



# *Nemacheilus stigmofasciatus*, a new species of nemacheiline loach (Cypriniformes: Balitoridae) from the Western Ghats, India

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**Author Details:** DR. M. ARUNACHALAM has more than 20 years of research experience in stream and stream fish ecology. DR. M. MURALIDHARAN has 8 years experience in the same fields.

**Author Contribution:** The authors were equally involved in field work, analysis of data and writing.

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**Abstract:** A new nemacheiline loach is described from the Seethanathi river of the Western Ghats, Karnataka. The new species differs from others of the genus in having an incomplete lateral line extending up to the end of the pelvic fin, shorter snout (35.9 -39.4% of HL) and bigger eyes (28.1-31.3% of HL). Notable colour variation is present in the bands on the back (11-13) and blotches (6-8) evenly spaced along the lateral line.

**Keywords:** Karnataka, Nemacheiline loach, Peninsular India, Seethanathi, Western Ghats

**Abbreviations:** SL - Standard length; HL - Head length.

## INTRODUCTION

The rich biodiversity and pristine habitats of many of the westward-flowing rivers of peninsular India have attracted many researchers for the exploration of new taxa. The area is especially significant for ichthyologists as is evident from the discovery of two new nemacheiline loaches, *Schistura shravathiensis* and *Schistura nagodiensis* (Sreekantha et al. 2006) from the Shravathi river. The discovery is significant as these species have been collected from two streams of the same river basin. Also recently, the research team from Zoological Survey of India, Western Regional Station, Kozhikode, reported the collection of a new sisorid fish species from a stream inside Kudremukh National Park (to be published).

During our recent fish habitat survey in the main stream of the Seethanathi river in Karnataka, a few nemacheilines were collected having features distinct from known species; herein we describe a new species. The subfamily Nemacheilinae is readily distinguished from Balitorinae in having paired fins not inserted horizontally and with rounded abdomen. This genus has more than 450 species with distribution in southern China, South and southeast Asia, Baluchistan, western Iran and northeastern Africa (Kottelat et al. 1993). Fish of the genus *Nemacheilus* are characterized by a rather short dorsal fin (7 or 8 branched rays), a longitudinal stripe, which may be of lateral black band or black spots coalescing to form a band extending to caudal fin or distinct moniliform spots along the lateral line in the middle of body, large eyes, and a dark spot on the middle of the caudal base (Banarescue & Nalbant 1995). The genus *Nemacheilus* represents three valid species, namely *Nemacheilus corica* from northern India, and *N. anguilla* and *N. monilis* from southern India (Arunachalam & Muralidharan 2007). *Nemacheilus anguilla* Annandale was described from Medha river in Maharashtra state and *Nemacheilus monilis* (Hora 1921) was described from Bhavani river near Mettupalayam, which is endemic to the streams of Nilgiri Hills. *Nemacheilus poonaensis* (Menon 1950) described from Moola-Mootha river of Krishna drainage is placed in synonymy with *Nemacheilus anguilla* (Menon 1987). Also Menon (1987) considers *N. corica* as belonging to *Schistura*, another related genus, whereas Banarescue & Nalbant (1995) include it under the genus *Nemacheilus*, which has also been followed by Jayaram (1999).

## MATERIALS AND METHODS

Methods for taking measurements were followed from Menon (1987) & Kottelat (1990). Morphometric values are expressed as percentage of standard length or of other values (head length, etc). The examined materials are deposited in the Zoological Survey of India, Southern Regional Station, Chennai (ZSI/SRS) and Manonmaniam Sundaranar University Museum of Natural History (MSUMNH), Alwarkurichi, Tamil Nadu.

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***Nemacheilus stigmofasciatus* sp. nov.**

(Image 1)

**Holotype:** 22.ii.2002, 37.7mm SL, Thuttinjet, Seethanathi, Karnataka State, (13°23'54.3"N & 75°01'18.2"E), coll. M. Arunachalam, F7599, ZSI SRS Chennai.

**Paratypes:** 4 ex., 31.60–37.66mm SL, other details same as holotype, MSUMNH 19.

**Diagnosis**

*Nemacheilus stigmofasciatus* sp. nov. is distinguished from the other two peninsular Indian species *N. anguilla* and *N. monilis* by its colouration and a set of morphometric characters. The new species differs in having a lateral line that extends to the pelvic fin base below (vs. reaching up to anal fin in *N. anguilla* and complete in *N. monilis*), shorter snout length (35.9–39.4% HL vs 46.8% HL in *N. anguilla* and 40.5–48.1% HL in *N. monilis*), bigger eye (28.1–31.3% HL vs 23.0% HL in *N. anguilla* and 15.9–19.9% HL in *N. monilis*), caudal peduncle shorter than *N. anguilla* (12.4–13.1% SL vs 15.5% SL) and shallower than *N. monilis* (9.5–10.2% SL vs 12.0–14.5% SL). Vent to anal distance is reduced compared to *N. anguilla* (29.7–34.5% vs 40.6% Pelvic to anal distance) and greater than *N. monilis* (29.7–34.5% vs 16.9–25.9% Pelvic to anal distance). Notable colour variations are the lesser number of bands on dorsal (back) 11–13 (vs 19–20 in *N. anguilla* and *N. monilis*), 6–8 blotches evenly spaced along the lateral line (vs. band formed of coalescing blotches extending to caudal base in *N. anguilla* and moniliform band in *N. monilis*).

**Description**

The general body shape and appearance are shown in Fig. 1. Morphometric data of the holotype and paratypes are given in Table 1. Body sub-cylindrical, dorsal profile slightly arched, dorsal region raises gradually from tip of snout to dorsal fin origin, followed by a gentle sloping for some extent and then evenly proceeds to caudal base. Ventral profile fairly convex. Depth of body (12.1–13.5% in SL), head of moderate size and its length 23.5–24.8% in SL. Snout short, blunt anteriorly, shorter than postorbital distance and its length 8.4–9.7% in SL and 35.9–39.4% in HL. Eyes large, placed dorsally in the mid of head length and not visible from ventral view. Nostrils close to each other with short flap, tubular but not extended as barbels. Mouth semicircular, lips moderately fleshy, deeply furrowed, upper lip with a pair of barbel like process at the arch, interrupted with a median incision, lower lip with small lobes and a median notch similar as in *N. anguilla* (Image 2). Dentiform process moderately developed. Barbels long and simple, two pairs rostral and one pair maxillary. Outer rostral pair, longest among barbels, extends almost to the anterior margin of eye. Maxillary barbels reaching to middle of eye. Entire body surface with uniformly small imbricate scales, except on the ventral side. Dorsal fin, slightly less than length of head, with four simple and eight branched rays, its origin well in advance to the perpendicular of pelvic fin origin, slightly ahead of midway between tip of snout and caudal base.

Pectoral fins with one simple and 12–13 branched rays, extending to half way beyond the distance to pelvic origin. Pelvic fins with one simple and seven branched rays. Unculiferous pads on ventral surface of both paired fins, distinct

in anterior most rays. Anal fin with three simple and five branched rays, its origin very far posterior, however, when compressed not reaching caudal fin base. Vent nearer to anal fin than to pelvic fin origin, which is overlapped by distal end of pelvic fin. Caudal fin deeply forked with well-developed upper and lower lobes, of equal length with 19 rays. Procurrent rays, beyond the caudal principal ray, 10 in upper lobe and seven in the lower lobe. Caudal peduncle short, its length 12.4–13.1 in percent of SL and its depth 75.0–76.8 percent in its own length.

**Colour**

Head and body pale yellow with little greenish tinge. Head with numerous brownish patches distinct in inter-orbital and inter-nasal region. Dorsal region with 11–13 dark brown vertical bands of varied thickness mostly as wide as interspaces (Image 1). Bands usually 3–4 in the predorsal region between occiput and dorsal region, four in the dorsal fin region (origin to distal end of the fin) and 4–5 in the post-dorsal region beyond the dorsal fin extension up to caudal base. Bands darker in the back, except for the two anterior most bands on lateral side, probably branched extensions of dorsal bands, first one as an elongated dot over upper angle of operculum and the second one as curved band from little above lateral line to half way along the anterior branched rays of pectoral fin diminishing afterwards. Rest others fade as they descend downward as incomplete bands, distinct upto lateral line beyond which they are less clear. Body with 6–8 longitudinally elongated dark brown blotches along the lateral line distributed in array upto caudal base, which end with the black spot a characteristic feature of genus *Nemacheilus*. The blotches along the lateral line are found to overlap or placed in between the forked bands. Dorsal fin has three black bands and caudal fin with melanin pigmentation as transverse rays in the median region. The sexual dimorphism as such is not exhibited, neither sub orbital flaps nor any form of colour indications have been noted.

**Etymology**

The specific name *stigmofasciatus* is a combination of the Greek words *stigma* for blotch and *fasciatus* for band, due to the regularly sized blotches alternating with bands.

**Distribution and habitat ecology**

*N. stigmofasciatus* is represented only in the Seethanathi river at Thuttinjet. The Seethanathi is a small west-flowing river in Karnataka with many cascades and waterfalls in the upstream portion. The elevation of the stream at the type locality is 199m above sea level. The habitat in the study area is dominated by the presence of pebbles and boulders, gravels are lesser, sand constitutes about 5% of the total substrate. Riparian cover is about 20% and gradient is 3% and the banks are highly stable, left bank with thick vegetation while right bank is sparsely vegetated. Feeding was not observed in the field and gut contents were not examined due to the lesser number of specimens collected.

**Comparison of species**

Of the two valid species *N. anguilla* and *N. monilis* from peninsular India, the new species has more features in common with *N. anguilla*. The new species resembles other congeners with regards to prominent characters of the genus: blotches



Image 1. *Nemacheilus stigmofasciatus* sp. nov., holotype, F 7599, 37.6 mm SL.

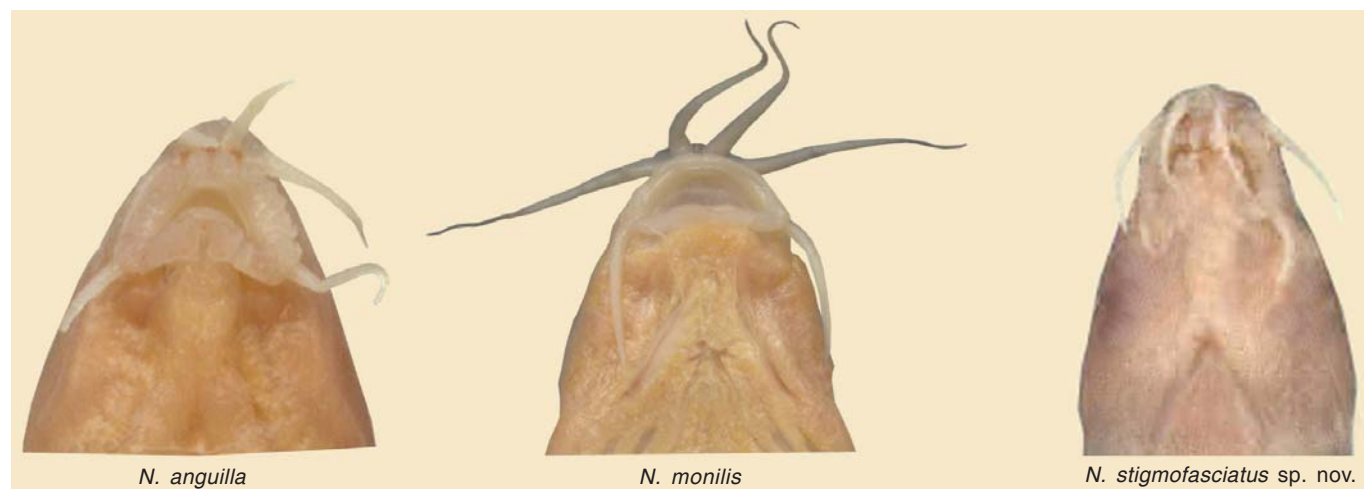


Image 2. Variation in lip structure and barbel length among the three southern Indian nemacheiline species.

Table 1. Morphometric data of *Nemacheilus stigmofasciatus* sp. nov. (Holotype F 7599, ZSI/SRS) and paratypes; *Nemacheilus anguilla* (Holotype, F 9692/1) and *Nemacheilus monilis* (MSUMNH 31, MSUMNH 32 and MSUMNH 36). ‘—’ indicates measurement absent due to damage.

Morphometric Characters	<i>Nemacheilus stigmofasciatus</i> sp. nov.			<i>Nemacheilus anguilla</i>	<i>Nemacheilus monilis</i>	
	F 7599	MSUMNH 19	n=6	ZSI F 9692/1	MSUMNH 31 MSUMNH 32 MSUMNH 36 n=11	
	Holotype	Paratypes	Mean	Holotype		
1 Standard length	37.6	31.6 - 37.7	34.8	45.4	59.8 - 72.9	
2 Total length	48.3	39.4 - 48.3	43.7	-	72.8 - 88.6	
% SL						
3 Body depth	12.7	12.1 - 13.5	12.8	14.8	14.2 - 17.0	
4 Head length	23.5	23.5 - 24.8	24.1	20.9	22.5 - 26.1	
5 Snout length	8.4	8.4 - 9.7	9.1	9.8	10.0 - 11.7	
6 Pre dorsal length	48.8	48.0 - 48.8	48.4	44.2	50.7 - 54.1	
7 Pre pelvic length	52.1	51.3 - 54.5	52.4	48.9	50.9 - 54.0	
8 Pre pectoral length	23.7	22.2 - 25.2	23.5	19.9	22.1 - 24.7	
9 Pre occipital length	22.4	22.4 - 24.6	23.5	18.7	21.0 - 22.7	
10 Pre anal length	81.4	79.7 - 81.4	80.2	75.3	75.7 - 80.6	
11 Pre anus length	67.7	67.4 - 70.3	68.9	62.4	70.7 - 75.2	
12 Pectoral fin length	23.2	23.2 - 24.9	23.9	20.5	17.6 - 19.5	
13 Pelvic fin length	19.1	19.1 - 21.0	19.9	18.8	15.0 - 17.4	
14 Caudal fin length	30.3	24.2 - 30.3	26.7	-	21.2 - 25.7	
15 Anal fin length	14.7	14.7 - 16.0	15.6	-	14.4 - 16.3	
16 Pectoral origin to pelvic origin	28.5	28.5 - 31.7	29.8	29.6	16.9 - 20.0	
17 Dorsal fin height	20.6	19.4 - 20.6	20.0	-	9.9 - 15.4	
18 Dorsal fin base length	16.9	16.9 - 18.5	17.6	14.7	13.1 - 15.1	
19 Peduncle length	12.4	12.4 - 13.1	12.7	15.5	12.8 - 13.5	
20 Body width (dorsal)	12.1	12.0 - 12.2	12.1	12.8	11.7 - 14.4	
21 Body width (at anus)	8.2	8.1 - 8.6	8.3	7.7	8.4 - 11.2	
22 Peduncle depth	10.2	9.5 - 10.2	9.8	-	12.0 - 14.5	

Key to the species under the genus *Nemacheilus* in peninsular India

1. Lateral line incomplete, extending to pelvic fin; 6–7 dark brown blotches along lateral line ..... *Nemacheilus stigmofasciatus* sp. nov.
- Lateral line complete, extending to anal fin or caudal base; transverse band along lateral line ..... 2
2. Lateral line extending to anal fin; Body with transverse band or blotches coalescing along the lateral line ..... *Nemacheilus anguilla*
- Lateral line extending to caudal fin base; Body with moniliform band from snout to caudal base..... *Nemacheilus monilis*

along mid-lateral line, bands on the dorsal region, long barbels and occurrence of a dark spot on the median lobe of the caudal fin. *N. monilis* differs from the new species in having a bigger body, smaller eyes, a lateral line that reaches to the caudal base, prominent moniliform black spots, and also in having a mouth with upper lip poorly furrowed (Image 2). *N. anguilla* shows a closer resemblance, but the new species differs in several features: a lateral line that extends up to the pelvic fin, shorter snout, bigger eye diameter, shorter caudal peduncle, and pelvic fin extending beyond vent. Variation is also found in body colouration, with 6–7 roundish blotches along the mid lateral line along with a peculiar pattern of 10–14 vertical bands varying in number and extension along the back to the lateral line. Both *N. anguilla* and *N. stigmofasciatus* sp. nov. have a pair of barbel-like processes interrupted with a median incision in their upper lip. However, the shape of the mouth opening differs a little, the tip of mouth is sharp in the form of inverted V shape in *N. anguilla* whereas it is curved and bell-shaped in *N. stigmofasciatus* sp. nov. Also the inner rostral barbels are not as short (Image 2) and the barbels are not as thick and fleshy as compared to those found in *N. anguilla*.

## Materials examined

*Nemacheilus anguilla*: ZSI, Kolkatta F 9692/1 Holotype (45.4mm SL), Yenna river at Medha, Satara Dist, Annandale. No date; MSUMNH 25, 1 ex., 48.8mm SL, Krishna river, near Koyna Dam, Pune, M. Arunachalam, 1998; MSUMNH 27, 2 ex., 35.3–39mm SL, Bhadra river, Karnataka. M. Arunachalam & J.A. Johnson 18.i.1998; MSUMNH 22, 1 ex., 45.3mm SL, Ponnambalamedu, Pamba river, Kerala, M. Arunachalam 02.xi.2003; MSUMNH 26, 1 ex., 38.3mm SL Syntheri rock, Kanneri river, tributary of river Kali, Karnataka, M. Arunachalam, 10.i.2003.

*Nemacheilus monilis*: MSUMNH 32, Topotype 4 ex., 64–72.9mm SL, Chengal, Bhavani river near Mettupalayam, M. Arunachalam & team, 01.ii.2001; MSUMNH 36, 5 ex., 65.4–

72.7mm SL, Bommeenmaduvu, Bhavani river, M. Arunachalam & team 03.ii.2001; MSUMNH 31, 2 ex., 59.8–67.6mm SL, Gugalthurai, Moyar river, tributary of Bhavani river, M. Arunachalam, 25.iii.2000.

No type materials available in ZSI Calcutta, ZSI/SRS, Chennai and ZSI/WRS, Kozhikode for this species.

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