

## BREVIBORA CHEEYA, A NEW SPECIES OF CYPRINID FISH FROM MALAY PENINSULA AND SUMATRA

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**ABSTRACT.** – *Brevibora cheeya* is a new species of cyprinid fish from the Malay Peninsula and Sumatra. It is distinguished from its only congener, *B. dorsiocellata*, by the complete lateral line, more scales along the lateral row and larger size.

**KEY WORDS.** – Taxonomy, *Brevibora cheeya*, *Brevibora dorsiocellata*, Southeast Asia, Biodiversity.

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### INTRODUCTION

*Brevibora* is a monotypic genus diagnosed by the large, black dorsal-fin blotch and less than nine predorsal vertebrae (Liao et al., 2010). *Brevibora dorsiocellata* (Fig. 1) is characterized amongst others, by having an incomplete lateral line (Duncker, 1904). However, variation of the lateral line length has been reported on by subsequent workers (Brittan, 1972; Roberts, 1989). Examination of various populations of *B. dorsiocellata* reveals that some populations have complete lateral line while other populations have incomplete lateral line. This character is consistent within each population. The purpose of this paper is to describe a new species of *Brevibora* with complete lateral line from the Malay Peninsula and Sumatra.

### MATERIAL AND METHODS

Counts were based on radiographs and cleared-and-stained (C&S) specimens. Caudal vertebrae referred to those vertebrae bearing a haemal-spine, including the compound centrum, and the remaining vertebrae were counted as abdominal vertebrae, including the vertebrae forming the Weberian apparatus. The last two rays of the dorsal fin articulating on the same pterygiophore are counted as one. All perforated scales along the lateral line were counted as lateral line scales. Scales of lateral row were counted along the row of the lateral line, including scales on the caudal fin. Definition of lateral line completeness follows that of

Brittan (1954). According to his definition, the lateral line is complete when it extends beyond the insertion of last anal-fin ray; if incomplete, the lateral line may end at any point before the insertion of last anal-fin ray. Predorsal scales were counted along the dorsum midline from the first scale behind the head to the scale in front of the dorsal-fin insertion. Transverse line scales were counted on a projected straight line from the origins of the dorsal and pelvic fins (F-J in Fig. 2). Circumpeduncular scale row was the number of longitudinal scale rows around the caudal peduncle. All measurements and counts were conducted on the left side of the body whenever possible.

Measurements on specimens were taken point-to-point to the nearest 0.1 mm with a pair of digital calipers. Points used in measurements are given in Fig. 2. Numbers in parentheses used in description refer to number of specimens examined.

Cleared-and-stained specimens were prepared according to Taylor and Van Dyke (1985) with slight modifications.

Terminologies of color pattern followed Brittan (1954) unless noted. Vernacular group names follow Fang et al. (2009), viz. rasborins for the genus *Rasbora* and related genera.

Specimens examined are from the Natural History Museum, London (BMNH), the Swedish Museum of Natural History (NRM) and the Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore (ZRC).

**TAXONOMY**

***Brevibora cheeya*, new species**

(Figs. 3, 4)

**Material examined.** – Holotype – ZRC 51965, 26.6 mm SL; Malaysia: Terengganu, Rantau Abang, 56 km to Kuala Terengganu; P.K.L. Ng et al, 16 May.1995.

Paratypes - ZRC 40196, 10, 20.4-27.3 mm SL; same data as holotype. - CMK 8156, 20, 12.9-22.8 mm SL, ZRC 24127, 17, 13.3-22.3 mm SL; same locality as holotype; M. Kottelat et al., 18 Mar.1992. - ZRC 51966, 46, BMNH 2010.1.11.1-70, 70, 14.1-25.5 mm SL; Malaysia: Terengganu, Rantau Abang, 56 km to Kuala Terengganu; L. Rüber et al., 28 Feb.2009.

**Additional non-type material.** – ZRC 39158, 11 (1 C&S), 11.4-28.0 mm SL; Indonesia: Sumatra: Jambi: Berbak Nature Reserve, Sungai Air Hitam Dalam; H.H. Ng & S.H. Tan, 16-17 Jun.1995. - ZRC 43116, 1, 19.6 mm SL; Indonesia: Sumatra: Riau: Indragiri, Sungai Jakil; H.H.Tan et al., 25 Nov.1996. - ZRC 30911, 2 ex., 30.4-30.9 mm SL; Sumatra: Banka island, Kampung Jelit; M. Kottelat et al., 2 Mar.1993. - ZRC 3206, 406, 10.9-38.8 mm SL; Malaysia: Pahang, Tasek Bera; C.C. Lindsey, 29 Mar.1963. - ZRC 18826, 7, 25.9-31.9 mm SL; Malaysia: Selangor, Tanjung Malim; P.K.L. Ng

et al., 14 Sep.1991. - ZRC 42852, 4, 20.0-21.5 mm SL; Malaysia: Johor, Sungei Kayu; H.H. Tan et al., 12 Mar.1998.

**Diagnosis.** – *Brevibora cheeya* is distinguished from *B. dorsiocellata* by the complete lateral line (25-30 perforated scales vs. 4-9), more scales along the lateral row (29-32 vs. 25-27), larger size (up to 39.0 mm SL vs. 23.0 mm SL); and larger head and prepectoral length (head length 28.5-30.0% SL, vs. 24.4-27.9; prepectoral length 29.6-32.9% SL, vs. 25.8-28.8).

**Description.** – Refer to Fig. 3 for overall body shape and to Table 1 for morphometric data. Body laterally compressed, rather elongated. Head short. Snout pointed. Mouth terminal, reaching vertical of anterior orbit. Dorsal-fin origin at highest point of body outline. Predorsal contour almost straight, with a slight depression on snout. Ventral outline slightly curved from tip of snout to the middle of caudal peduncle. Barbel, keel and tubercles absent.

Dorsal-fin origin opposite or slightly ahead to pelvic-fin origin, tip of last branched ray opposite to anal-fin origin, pointed, posterior outline rather straight. D. ii.6 (11). Longest pectoral-fin ray (1<sup>st</sup> or 2<sup>nd</sup> branched ray) almost reaching pelvic-fin origin. P. ii.11 (2), ii.12 (8). Pelvic fin triangular, longest ray almost reaching anal-fin origin. V. ii.8 (10). Anal-fin origin closely behind vent, posterior outline concave, longest ray not reaching caudal fin A. iii.5 (11). Caudal fin deeply forked.

Lateral line complete with 25-30 perforated scales [25 (1), 26 (2), 27 (5), 28 (1), 29 (1), 30 (1)], last two to six scales not perforated. Lateral row with 29-32 scales [29 (3), 30 (3), 31 (3), 32 (2)], including two scales on base of caudal fin, lateral row descending from 1<sup>st</sup> to 4<sup>th</sup> scale and rather horizontal between 5<sup>th</sup> and 7<sup>th</sup>, then descending from 8<sup>th</sup> scale onwards to caudal-fin base (scale number based on holotype). Predorsal scales 10-11 [10 (9), 11 (2)]. Transverse



Fig. 1: *Brevibora dorsiocellata*. ZRC 42313, 22.7 mm SL; Indonesia: Sumatra: Jambi: Sungai Alai: 19.5 km to Muara Tebo from Muara Bungo.

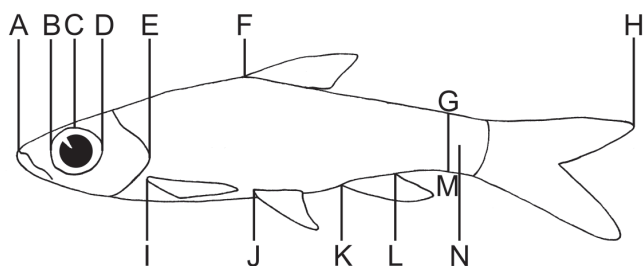


Fig. 2: Points used in measurements of rasborins species. **1**, Standard length (SL): A-N, from tip of upper jaw to end of hypural plate. **2**, Total length (SL): A-H, from tip of upper jaw to tip of upper caudal-fin lobe. **3**, Head length: A-E, from tip of upper jaw to posterior edge of opercle. **4**, Head depth: at level of posterior margin of orbit (D). **5**, Orbital diameter: B-D, between horizontal margins of osseous orbit. **6**, Snout length: A-B, from tip of upper jaw to anterior margin of osseous orbit. **7**, Interorbital width: distance between upper margins (C) of each osseous orbit. **8**, Predorsal length: A-F, from tip of upper jaw to dorsal-fin origin. **9**, Preanal length: A-K, from tip of upper jaw to anal-fin origin. **10**, Prepectoral length: A-I, from tip of upper jaw to pectoral-fin origin. **11**, Prepelvic length: A-J, from tip of upper jaw to pelvic-fin origin. **12**, Dorsal hypural length: F-N, from anterior edge of dorsal-fin insertion to end of hypural plate. **13**, Body depth: at level of dorsal fin origin (F). **14**, Caudal peduncle length: L-N, from end of anal-fin base to end of hypural plate. **15**, Caudal peduncle depth: narrowest part of caudal peduncle (G-M).



Fig. 3: *Brevibora cheeya*. ZRC 51965, holotype, 26.6 mm SL; Malaysia: Terengganu, Rantau Abang, 56 km to Kuala Terengganu.



Fig. 4: *Brevibora cheeya*. ZRC 39158, 11.4 mm SL; Indonesia: Jambi Province: Berbak Nature reserve, Sungai Air Hitam Dalam.

line scales  $\frac{1}{2}$  4/1/3  $\frac{1}{2}$  (11). One scale between lateral-line scale row and the pelvic-fin origin. Circumpeduncular scales  $\frac{1}{2}$  3/1/1  $\frac{1}{2}$  (11). Pectoral axillary scale rudimentary. Pelvic axillary scale well developed, corresponding to 1/3 of pelvic fin in length.

Predorsal vertebrae 8-9 [8 (10), 9 (1)], abdominal vertebrae 16 (11), caudal vertebrae 15-16 [15 (10), 16 (1)], total vertebrae 31-32 [31 (10), 32 (1)]; pharyngeal teeth in three rows, 5, 4, 2; 2, 4, 5 (1), rasborin process present.

**Coloration in preservative.** – Dorsum dark brownish, ventral gradually lighter. Abdomen yellowish. Dorsum of head dark brownish. Tip of snout more densely pigmented than adjacent area, exhibiting an appearance of dusky lips. Suborbital yellowish. Gill cover rather transparent with brownish pigment. Iris whitish, black dorsally and ventrally. Dorsal stripe prominent, half of dorsal-scale row in width. Reticulate pattern on sides distinct. Melanophores densely scattered along distal margin of scales in three or four rows, more prominent in dorsal half of body. An axial streak running from two scales in front of caudal-fin base to the upper edge of gill opening, fading out anteriorly. Dark lateral stripe absent. Supra-anal pigment present as a streak and connected with subpeduncle streak, both blackish. A distinct black blotch on

anterior middle dorsal fin, intensely pigmented with a defined outline, oval in shape, covering two unbranched and first four branched rays. Other fins hyaline, with some melanophores scattered on fin rays. Melanophores most intense on distal half of anal fin rays, similar to a blotch in overall shape. Inter-radial membrane of anal fin transparent. It is not sure whether the blotch on anal fin due to stronger pigmentation caused by environmental factors. In the smallest specimen of ZRC 39158 (Fig. 4) the distal half of its pelvic fin rays with highly scattered melanophores and pigmentation on its anal fin rays more intense than larger specimens. It is postulated that this pigmentation fades out upon maturity.

**Distribution and field notes.** – *Brevibora cheeya* is distributed both in the westerly and easterly flowing river basins of Peninsular Malaysia (western: Selangor; eastern: Terengganu, Pahang, Johor), Central Sumatra (Jambi, Riau) and Banka Island (Fig. 5). *Brevibora dorsiocellata* appears to be restricted to the Muar river basin in Malaysia, but this could be due to insufficient sampling (based on ZRC material and second author pers. obs.); but occurs in Central Sumatra, where *B. cheeya* is also present, but seemingly in different sub-basins. The *Brevibora dorsiocellata* group is also present in Borneo, and will be covered in more detail in future works.

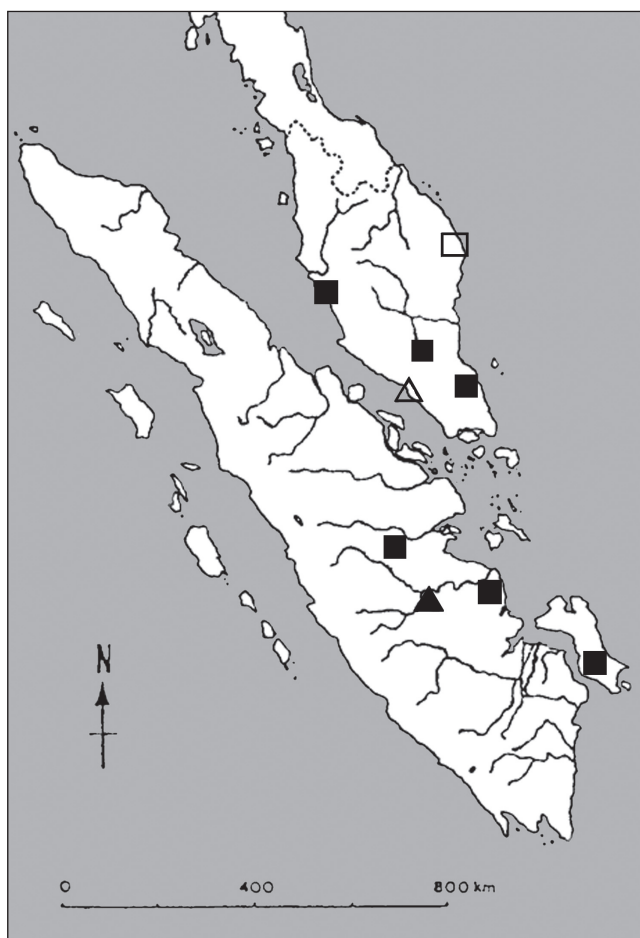


Fig. 5: Map of Sumatra and Malay Peninsula showing the distribution of *Brevibora cheeya* (square; hollow symbol denotes the type locality) and *B. dorsiocellata* from comparative material (triangle; hollow symbol denotes the type locality).

The type locality in Malaysia is in a coastal heath forest (Fig. 6). This habitat consists mainly of *Melaleuca* (Myrtaceae) stands on sandy and peaty substrate. The waters are tannin stained, slow flowing, and acidic (pH 4.5, as measured in February 2009). Syntopic species recorded from the type locality include: *Boraras maculatus*, *Cyclocheilichthys apogon*, *Osteochilus spilurus*, *Parachela maculicauda*, *P. oxygastroides*, *Rasbora einthovenii*, *R. trilineata*, *Systemus johorensis*, *Trigonopoma gracile*, *T. pauciperforatum* (Cyprinidae), *Lepidocephalichthys furcatus*, *Pangio alcoides*, *P. semicincta* (Cobitidae), *Kryptopterus macrocephalus*, *Ompok leiacanthus*, *Wallago leerii* (Siluridae), *Hemibagrus nemurus*, *Pseudomystus leiacanthus* (Bagridae), *Clarias batrachus*, *C. meladerma* (Clariidae), *Parakysis verrucosa* (Akysidae), *Aplocheilus panchax* (Aplocheilidae), *Hemirhamphodon pogonognathus* (Hemiramphidae), *Monopterus albus* (Synbranchidae), *Nandus*



Fig. 6: Type locality of *Brevibora cheeya* at Rantau Abang, Terengganu, Malaysia (February 2009).

Table 1: Morphometry of *Brevibora cheeya*. SD = standard deviation. Measurements of *B. dorsiozellata* are from 12 specimens including two of paralectotypes BMNH 1913.5.24.13-14 and ten of ZRC 42313. Differences in range of variation are indicated in bold.

	<i>Brevibora cheeya</i>			<i>Brevibora dorsiozellata</i>		
	Holotype	Paratype (n=10)		n=12		SD
		range	mean	range	mean	SD
Standard length (SL; in mm)	26.6	20.4-27.3	17.0-22.1			
In % of SL						
total length	137.3	137.1-143.0	139.2	137.2-144.7	141 (n=10)	2.6
<b>head length</b>	<b>28.5</b>	<b>28.5-30.0</b>	<b>29.3</b>	<b>24.4-27.9</b>	<b>26.3</b>	<b>1.0</b>
body depth	26.5	24.4-26.7	25.6	25.8-28.4	27.0 (n=10)	0.8
caudal peduncular depth	11.9	11.7-13.0	12.3	10.5-13.6	11.8	0.5
caudal peduncular length	18.5	16.6-18.5	17.3	17.3-20.7	18.5	0.8
predorsal length	72.3	70.2-73.9	72.3	70.6-76.8	73.6	1.3
preanal length	51.2	51.2-55.2	53.5	48.8-56.0	53.5	1.3
<b>prepectoral length</b>	<b>29.6</b>	<b>29.6-32.9</b>	<b>31</b>	<b>25.8-28.8</b>	<b>27.7</b>	<b>0.8</b>
prepelvic length	53.8	52.7-54.6	53.7	51.8-57.9	54.4	1.3
dorsal-hypural length	50.8	49.3-52.2	50.7	51.0-55.4	52.7	1.4
length of dorsal fin	25.8	26.2-29.3	27.8			
length of anal fin	16.5	16.5-18.8	17.7 (n=7)			
In % of head length (HL)						
head depth	63.5	59.5-63.9	61.8	60.3-65.5	62	1.1
snout length	32.4	28.3-32.8	30.5	23.4-30.9	28.3	1.7
orbital diameter	35.1	33.3-40.0	37.2	34.5-37.7	36	1.1
interorbital width	35.1	33.8-41.0	37.7	29.8-43.4	37.3	2.3

*nebulosus* (Nandidae), *Pristolepis grooti* (Pristolepididae), *Belontia hasseltii*, *Betta imbellis*, *B. waseri*, *Luciocephalus pulcher*, *Parosphromenus paludicola*, *Trichopodus leerii*, *T. trichopterus*, *Trichopsis vittata* (Osphronemidae), *Channa bankanensis*, *C. lucius* and *C. striata* (Channidae) (Kottelat et al., 1992; unpublished data).

**Etymology.** – Cheeya and Beiya, are two Chinese deities who hunt ghosts for Yama; “chee” and “bei” mean seven and eight, respectively, and “ya” is an honorable title for a respected person. Cheeya is tall and Beiya is short; in allusion to its relatively larger size as compared to *B. dorsiocellata*. A noun in apposition.

## DISCUSSION

*Brevibora dorsiocellata* was described by Duncker (1904) as a member of *Rasbora*, based on specimens from Muar (north-western corner of the southern state of Johor in Malaysia). This species is a popular aquarium fish well-known for the conspicuous black blotch on its dorsal fin. Duncker (1904) mentioned that *B. dorsiocellata* has an incomplete lateral line with only eight perforated scales. However, in his drawing (Duncker, 1904), the lateral line is complete. Weber & Beaufort (1916) noticed this discrepancy and after examination of the types sent by Duncker, they stated that the drawing is erroneous. In addition, the drawing did not show the unique lateral line pattern shared by *Brevibora* and *Kottelatia*. Meinken (1951) described a subspecies of *Rasbora dorsiocellata* as *R. dorsiocellata macrophthalmalma*, also with a black blotch on the dorsal fin and an incomplete lateral line, which was subsequently synonymized with *B. dorsiocellata* by Brittan (1954). The holotype of *B. macrophthalmalma* is missing (Eschmeyer & Fricke, 2009), so no direct comparison can be made. Moreover, the locality is vague and listed only as Malay Archipelago, as it had been obtained from the aquarium trade. Since *B. macrophthalmalma* also possesses an incomplete lateral line, it would not affect the validity of *B. cheeya*. We follow Brittan’s opinion in treating *B. macrophthalmalma* as a synonym of *B. dorsiocellata*.

Brittan (1954) considered variation in length of lateral line as an intra-species variation in *B. dorsiocellata*. However, this conclusion was based on only five specimens from three localities. Apparently the sample size is insufficient and, indeed, no variation was observed within any population by Brittan (1954). Roberts (1989) also noted the difference in lateral line length, but he adopted the interpretation of Brittan without additional comments. In material of *B. dorsiocellata* from Malay Peninsula and Sumatra, we found that lateral line length (complete or incomplete) is a stable character within a population and locality, and hence the lateral line completeness is a good character for species diagnosis within this genus. Brittan (1954) reported that two specimens of *B. dorsiocellata* (s. l.) from Pahang (SU 31196) possess incomplete lateral line of 30 and 33 mm SL, one with 20 pores on the left and 28 on the right, the other with 24 pores on both sides. Although we did not examine these two specimens, it is likely that these two specimens are *B.*

*cheeya*. In some rasborins with complete lateral line, the last few scales are usually not perforated, commonly observed in the *Rasbora daniconius* and *R. trifasciata* species groups (Brittan, 1954), and this is probably the reason why Brittan (1954) made a unique definition of lateral line completeness (see MATERIAL AND METHODS).

Kottelat & Vidthayanon (1993) provided a list of 47 miniature fish species from South and Southeast Asia according to the criterion proposed by Weitzman & Vari (1988), being less than 20 mm SL at female maturity or unknown maturity but never surpassing 26 mm SL in the wild. *Brevibora dorsiocellata* (sensu lato) was not included in their list, and none of the subsequent authors considered this species as a miniature fish. However, after this present description of *B. cheeya*, *B. dorsiocellata* (less than 23 mm SL) meets the criterion of a miniature fish.

A black blotch in the middle of dorsal fin is a conspicuous character distinguishing *Brevibora* from the other rasborins. Among species of rasborins, *Rasbora atridorsalis* and *R. dorsinotata* also possess a black blotch on the dorsal fin (Kottelat & Chu, 1987), but the blotch is at the tip rather than in the middle of the fin.

**Comparative material.** – *Brevibora dorsiocellata*: BMNH1913.5.24.13-14, 2 paralectotypes, 17.0 & 19.8 mm SL; Malaysia: Johore. - ZRC 2315, 3 paralectotypes, 14.4-15.7 mm SL; Malaysia: Negeri Sembilan, Kuala Jelai. - BMNH 1994.12.16.237, 1, 21.6 mm SL; Indonesia: Kalimantan Tengah: Sungai Sebangau: 1 km downstream from Keram Benkari (10km South of Palangka Raya). - ZRC 42313, 11 (out of 67), up to 23.0 mm SL; Indonesia: Sumatra: Jambi: Sungai Alai: 19.5 km to Muara Tebo from Muara Bungo. ZRC 38494, 2, 9.6-17.8 mm SL; Indonesia: Sumatra: Jambi: Danau Pinang, Sungai Pijoan. - ZRC 38580, 21, 13.5-19.9 mm SL; Indonesia: Sumatra: Jambi: Danau Kamining. - ZRC 38563, 33, 10.8-20.9 mm SL; Indonesia: Sumatra: Jambi: Sungai Alai. NRM 57237, 1 (C&S), 19.8 mm SL; Aquarium.

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LITERATURE CITED

- Brittan, M.R., 1954. *A revision of the Indo-Malayan fresh-water fish genus Rasbora*. Monographs of the Institute of Science and Technology, Manila. 224 pp.
- Duncker, G., 1904. Die Fische der malayischen Halbinsel. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg*, **21**: 133–207.
- Eschmeyer, W. N. & R. Fricke (eds.), 2009. Catalog of Fishes electronic version (version of 9 September 2009). Available via <http://research.calacademy.org/ichthyology/catalog/fishcatsearch.html>.
- Fang, F., M. Noren, T.Y. Liao, M. Källersjö & S.O. Kullander, 2009. Molecular phylogenetic interrelationships of the south Asian cyprinid genera *Danio*, *Devario*, and *Microrasbora* (Teleostei, Cyprinidae, Danioninae). *Zoologica Scripta*, **38**: 237–256.
- Kottelat, M. & X.L. Chu, 1987. Two new species of *Rasbora* Bleeker, 1860 from southern Yunnan and northern Thailand. *Spixiana*, **10**: 313–318.
- Kottelat, M. & C. Vidthayanon, 1993. *Boraras micros*, a new genus and species of minute freshwater fish from Thailand (Teleostei: Cyprinidae). *Ichthyological Exploration of Freshwaters*, **4**: 161–176.
- Kottelat, M., P. K. L. Ng & K. K. P. Lim, 1992. Recent collections of freshwater fish from Terengganu, Peninsular Malaysia. *Malayan Naturalist*, **46**: 7–12.
- Liao, T.Y., S.O. Kullander & F. Fang, 2010. A phylogenetic analysis of the cyprinid fish genus *Rasbora* (Teleostei: Cyprinidae). *Zoologica Scripta*, **39**: 155–176.
- Meinken, H., 1951. Mitteilungen der Fischbestimmungsstelle des VDA. *Aquarien und Terrarien Zeitschrift*, **4**: 119–120.
- Roberts, T. R., 1989. The freshwater fishes of western Borneo (Kalimantan Barat, Indonesia). *Memoirs of the California Academy of Sciences*, **14**: 1–10.
- Taylor, W.R. & G.C. Van Dyke, 1985. Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. *Cybiurn*, **9**: 107–119.
- Weber, M. & L.F. de Beaufort, 1916. *The fishes of the Indo-Australian Archipelago. III. Ostariophysi: II Cyprinoidea, Apodes, Synbranchi*. Brill, Leiden. 455 pp.
- Weitzman, S.H. & R.P. Vari, 1988. Miniaturization in South American freshwater fishes; an overview and discussion. *Proceedings of the Biological Society of Washington*, **101**: 444–465.