nemacheilus spiniferus* Kottelat, 1984
 85. *Neogastromyzon nieuwenhuisii* Popta, 1905
 86. *Neogastromyzon pauciradiatus* (Inger & Chin, 1961)
 87. *Parhomaloptera microstoma* (Boulenger, 1899)
 88. *Protomyzon griswoldi* (Hora & Jayaram, 1952)
- ORDER SILURIFORMES
 FAMILY BAGRIDAE
 89. *Bagrichthys macracanthus* (Bleeker, 1954) *
 90. *Bagroides melapterus* Bleeker, 1851d
 91. *Hemibagrus nemurus* (Valenciennes, 1839) *
 92. *Hemibagrus bongan* (Popta, 1904)
 93. *Hemibagrus chrysops* Ng & Dodson, 1999
 94. *Hemibagrus fortis* (Popta, 1904)
 95. *Hemibagrus wyckii* (Bleeker, 1858b) *
 96. *Leiocassis micropogon* (Bleeker, 1852d)
 97. *Mystus castaneus* Ng, 2002
 98. *Mystus singaringan* (Bleeker, 1846) *
 99. *Pseudomystus fuscus* (Popta, 1904) *
 100. *Pseudomystus inornatus* (Boulenger, 1894) *
 101. *Pseudomystus stenomus* (Valenciennes, in Cuvier & Valenciennes, 1840a) *
- FAMILY SILURIDAE
 102. *Ceratoglanis scleronema* (Bleeker, 1862)
 103. *Hemisilurus heterorhynchus* (Bleeker, 1853a) *
 104. *Kryptopterus bicirrhis* (Valenciennes, in Cuvier & Valenciennes, 1840a) *
 105. *Kryptopterus kryptopterus* (Bleeker, 1851c) *
 106. *Kryptopterus hexapterus* (Bleeker, 1851d) *
 107. *Kryptopterus limpok* (Bleeker, 1852c) *
 108. *Kryptopterus macrocephalus* (Bleeker, 1858b)
 109. *Kryptopterus platypogon* Ng, 2004
 110. *Micronema apogon* (Bleeker, 1851e) *
 111. *Ompok jaynei* Fowler, 1905
 112. *Silurichthys phaiosoma* (Bleeker, 1851a)
 113. *Wallago leerii* (Bleeker, 1851a)
- FAMILY PANGASIIDAE
 114. *Pangasius micronemus* Bleeker, 1847
 115. *Pangasius polyuranodon* Bleeker, 1852c
 116. *Pangasius nasutus* Bleeker, 1863
 117. *Pangasius* sp. *
- FAMILY SISORIDAE
 118. *Glyptothorax major* (Boulenger, 1894)
 119. *Glyptothorax platypogon* (Valenciennes, in Cuvier & Valenciennes, 1840b)
- FAMILY AKYSIDAE
 120. *Acrochordonichthys rugosus* (Bleeker, 1847)
- FAMILY CLARIIDAE
 121. *Clarias leiacanthus* Bleeker, 1851a *
 122. *Clarias planiceps* Ng, 1999a
 123. *Encheloclarias baculum* Ng & Lim, 1992
- FAMILY ARIIDAE
 124. *Hemipimelodus borneensis* (Bleeker, 1851a) *
- ORDER ATHERINIFORMES
 FAMILY PHALLOSTETHIDAE
 125. *Phenacostethus smithi* Myers, 1928 *
- ORDER BELONIFORMES
 FAMILY HEMIRAMPHIDAE
 126. *Hemirhamphodon kuekenthalii* Steindachner, 1901
- ORDER GASTEROSTEIFORMES
 FAMILY SYNGNATHIDAE
 127. *Doryichthys martensii* (Peters, 1868) *
- ORDER SYNBRANCHIFORMES
 FAMILY CHAUDHURIIDAE
 128. *Nagaichthys* sp.
 FAMILY MASTACEMBELIDAE
 129. *Macrognathus aculeatus* (Bloch, 1786)
 130. *Macrognathus circumcinctus* (Hora, 1924) **
 131. *Macrognathus keithi* (Herre, 1940)
 132. *Mastacembelus unicolor* Cuvier, in Cuvier & Valenciennes, 1832
- ORDER PERCIFORMES
 FAMILY CHANDIDAE
 133. *Parambassis wolffii* (Bleeker, 1851b) *
 FAMILY DATNIODIDAE
 134. *Datnioides quadrifasciatus* (Sevastianof, 1809) *
 FAMILY POLYNEMIDAE
 135. *Polynemus hornadayi* Myers, 1936 *
 136. *Polynemus melanochir* (Valenciennes, in Cuvier & Valenciennes, 1831) *
- FAMILY NANDIDAE
 137. *Nandus nebulosus* (Gray, 1835)
- FAMILY PRISTOLEPIDAE
 138. *Pristolepis grootii* (Bleeker, 1852d) *
- FAMILY ELEOTRIDAE
 139. *Eleotris melanosoma* Bleeker, 1852e *
 140. *Oxyeleotris marmorata* (Bleeker, 1852b) *
 141. *Oxyeleotris urophthalmoides* (Bleeker, 1853b) *
 142. *Pogoneleotris heterolepis* (Günther, 1869) *
- FAMILY GOBIIDAE
 143. *Eugnathogobius siamensis* (Fowler, 1934) *
 144. *Eugnathogobius* sp. *
 145. *Glossogobius celebius* (Valenciennes, in Cuvier & Valenciennes, 1837) *
 146. *Parawaous megacephalus* (Fowler, 1905) *
- FAMILY ANABANTIDAE
 147. *Anabas testudineus* (Bloch, 1792) *
- FAMILY OSPHRONEMIDAE
 148. *Betta akarensis* Regan, 1910 *
 149. *Betta brownorum* Witte & Schmidt, 1992
 150. *Luciocephalus pulcher* (Gray, 1830)
 151. *Osphronemus septemfasciatus* Roberts, 1992 *
 152. *Parosphromenus allani* Brown, 1987
 153. *Sphaerichthys osphromenoides* Canestrini, 1860
 154. *Trichogaster pectoralis* (Regan, 1910) *
 155. *Trichogaster trichopterus* (Pallas, 1770)
- FAMILY CHANNIDAE
 156. *Channa gachua* (Hamilton, 1822) *
 157. *Channa lucius* (Cuvier, in Cuvier & Valenciennes, 1831)
- ORDER PLEURONECTIFORMES
 FAMILY SOLEIDAE
 158. *Achiroides leucorhynchus* Bleeker, 1851f *
 159. *Achiroides melanorhynchus* (Bleeker, 1851b) *

ORDER TETRAODONTIFORMES

FAMILY TETRAODONTIDAE

160. *Auriglobus modestus* (Bleeker, 1851b)
161. *Auriglobus nefastus* (Roberts, 1982b)
162. *Auriglobus silus* (Roberts, 1982b)
163. *Carinotetraodon borneensis* (Regan, 1903)
164. *Carinotetraodon salivator* Lim & Kottelat, 1995