

NEMACHEILUS PAUCIMACULATUS, A NEW SPECIES OF LOACH FROM THE SOUTHERN MALAY PENINSULA (TELEOSTEI: NEMACHEILIDAE)

Jörg Bohlen

Institute of Animal Physiology and Genetics, Academy of Sciences of the Czech Republic, Rumburská 89, 277 21 Liběchov, Czech Republic.
Email: bohlen@iapg.cas.cz

Vendula Šlechtová

Institute of Animal Physiology and Genetics, Academy of Sciences of the Czech Republic, Rumburská 89, 277 21 Liběchov, Czech Republic

ABSTRACT. – *Nemacheilus paucimaculatus*, a new species of loach, is described from three localities in the southern Malay Peninsula. It is distinguished from all congeners except *N. arenicolus* by its colour pattern of 8–10 dark brown dorsal saddles and 8–10 dark brown blotches, each larger than eye, along the lateral midline. It is distinguished from *N. arenicolus* by the presence of a black dot on the lower anterior part of dorsal fin and the presence of scales on the whole body.

KEY WORDS. – Cobitoidea, Malaysia, Johor, Selangor, Negeri Sembilan.

INTRODUCTION

The genus *Nemacheilus* as restricted by Kottelat (1990) and Bănărescu & Nalbant (1995) is distributed throughout Indochina, Sundaland and with two isolated species in western India (Kottelat, 1984, 1990; Bănărescu & Nalbant, 1995). At present, *Nemacheilus* contains about 30 valid species. Ten of them were described since 1990 and new species are still being discovered.

Recently we collected an unnamed species of *Nemacheilus* in the Segamat River (Johor State) in southern Malaysia. Comparisons with the material housed in the Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore revealed more specimens of the new species from Selangor and Negeri Sembilan. In the present study we describe the species.

MATERIAL AND METHODS

Measurements were made point-to-point with a pair of digital callipers; measurements and counts follow Kottelat (1990). Values are given as proportions of standard length (SL). Drawings were made using an Olympus SZX 7 microscope with an Olympus SZX-DA drawing device. Lines were smoothed using Corel PhotoPaint 7.

Institutional abbreviations are: CMK – Collection of Maurice Kottelat, Cornol, IAPG – Institute of Animal Physiology and Genetics, Liběchov, Czech Republic, ZRC - Zoological

Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore.

Nemacheilus paucimaculatus, new species (Fig. 1, 2, 3)

Material examined. – Holotype: ZRC 52361, 47.1 mm SL, Malaysia: Johor, tributary of Segamat River upstream of Segamat, 02°28'47"N 103°05'13"E, coll. J. Bohlen & V. Šlechtová, 4 Mar. 2006.

Paratypes: CMK 22255, 1 ex., 43.0 mm SL; IAPG A1742-1743, 2 ex., 37.4–43.7 mm SL, locality data as for holotype. ZRC 2063, 35 ex., 28.7–52.4 mm SL, Malaysia: Negeri Sembilan, Sungai Jelai, 14th mile along road from Tampin to Kuala Pilah, about 2°37'N 102°16'E, coll. M. Dali & C. K. Quek, 29 Apr. 1967.

Additional material: ZRC 489, 5 ex., 46.9–61.5 mm SL, Malaysia: Selangor, Ulu Langat, Dusun Tua, about 3°08'N 101°50'E, coll. J. I. Furtado, 6 Nov. 1963.

Diagnosis. – *Nemacheilus paucimaculatus* is distinguished from all congeners except *N. arenicolus* by its colour pattern of 8–10 dark brown dorsal saddles and 8–10 dark brown blotches, each larger than eye, along the lateral midline (vs. 10–19 blotches, a stripe or a marbled pattern in other species). It is distinguished from *N. arenicolus* by the presence of a dark blotch on the first rays of the dorsal fin (vs. absence) and the presence of scales on the whole body (vs. restricted to few rows along lateral line in the anterior part of body).

Description. – General body shape as in Figs. 1, 2. Morphometric data as in Table 1. A moderately sized

Table 1. Morphometric data of holotype and 19 paratypes of *Nemacheilus paucimaculatus*.

	Holotype	Range	Mean	S.D.
SL (mm)	47.1	28.7–61.5		
in percents of SL				
total length	124.8	123.8–128.6	126.4	1.4
dorsal head length	18.5	17.2–22.5	19.4	1.3
lateral head length	20.2	20.3–24.2	22.1	1.0
predorsal length	48.8	44.4–51.2	48.7	1.6
pre-pelvic length	49.3	47.2–50.6	49.0	1.0
pre-anus length	72.8	66.3–71.6	69.0	1.7
preanal length	78.6	73.5–78.9	75.9	1.5
head depth at eye	9.1	8.8–10.0	9.3	0.4
head depth at nape	10.0	10.5–12.1	11.2	0.5
body depth	11.5	12.3–15.0	13.7	0.9
depth of caudal peduncle	8.1	7.6–9.6	8.7	0.5
length of caudal peduncle	14.0	11.8–15.8	13.9	1.2
snout length	7.6	7.8–9.4	8.4	0.5
head width at nares	7.0	6.3–7.7	7.0	0.4
maximum head width	11.0	10.7–12.6	11.9	0.6
body width at dorsal origin	10.4	8.1–13.0	9.5	1.1
body width at anal origin	6.6	4.4–6.3	5.7	0.5
eye diameter	5.1	3.9–5.8	4.8	0.5
interorbital width	5.7	4.7–6.2	5.4	0.5
height of dorsal fin	19.1	15.3–21.9	18.3	1.8
length of upper caudal lobe	22.7	22.3–27.2	25.5	1.1
length of median caudal ray	22.7	22.9–27.6	25.6	1.2
length of lower caudal lobe	16.6	13.5–17.9	15.6	1.4
depth of anal fin	18.5	14.6–18.8	16.6	1.3
length of pelvic fin	17.4	14.9–18.5	16.9	1.2
length of pectoral fin	19.3	16.4–21.2	18.6	1.3

nemacheiline loach, largest known size 61.5 mm SL. Body elongate, anterior part only slightly compressed; caudal peduncle compressed; head slightly compressed. Body slender, maximum body depth at origin of dorsal fin. Caudal peduncle elongate, its height 1.3–1.9 times in its length and 1.4–1.9 times in body depth at dorsal-fin origin. No adipose crest on dorsal or ventral midline of caudal peduncle. Axillary pelvic lobe present and free.

Dorsal fin with 4 simple and 9½, rarely 10½ branched rays. Distal margin of dorsal fin straight. Anal fin with 3 simple and 5½ branched rays, not reaching caudal-fin base. Caudal fin with 9+7 (three out of 30 counted specimens), 9+8 (26 specimens) or 10+8 (one specimen) branched rays, deeply



Fig. 1. *Nemacheilus paucimaculatus*, ZRC 52361, holotype, 47.1 mm SL, Malaysia: Johor, tributary of River Segamat.

forked, lobes pointed and of same length. Pelvic fin with 8 rays; origin under last unbranched or first branched dorsal-fin ray; reaching slightly beyond half of distance to anal-fin origin; not reaching anus, which is situated about one eye diameter in front of anal fin. Pectoral fin with 11 or 12 rays, reaching slightly behind half of distance between bases of pectoral and pelvic fins.

Body completely covered with scales except between base of pectoral fins. Complete lateral line with 90–102 pores. Cephalic lateral line system with 5 supraorbital, 4+11 infraorbital, 9 pre-operculo-mandibular and 3 supratemporal pores.

Anterior nostril pierced in front side of a flap-like tube, with low anterior rim. Mouth gape arched, about twice as wide as long (Fig. 3). Lips and barbels covered with uncini. Processus dentiformis present. Lips moderately thick; upper lip without median incision; 5–9 deep furrows in median part, papillae on remaining parts of lip. Lower lip with a small median interruption and 3–5 furrows on each side. Inner rostral barbel reaching behind corner of mouth, outer rostral and maxillary barbels reaching behind vertical through posterior rim of eye.

Sexual dimorphism. – Males with finger-shaped suborbital flap under the eye and thickened first branched pectoral-fin ray. Smallest male specimen with enlarged suborbital flap 36.9 mm SL.

Coloration. – In 70% ethanol: Ground colour light yellow, lighter on ventral side than on dorsal side. Dorsal half of

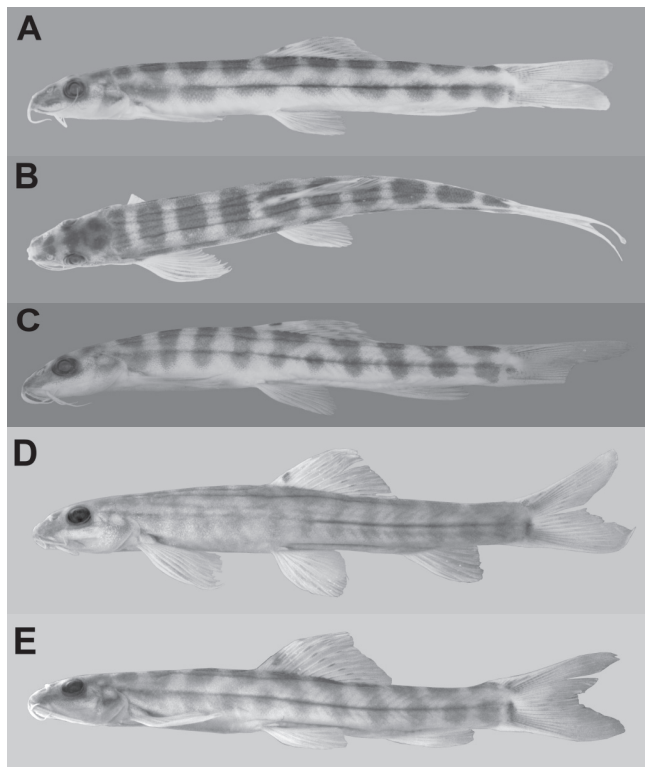


Fig. 2. *Nemacheilus paucimaculatus*, **A, B** ZRC 52361, holotype, 47.1 mm SL, Malaysia: Johor, tributary of River Segamat; **C** CMK 22255, 43.0 mm SL, same data as A; **D** ZRC 2063, 52.4 mm SL, Malaysia: Negeri Sembilan, Sungai Jelai; **E** ZRC 2063, 44.4 mm SL, same data as D.

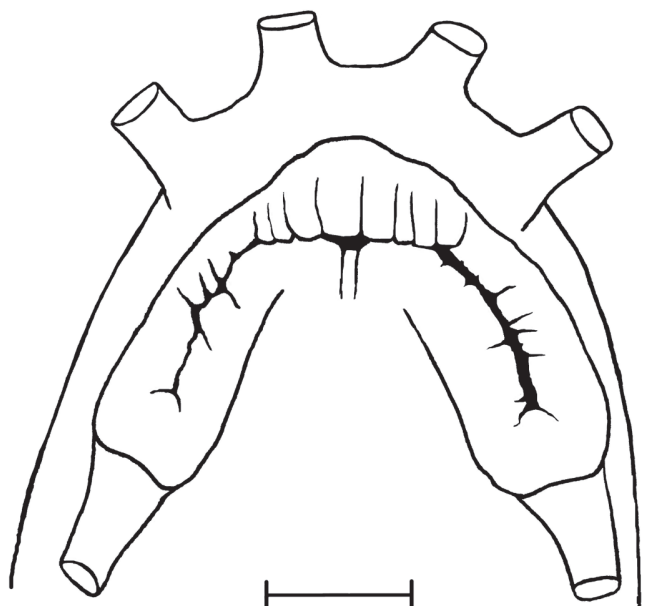


Fig. 3. *Nemacheilus paucimaculatus*, ZRC 52361, holotype, 47.1 mm SL; mouth, ventral view (scale bar = 5 mm).

head light grey, ventral half light yellow. A row of 8–10 dark brown blotches along lateral midline of body. In a few specimens blotches vertically elongated. Blotches usually as large as, or larger than eye and of same width or wider than interspaces. A thin black line sometimes visible along lateral midline in the posterior part of the body. Eight to ten dark brown saddles, wider than interspaces present along dorsal midline; saddles frequently ventrally elongated and conjoined with lateral blotches. Black spot at base of caudal fin surrounded by a whitish area. Head with following dark grey markings: dorsal blotch in front of nape, band between eyes and band between nostrils. Indistinct band from the snout to about two-thirds of distance to eye and horizontal band on opercle present on sides of head. Small black spot on anterior part of dorsal fin close to base, usually smaller than pupil and located between third unbranched to first branched ray. First branching point of branched dorsal-fin rays with pigmentation; resulting in a faint dark row of spots about midway along dorsal fin. In few specimens, second row of pigmented zones appears along second branching point of branched dorsal-fin rays. Dark grey pigment along uppermost and lowermost branched caudal-fin ray and first branched pectoral-fin ray. All other fins hyaline.

Distribution. – Known currently from three localities in the basins of Muar and Langat in Johor, Selangor and Negeri Sembilan in southern Peninsular Malaysia.

Etymology. – The name is derived from the Latin prefix ‘pauci’, meaning ‘having few’ and the Latin ‘macula’, meaning ‘blotches’, referring to the comparably low number of lateral and dorsal blotches.

DISCUSSION

Using the key provided in the most comprehensive review of Southeast Asian Nemacheilidae (Kottelat, 1990), the new species is identified as a member of the genus *Nemacheilus*. Kottelat (1990) further defines three species-groups within *Nemacheilus* on the basis of their different pigmentation

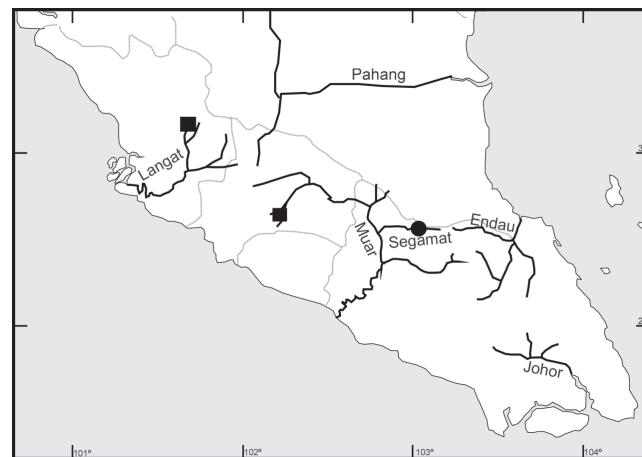


Fig. 4. Southern part of Malay Peninsula showing selected rivers and the collection points of *Nemacheilus paucimaculatus*. The type locality is indicated as solid circle, other localities as solid squares. Grey dotted lines outline governmental states.

patterns. The new species is hereby assigned to the species of the *N. fasciatus* group (group A in Kottelat, 1990), which is defined by a series of saddles along the dorsal midline and a series of blotches along the lateral midline. Kottelat (1990) listed *N. fasciatus* (from Java), *N. masyae*, *N. pallidus* (from Indochina) and *N. papillosus* (from Sumatra) as members of this group. *Nemacheilus longipectoralis* (from Borneo) was thought to be a member of the group, but subsequent studies have confirmed that it possesses a different pigmentation pattern from the species of the *N. fasciatus* group (Hadiaty & Kottelat, 2010). In *N. kapuasensis* (from Borneo), small specimens bear vertical bars which split in large specimens into dorsal saddles and lateral blotches (Kottelat, 1984). Species described after Kottelat's review and with a colour pattern similar enough to be assigned to the *N. fasciatus* group include *N. tuberigum* from Sumatra and *N. arenicolus* from Laos.

Nemacheilus paucimaculatus differs from all other species of the *N. fasciatus* group except for *N. arenicolus* in having fewer dorsal saddles (8–10 vs 10–12 in *N. kapuasensis*, 11–15 in *N. tuberigum*; 14–16 in *N. papillosus*; 17–18 in *N. masyae* and *N. fasciatus* and 14–19 in *N. pallidus*). It differs from all other species of the *N. fasciatus* group except for *N. tuberigum* and *N. arenicolus* in having fewer lateral blotches (8–0 vs 10–12 in *N. papillosus* and *N. kapuasensis*; 12–17 in *N. masyae* and *N. fasciatus* and 13–16 in *N. pallidus*). *Nemacheilus paucimaculatus* differs from *N. tuberigum* by the absence of enlarged body scales bearing tubercles (vs. presence), from *N. arenicolus* by the presence of a dark blotch on the first rays of the dorsal fin (vs. absence) and the presence of scales on the entire body (vs. restricted to few rows along lateral line in the anterior part of body). It further differs from *N. pallidus* in having the dorsal saddles and lateral blotches wider (vs. narrower) than interspaces. In general morphology, *N. paucimaculatus* is most similar to *N. masyae* and *N. fasciatus*. It further differs from *N. masyai* in having both caudal-fin lobes of equal length (vs. upper lobe longer than lower), 5–9 deep furrows in the median part of the upper lip (vs. furrows absent) and dorsal saddles usually of the same size as the eye (vs. usually smaller than the eye). *Nemacheilus paucimaculatus* differs from *N. fasciatus* by the absence of enlarged scales on the body side (vs. enlarged scales present along the lateral line). *Nemacheilus paucimaculatus* differs from *N. kapuasensis* by a more slender body (body depth at dorsal origin 11.8–15.0% SL vs 14.9–20.6% SL), by having 3–5 (vs 5–7) furrows on each side of lower lip and by having the anus one (vs two) eye diameters in front of anal-fin origin.

COMPARATIVE MATERIAL

Nemacheilus arenicolus: CMK 21208, 5, 45.9–49.8 mm SL, Laos: Bolikhamxai Prov., Nam Phao downstream of Ban Phonethong; CMK 21137, 2, 42.1–49.5 mm SL, Laos: Khammouan Prov., Nam Theun.

Nemacheilus masyae: IAPG A4517–4524, A4528–4533, 14, 41.1–61.0 mm SL, Thailand: Surat Thani Prov., Khlong Sok; IAPG 4525–4526, A4534–4535, 4, 38.1–62.2 mm SL, Thailand: Nakhom Sri Thammarat Prov., River at Kamlon; IAPG 4527, 1 54,1 mm SL, Malaysia: Pahang Prov., Sungai Tahan at Kuala Tahan; ZRC 42806, 1, 47.2 mm SL, Malaysia: Johor Prov., Sungai Kahang; ZRC 38739, 6 (of 11), 35.9–44.2 mm SL, Malaysia: Terengganu Prov., downstream of Sekaya Waterfall Park.

Nemacheilus pallidus: IAPG A1394–1401, 8, 37.4–41.8 mm SL, Thailand: Nan Prov., small stream draining into River Nan.

Nemacheilus papillosus: IAPG A3725–3730, 6, 34.1–40.9 mm SL, ornamental fish trade.

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