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THE IDENTITY OF *OPHICEPHALUS CYANOSPILOS* BLEEKER FROM SUMATRA, AND A NEW RECORD OF *CHANNA BANKANENSIS* (BLEEKER) FROM PENINSULAR MALAYSIA (PISCES: CHANNIDAE)

Peter K. L. Ng and **Kelvin K. P. Lim**

ABSTRACT. - *Ophicephalus cyanospilos* Bleeker, 1853 has not been recognised as a separate snakehead species since 1922. A recent collection from northern Sumatra shows that Bleeker's species is valid and not synonymous with *C. striata* (Bloch, 1793) as believed. The body colour pattern of *C. cyanospilos* is very distinctive, with pale blue to whitish spots on the ventral half of the body. The lower jaw is also distinctly shorter than that of its closest relative, *C. melasoma* (Bleeker, 1851). *Channa bankanensis* (Bleeker, 1852) is also recorded for the first time in Peninsular Malaysia, from specimens collected in a peat swamp-forest in Selangor.

INTRODUCTION

Bleeker (1853) described *Ophicephalus cyanospilos* on the basis of a 102 mm (total length) specimen collected from Telok Betong (= present Bandar Lampung), southern Sumatra (ca. 5°28'S 105°15'E), and provided a schematic colour illustration of the species in 1877. Volz (1904) reported two specimens, possibly of this species, from the Lake Toba area in northern Sumatra. Weber & de Beaufort (1922) however, queried the identity of *O. cyanospilos* and placed Bleeker's species under the synonymy of *Channa striata* (Bloch, 1793) with question. Since this revision, Weber & de Beaufort's synonymy has been generally accepted and the name *O. cyanospilos* has disappeared from use in the literature (see Myers & Shapovalov, 1931; Roberts, 1989). In a recent review of Indonesian, Malaysian and Singaporean snakeheads, Ng & Lim (1990b) followed Weber & de Beaufort (1922) in listing *O. cyanospilos* as a questionable synonym of *C. striata*. Ng & Lim (1990b) also reported two unidentified specimens from northern Sumatra in the Museum Zoologicum Bogoriense which apparently did "... not fit the descriptions of any known species. It is allied to *C. melasoma* in body form, but differs in several important aspects, as well as having a very characteristic colour pattern. It appears to be an undescribed species." (p. 133). We are now of the opinion that the two specimens are actually the *Ophiocephalus cyanospilos* of Bleeker (1853).

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While studying specimens collected by the Asian Wetlands Bureau (Kuala Lumpur, Malaysia) from a peat swamp forest in Selangor, the authors also found three snakeheads which had been incorrectly identified as *Channa striata*. They belonged to *C. bankanensis* (Bleeker, 1852) instead. *Channa bankanensis* is known thus far from Banka, mainland Sumatra and Kalimantan (Roberts, 1989; Ng & Lim, 1990b), and its presence in Selangor constitutes a new record for Peninsular Malaysia.

The present paper serves to discuss the taxonomy of *C. cyanospilos* and record the presence of *C. bankanensis* in Peninsular Malaysia. The abbreviations TL and SL are used for total and standard lengths respectively. The lower jaw length is measured along the midline of the head. Specimens are deposited in the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore; Museum Zoologicum Bogoriense (MZB), Research Centre for Biology, Indonesian Institute of Sciences, Bogor, Indonesia; and the Asian Wetlands Bureau (AWB), Institute for Advanced Studies, University of Malaya, Kuala Lumpur, Malaysia.

Channa cyanospilos (Bleeker, 1853)

(Figs. 1, 2A, 3A, D)

Ophicephalus cyanospilos Bleeker, 1853a: 256 [Telok betong, in fluviis]
Ophicephalus cyanospilos - Bleeker, 1860a: 33 [no new record]
Ophiocephalus cyanospilos - Günther, 1861: 474 [no new record]
Ophicephalus cyanospilos - Bleeker, 1877: Table 397, fig. 2 [no new record]
Ophicephalus cyanospilus (sic) - Bleeker, 1879: 45 [no new record]
?*Ophiocephalus cyanospilos* - Volz, 1904: 460, 493 [Tongging, Tobasee]
Ophiocephalus cyanospilus (sic) - Volz, 1906: 132 [no new record]
?*Ophiocephalus striatus* - Weber & de Beaufort, 1922: 317 (part) (nec Bloch, 1793: 141, Pl 359) [no new record]
Channa sp. - Ng & Lim, 1990b: 133 [northern Sumatra]
?*Channa striata* - Ng & Lim, 1990b: 134 (part) [no new record]

Material examined. - 2 specimens (ZRC 14252; MZB 5611B), Sungei Wumbih, tributary of Sungei Alas, southern Aceh, Rundeng, northern Sumatra, ca. 3°05'N, 97°55'E; leg. Soetikno Wirjoatmodjo, 21.ii.1984.

Description . - Head broad; body cylindrical, tapering dorso-ventrally to tail; lateral line curves downward at scale 13 (ZRC 14252) or 15 (MZB 5611B). Lower jaw length 5% SL; caniniform teeth absent on upper jaw; lower jaw with small conical caniniform teeth. Nasal appendage distinct, extending beyond edge of upper lip. Morphometric data as per Table 1. First dorsal fin ray slightly shorter than second and third.

Colour (based on specimens in 70% alcohol): Dorsum uniformly dark brown, fading to whitish below lateral line; pale blue to whitish spots scattered on ventral half of body from snout to tail; spots more intense and dense below head; some isolated spots on distal portion of dorsum; a vertical row of white spots just before edge of caudal peduncle; throat dark and distinctly marked with larger whitish or bluish spots and blotches. Dorsal and anal fin with thin, but distinct white distal margin, fin rays tinged with bluish-green; scattered white spots on rays and membrane. Caudal fin rays tinged with bluish-green; membrane brown; white spots on rays

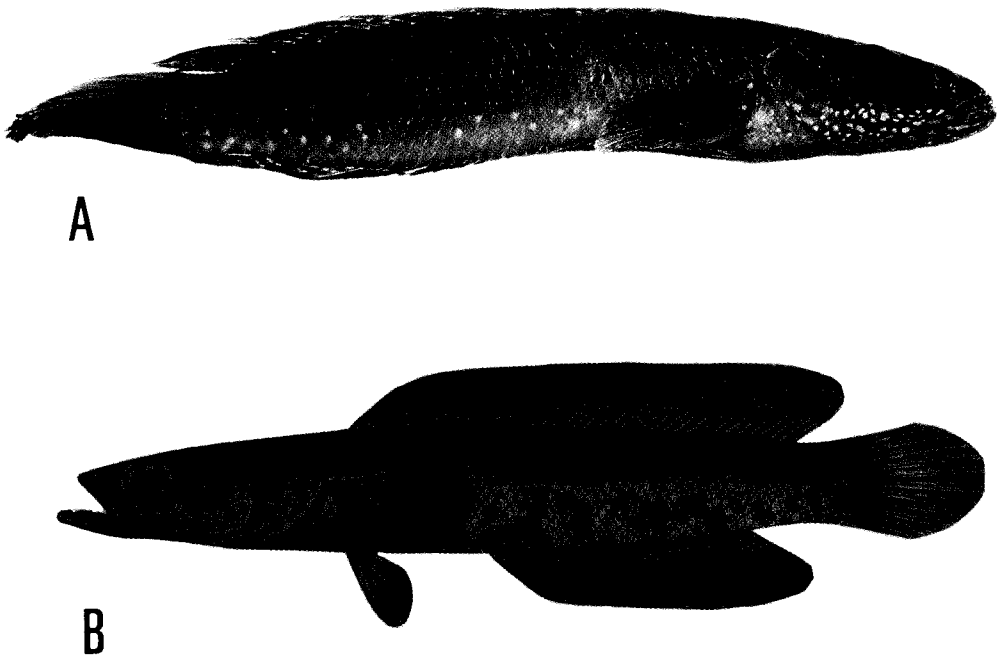

Fig. 1. A, *C. cyanospilos* (ZRC 14252); B, *C. cyanospilos* (Holotype, whereabouts uncertain) (after Bleeker, 1877).

and membrane merge to form 7-8 semi-concentric bars. Pectoral fin rays and membrane bluish-green with no discernable spots; base of pectoral fins with 3 white spots (2 marginal, 1 median). Pelvic fins whitish.

Remarks. - The colour pattern of the two specimens is perhaps its most distinctive feature and Bleeker's choice of the specific name is both diagnostic and highly appropriate. The pale blue spots extend throughout the sides of the body, a feature present on no other known Malaysian and Indonesian channid. Weber & de Beaufort (1922: 319) commented that differences cited by Bleeker (1853) for *C. cyanospilos* with regards to the bluish coloured ocelli, origin of the dorsal fin and posterior extension of the maxillary are "... so slight, that it seems to us justified to range *O. cyanospilos* - although with a ? - under the synonyms of *O. striatus*." The present two specimens agree with Bleeker's description and figure of the type 102 mm specimen well and the authors have little hesitation in regarding the northern and southern Sumatran specimens as conspecific.

The morphological features (Table 1) and coloration of *C. cyanospilos* however, strongly suggest affinities with *C. melasoma* (Bleeker, 1851) rather than *C. striata*. The shapes of the throat and ventral surfaces of the operculum are very different from that of *C. striata* but closer to *C. melasoma* instead (Fig. 3A-C; see also Ng & Lim, 1990a, b). The morphometrics of the three species (Table 1) demonstrate this. *Channa cyanospilos* can be separated from *C. melasoma* most effectively by its shorter lower jaw (Figs. 1A, 2A). The lower jaw lengths for the two specimens of *C. cyanospilos* are both 5% SL, whereas in *C. melasoma*, the values are 13 and 12% SL for the two specimens examined. The lower jaw lengths for other specimens *C.*

melasoma of various sizes we have examined from Singapore and Peninsular Malaysia all fall within 12 and 13% SL.

Table 1: Morphometric data of *Channa cyanospilos*, *C. melasoma* and *C. striata*

	C. cyanospilos			*C. melasoma*		*C. striata*	
Catalogue number	ZRC 14252	MZB 5611B	Holo-type	ZRC 11675	ZRC 11633	ZRC 12922	ZRC 1147
TL	208.0	208.0	102.0	248.0	192.0	222.0	205.0
SL	176.0	176.0	-	205.0	158.0	190.0	173.0
Ratio of various dimensions (in % SL)							
Body depth	16	16	-	15	15	16	17
Head depth at nape	14	13	-	15	16	14	16
Head width	18	18	-	19	19	18	18
Preanal length	49	49	-	55	55	51	51
Predorsal length	34	33	-	34	35	34	33
Eye diameter	4	4	-	6	5	4	4
Snout length	7	6	-	7	7	6	6
Post-orbital length	19	19	-	20	20	21	22
Head length	29	29	-	31	31	31	32
Lower jaw length	5	5	-	13	12	12	12
Caudal peduncle height	9	9	-	9	9	9	10
Pectoral fin length	18	17	-	19	21	18	18
Dorsal fin base	63	59	-	60	59	61	61
Pectoral fin base	5	5	-	5	5	4	4
Inter-orbit	9	9	-	10	9	8	7
Fin-ray counts							
Dorsal	38	39	43	36	38	40	41
Anal	24	24	26	23	21	25	26
Pectorals	15	15	15	15	15	16	16
Pelvics	6	6	6	5	5	6	6
Caudal	15	15	12	15	15	15	15
Scale counts							
Predorsal (aftercephalic shields)	8	8	8	8	8	7	7
Around caudal peduncle	27	24	-	24	23	23	24
At midbody	13	13	-	13	13	15	14
Along lateral line	52	51	55	49	50	54	54

All measurements are in millimetres. Measurements and scale counts of holotype of *C. cyanospilos* are derived from Bleeker (1853). Specimens of *C. melasoma* (ZRC 11675, 11633) and *C. striata* (ZRC 12922, 1147) are collected from Singapore.

The pattern of pale blue spots and blotches on the throat of *C. cyanospilos* (Fig. 3A) resembles that of *C. melasoma* (Fig. 3B), but in *C. melasoma*, the spots and blotches merge to form a marbled pattern. *Channa striata* does not have blue patterns on its throat but a series of brown streaks and spots instead. The pattern on the fins and body of the three species are also clearly distinct (Fig. 1; see also Ng & Lim, 1990a). Although the two present specimens of *C. cyanospilos* have been preserved in alcohol since 1984, the colours are still discernible. From our experiences with various *Channa* species (see Ng & Lim, 1990b), we can extrapolate on its live colouration. The white margin on the dorsal and anal fins in the preserved specimens is perhaps the only uncertainty. In species like *C. gachua*, this margin is orange to red in live specimens but very quickly becomes white on preservation (formalin or alcohol) (see Ng & Lim, 1989). In *C. melasoma*, this margin is yellow to white in life. The bluish-green colour of the fins is probably similar to that in alcohol, except that it was probably more intense and iridescent. The scattered white spots and concentric rings on the fins would have been yellow or white in life; whereas the spots on the body were pale blue to white. The body colour of *C. cyanospilos* is probably brown to greenish-brown (brown in *C. striata*), but the demarcation of the dorsum and ventrum body colour is not sharp (like *C. melasoma*) (see Ng, 1990a). In *C. striata*, this demarcation is quite distinct.

The colours of the single specimen Bleeker (1853, 1877) described and figured differ from the present ones in only minor ways. The type appears to be a young fish, measuring only 102 mm in total length. The pectoral, dorsal and anal fins were dark violet, the caudal fin lighter in colour and the pelvic fins hyaline to bluish. The dorsum was greenish brown, the ventrum (below the lateral line) lighter (yellowish), with patches of darker scales, the sides of the ventrum with numerous pale blue spots. In the present specimens of *C. cyanospilos* (both exceeding 200 mm total length), the dorsum colour extends below the lateral line down to the ventrum where it gradually becomes lighter coloured on the belly. In *C. melasoma*, young specimens less than 110 mm in length have the dark and light body colours more or less demarcated along the lateral line. As they increase in size, the darker colours disperse below the lateral line, covering more of the ventrum (unpublished data). The same is probably true for *C. cyanospilos*, the type specimen being only about half the size of the present specimens.

The number of blue spots on Bleeker's figure of *C. cyanospilos* is conspicuously more that on the present two specimens might be due to age. The pattern observed here strongly excludes the possibility that *C. cyanospilos* may be the young or juveniles of another Southeast Asian channid. Ng & Lim (1990b) record the juvenile coloration of five species. The young of *C. bankanensis*, *C. marulioides*, *C. melanoptera* and *C. pleurophthalma* are not known. The form of the first few dorsal fin rays excludes *C. marulioides*, *C. melanoptera* and *C. pleurophthalma*. In these three species, the first to fifth dorsal fin rays become progressively longer, the anterior part of the dorsal fin sloping gradually when erect. In *C. cyanospilos* however, the first ray is only slightly shorter than the other rays which are subequal in length to each other; and no slope is discernable. The body of *C. cyanospilos* is also more rounded in cross-section, quite different the more laterally compressed condition in *C. pleurophthalma* (see Ng & Lim, 1990b). *Channa bankanensis* has a more cone-shaped head with a rounder cross-section, and its body colour patterns suggest a juvenile colour scheme closer to that of *C. lucius* than what is observed in *C. cyanospilos* (see Ng & Lim, 1990b).

The present report appears to confirm Volz's (1904) record of *C. cyanospilos* in northern Sumatra. The range of *C. cyanospilos* is interesting as it appears to be restricted to Sumatra, which would make it the only channid in this region known to have such a limited distribution

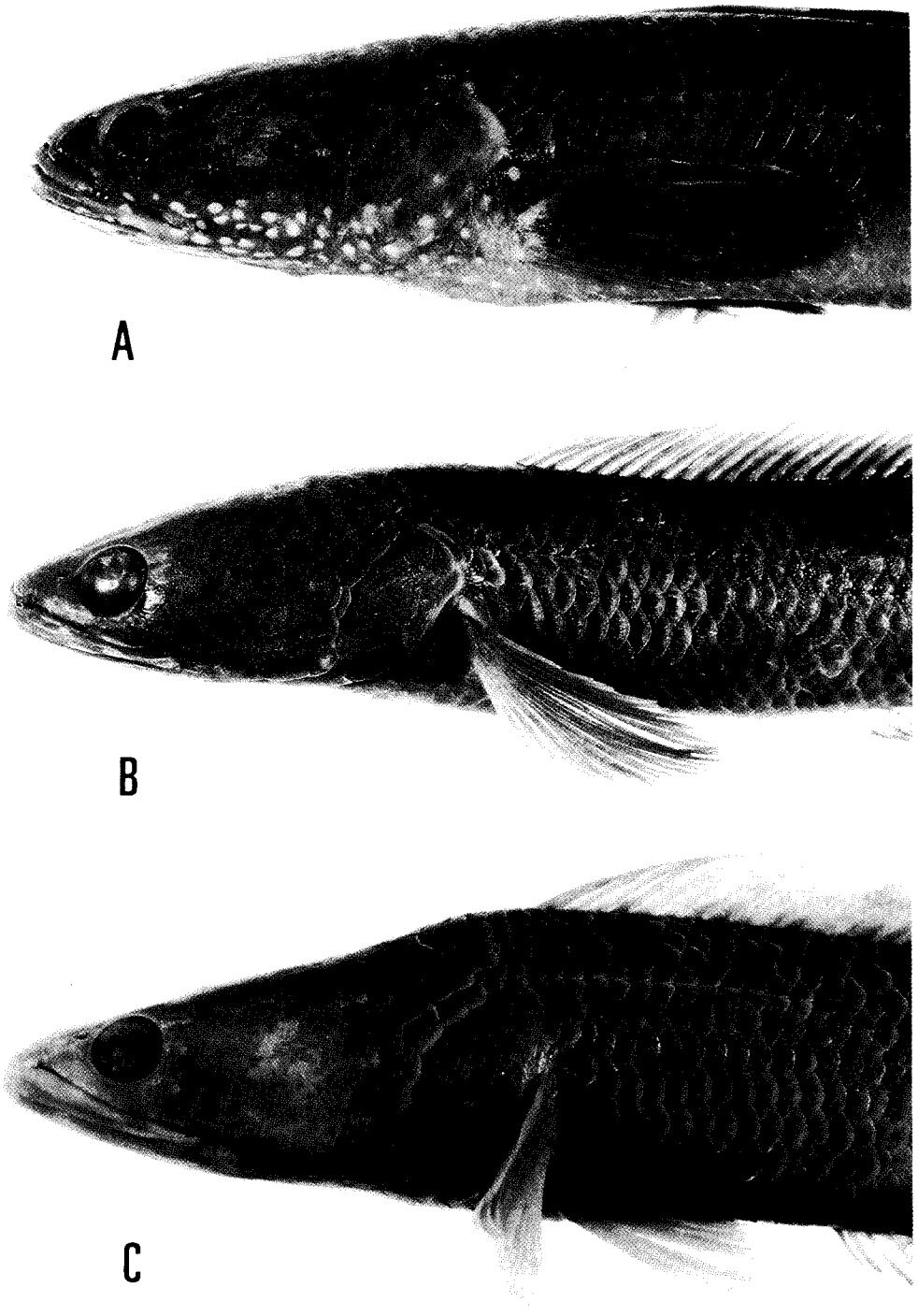

Fig. 2. Lateral views of head. A, *C. cyanospilos* (ZRC 14252); B, *C. melasoma* (ZRC 11633); C, *C. striata* (ZRC 1147).

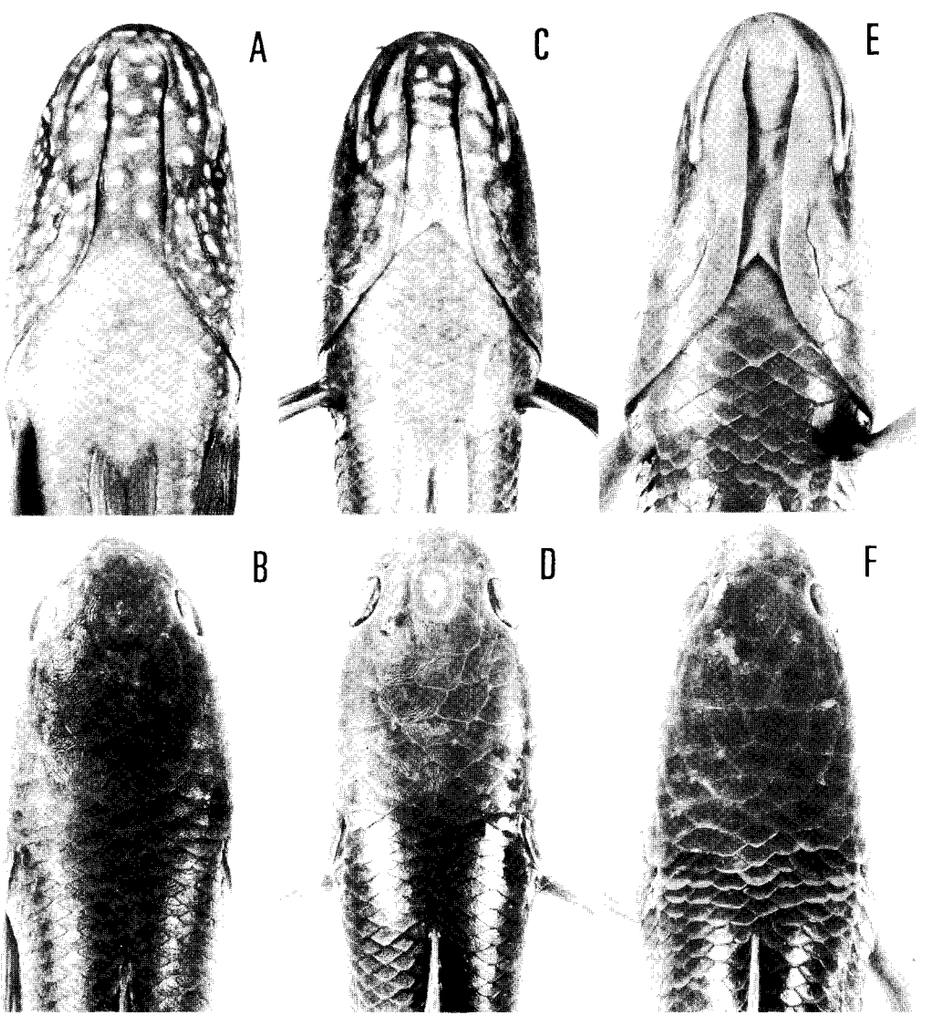

Fig. 3. A, C, E, ventral view of head; B, D, F, dorsal view of head. A, B, *C. cyanospilos* (ZRC 14252); C, D, *C. melasoma* (ZRC 11633); E, F, *C. striata* (ZRC 1147).

(see Roberts, 1989; Ng & Lim, 1990b). In all likelihood, considering the distribution of Sumatran fishes, the species will probably be found in Peninsular Malaysia or Borneo once the exact biotope is better understood and collected.

The whereabouts of the holotype specimen is uncertain. Günther (1861) listed this species in his catalogue of the fishes in the British Museum, but did not indicate whether he had examined any specimens. His short text appears to have been adapted from Bleeker's (1853) descriptions. Weber & de Beaufort (1922: 319) reported that the single type specimen of *C. cyanospilos* is "... apparently lost, as it is neither in the Leiden nor in the British Museum". No other specimens are known from southern Sumatra.

***Channa bankanensis* (Bleeker, 1852)**

(Fig. 4)

Ophicephalus bankanensis Bleeker, 1852: 726 [Banka]
Ophicephalus bankanensis - Bleeker, 1853b: 187 [Marawang et Toboali, Bankae insulae, in fluviis]
Ophiocephalus bankanensis - Bleeker, 1860b: 15 [Bandjermasin]
Ophiocephalus bankanensis - Günther, 1861: 475 [no new record]
Ophicephalus bankanensis - Bleeker, 1877: Table 397, fig. 1 [no new record]
Ophicephalus bankanensis Bleeker, 1879: 51 [no new record]
Ophicephalus bankanensis - Vaillant, 1902: 13, 16 [Pontianak, Sintang]
Ophiocephalus bankanensis - Weber & de Beaufort, 1922: 317 [Banjermasin, mouth and middle course of river Kapuas, Danau Sriang]
Channa bankanensis - Roberts, 1989: 169 [no new record]
Channa striata - Davies & Rahim, 1989: Appendix 1 (part) (nec Bloch, 1793: 141, Pl. 359) [North Selangor Peat Swamp Forest]
Channa bankanensis - Ng & Lim, 1990b: 131, 132, 133, Figs. 3E, F, 4C, K, 5D [central Borneo and Sumatra mainland]

Material examined. - 1 spec. (SL 177 mm) (ZRC 11710), 3 spec. (MZB 5179), Pasar Palang Karaya, Kalimantan Tengah, Borneo, leg. Soetikno Wirjoatmodjo, 22.vi.1980. — 1 spec. (SL 230 mm) (MZB 2345), Djambi, Palembang, Sumatra, leg. LPPD Bogor, 27.ii.1976. —.1 spec. (SL 118 mm) (ZRC 14249), north Selangor peat-swamp forest, Peninsular Malaysia, leg. Abdullah A. Rahim, 26.v.1989. — 2 specs. (SL 164 mm, SL 109 mm), (AWB), north Selangor peat-swamp forest, Peninsular Malaysia, leg. Abdullah A. Rahim, 31.v.1989.

Distribution. - Sumatra: Banka, Djambi; Borneo: Pontianak, Sintang, Banjermasin, mouth and middle course of river Kapuas, Danau Sriang, Barito, central Borneo.

Remarks. - *Channa bankanensis* superficially resembles *C. lucius* (Cuvier, 1831), especially with regards to the general colour pattern. In *C. lucius*, there are numerous striations and black blotches on the ventrum. These are lacking in *C. bankanensis*. Instead, the ventrum is covered with scattered small black spots. These small spots are also numerous on the head and dorsum, which are scarce in *C. lucius*. In *C. bankanensis* the black blotches on the side of the body appear more continuous and are not as rounded, appearing more like "dashes". In *C. lucius*, the black blotches are clearly separated in adults.

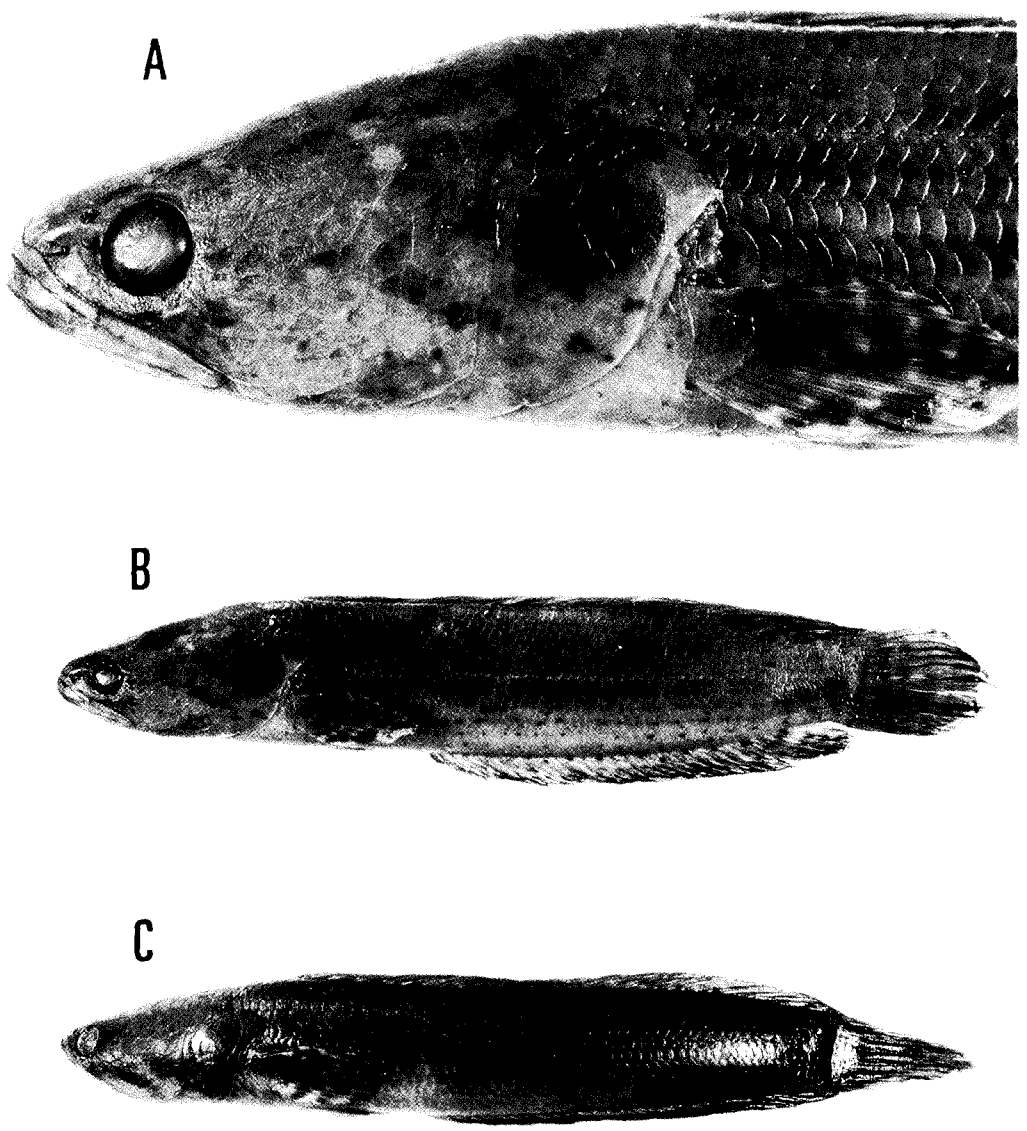

Fig. 4. *Channa bankanensis*. A, B, (ZRC 11710), central Borneo; C, (ZRC 14249), north Selangor.

The morphometric data for both species is very similar. The most distinctive feature is the shape of the head, which in *C. bankanensis* is more conical, the dorsal part evenly convex (not flat as in *lucius*) and when viewed laterally, the orbits do not reach the top of the head (Fig. 4B). In *C. lucius*, because of the flattened dorsal part of the head, the orbits appear to reach the top of the head when viewed laterally. Ng & Lim (1990b: 135) indicated that the ratio of the postocular height to head length was 0.36 for *C. bankanensis* and 0.28 to 0.29 for *C. lucius* (Ng & Lim, 1990b). Remeasurements and condsideration of the present specimens show that the value for *C. lucius* varies from 0.25 to 0.29; whilst that for *bankanensis* varies from 0.31 to 0.33. The head length of *C. bankanensis* varies from 29 to 31% SL, whereas in *C. lucius*, its 33 to 34% SL. Another character worth noting is that the pelvic fins of *C. bankanensis* tend to be relatively shorter than those of *C. lucius*. When pressed against the ventrum, the pelvic fins of *C. bankanensis* do not reach the anus, whereas in *C. lucius*, it usually does.

The present record of another species of *Channa* from Peninsular Malaysia is rather unexpected, especially considering the size of the fish and the state in which it was found, Selangor, has been quite extensively collected. This brings the total number of species known thus far from Peninsular Malaysia to eight. The present three specimens from Peninsular Malaysia agree with the MZB specimens very well, except that their interorbital distances are slightly greater.

The habitat of *C. bankanensis* in Peninsular Malaysia appears to be highly acidic blackwater in freshwater peat swamps. Davies & Rahim (1989: Table 4) record the pH of the water as between 2.8 and 2.9, with the conductivity between 75.0 and 100.3 mS/cm. The specimens were all collected by hook and line with worms as bait (A. Rahim, pers. comm.). We have also examined specimens of *Channa lucius* from the Selangor peat swamp forest where *C. bankanensis* was collected. The two species however, have yet to be collected together from the same locality.

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LITERATURE CITED

Bleeker, P., 1852. Nieuwe bijdrage tot de kennis der ichthyologische fauna van het eiland Nanka. *Nat. Tijds. Ned. Ind.*, **3**: 715-738.

Bleeker, P., 1853a. Diagnostische beschrijvingen van nieuwe of weinig bekende vischsoorten van Sumatra. *Nat. Tijds. Ned. Ind.*, **4**: 243-302.

Bleeker, P., 1853b. Nalezingen op de ichthyologische fauna van het eiland Banka. *Nat. Tijds. Ned. Ind.*, **5**: 175-194.

Bleeker, P., 1860a. Achtste bijdrage tot de kennis der vischfauna van Sumatra. Visschen van Benkoelen, Priaman, Tandjong, Palembang en Djambi. *Act. Soc. Sc. Indo-Neerl.*, **8**: 1-88.

Bleeker, P., 1860b. Dertiende bijdrage tot de kennis der vischfauna van Borneo. *Act. Soc. Sc. Indo-Neerl.*, **8**: 1-64.

Bleeker, P., 1853. Diagnostische beschrijvingen van nieuwe of weining bekende vischsoorten van Sumatra. Tiental V-X. *Nat. Tijds. Ned. Ind.*, **4**: 243-302.

Bleeker, P., 1877. *Atlas ichthyologique des Indes Orientales Néerlandaises*. 9. Percoides III. 80 pp., Pls. 355-420.

Bleeker, P., 1879. Mémoire sur les Poissons à pharyngiens labyrinthiformes de l'Inde archipélagique. *Verh. Akad. Amsterdam*, **19**: 1-56.

Davies, J. & A. A. Rahim, 1989. Freshwater Fish Survey of the North Selangor Peat Swamp Forest. *Asian Wetland Bureau Publication*, No. 46: 1-8, Map 1, Tables 1-5, Appendices 1, 2.

Günther, A., 1861. *Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum*. Volume 3, 586 pp. London.

Myers, G. S. & L. Shapovalov, 1931. On the identity of *Ophicephalus* and *Channa*, two genera of labyrinth fishes. *Peking Nat. Hist. Bull.*, **6**: 33-37.

Ng, P. K. L. & K. K. P. Lim, 1989. Rediscovery of the Dwarf Snakehead, *Channa gachua* (Hamilton, 1822) (Channidae) in Singapore. *Raffles Bull. Zool.*, Singapore, **37**(1 & 2): 172-174.

Ng, P. K. L. & K. K. P. Lim, 1990a. The Black Snakehead, *Channa melasoma* (Bleeker, 1851) (Channidae): First Record from Singapore. *Raffles Bull. Zool.*, **38**(1): 21-24.

Ng, P. K. L. & K. K. P. Lim, 1990b. Snakeheads (Pisces: Channidae): Natural History, Biology and Economic Importance. In: *Essays in Zoology*. Eds. L. M. Chou and P. K. L. Ng. Department of Zoology, National University of Singapore. Pp. 127-152.

Roberts, T. R., 1989. The Freshwater Fishes of Western Borneo (Kalimantan Barat, Indonesia). *Mem. Calif. Acad. Sci.*, **14**: 1-210.

Vaillant, M. L., 1902. Résultats zoologiques de l'expédition scientifique Néerlandaise au Bornéo Central. Poissons. *Notes Leyden Mus.*, **24**: 1-165.

Volz, W., 1904. Fische von Sumatra gesammelt von Herrn G. Schneider. *Rev. Suisse Zool.*, **12**: 451-493.

Volz, W., 1906. Catalogue of the fishes of Sumatra. *Nat. Tijds. Ned. Ind.*, **65**: 35-250.

Weber, M. & L. F. de Beaufort, 1922. *The Fishes of the Indo-Australian Archipelago*, **4**: i-xii, 1-410.