



Barilius profundus, a new cyprinid fish (Teleostei: Cyprinidae) from the Koladyne basin, India

M. Dishma¹ & W. Vishwanath²

^{1,2} Department of Life Sciences, Manipur University, Canchipur, Manipur 795003, India
Email: ¹ dishma27@gmail.com, ² wvnath@gmail.com (corresponding author)

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Author Details: M. DISHMA is a junior research fellow under a project funded by the Department of Science & Technology, New Delhi. He is working on the inventory of the bariline and cobitid fishes of northeastern India. He is undergoing PhD on a relevant topic in the Department of Life Sciences, Manipur University. Dr. W. VISHWANATH is a Professor in the Department of Life Sciences, Manipur University. His field of specialization is fish and fisheries. He is presently engaged in taxonomy and systematics of freshwater fishes of northeastern India.

Author Contribution: See end of this article

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Abstract: *Barilius profundus*, a new species of bariline cyprinid fish is described from the Koladyne River, Mizoram, India. It is distinguished from congeners in having the following combination of characters: great body depth at dorsal-fin origin (32.0–37.3 % SL), 17–18 pre-dorsal scales, 7–10 dark blue bars on the sides of the body, 30–32 + 2–3 lateral line scales, ½7/1½ lateral transverse scales and 12 circumpeduncular scales. Key to species of *Barilius* of northeastern India is provided.

Keywords: Bariline fish, Mizoram, new species.

INTRODUCTION

Fishes of the genus *Barilius* Hamilton are characterised by a compressed body, blue-black bars or spots on the body and dorsal fin inserted behind the middle of the body (Hamilton 1822). The members of this genus are inhabitants of medium to fast flowing torrential mountain streams of China, western Asia, South and mainland South-east Asia. Thirteen species of the genus are hitherto known from the Eastern Himalaya region (Vishwanath et al. 2010). They are: *B. ngawa* Vishwanath & Manojkumar, *B. dogarsinghi* Hora, *B. chatricensis* Selim & Vishwanath, *B. lairokensis* Arunkumar & Tombi from the Chindwin drainage; *B. barila* (Hamilton), *B. bendelisis* (Hamilton), *B. tileo* (Hamilton), *B. shacra* (Hamilton), *B. vagra* (Hamilton), *B. barna* (Hamilton), *B. dimorphicus* Tilak & Husain, *B. radiolatus* Gunther, and *B. bonarensis* Chaudhuri from the Ganga-Brahmaputra drainage. The Koladyne River in Mizoram, northeastern India, is a drainage connected neither with the Ganga-Brahmaputra nor the Chindwin drainages. Its ichthyofauna is poorly explored. Collections from the river (also known as Kaladan or Chhimtui) include an undescribed species of *Barilius* which is herein described as a new species.

MATERIALS AND METHODS

Measurements were made point to point on the left side of specimens wherever possible with dial calipers to the nearest 0.1mm. The colour in fresh specimens was noted before fixation and preservation in 10% formalin. Counts and measurements follow Kottelat (1990) and lateral line scale count, Kottelat (2001). Head length (HL) and anatomical measurements are expressed as proportions of standard length (SL) and subunits of head as proportions of head length (HL). Osteological structures were observed in a cleared and alizarin-stained specimen



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Image 1. *Barilius profundus* sp. nov., side view of paratype, MUMF 27021, 69.9mm SL

following Hollister (1934). Vertebral counts follow Weitzman (1962). Fin rays were counted under a stereo-zoom light microscope. Type specimens are deposited in the Manipur University Museum of Fishes (MUMF).

***Barilius profundus* sp. nov.**
(Image 1)

Type material

Holotype: 24.xii.2009, 22°23'N & 92°57'E, 71.1mm SL; Koladyne River at Kolchaw, Lawntlai District, Mizoram, India, coll. Nebeshwar and party, MUMF 27001.

Paratypes: 4 exs., 55.2–67.7 mm SL, data as for holotype, MUMF 27002-27005; 8 exs., 30.xi.2008, 50.9–69.9 mm SL; Koladyne River at Kolchaw, Lawntlai District, Mizoram, India, coll. Nebeshwar & party, MUMF 27021-27028. One paratype (MUMF 27005, 54.5mm SL) dissected for osteology.

Diagnosis

A species of *Barilius* with the following combination of characters: great body depth at dorsal-fin origin (32.0–37.3 % SL); 17–18 pre-dorsal scales; 7–10 dark blue bars against faintly brown to yellowish-cream background of body, width of bar narrower than interspace width; lateral line complete with 30–32 + 2–3 scales; eye diameter (38.3–42.9 % HL), predorsal length (58.9–64.0 % SL); dorsal-fin length (21.6–25.7 % SL); ½7/1½ lateral transverse scales; 12 circumpeduncular scales; and 35 vertebrae.

Description

Morphometric data are shown in Table 1 and Appendix 1. Body compressed, abdomen rounded. Dorsal profile in front of dorsal-fin origin relatively straight, gently sloping downward towards base of caudal peduncle. Ventral profile slightly curved till pectoral-fin origin, then straight up to anal-fin origin, thereafter sloping dorsally to end of caudal peduncle. Muscular pads present at base of pectoral and pelvic fins.

Head moderately compressed; shorter than wide. Snout blunt, profile dorsally curved and rounded when viewed laterally, length shorter than interorbital distance. Eyes large, slightly bulging (convex), visible both from dorsal and ventral sides of head, situated in anterior half of head, diameter smaller than interorbital distance. Interorbital space slightly arched. Mouth terminal, obliquely directed upwards. Gape of mouth reaches anterior margin of orbit. Tubercles on snout and lower jaw poorly developed.

Barbels two pairs, short. One pair each of rostral and maxillary. Lips thin. Nostrils almost at level of upper margin of eye, distinctly nearer to anterior margin of eye than tip of snout. Jaws equal in length. Lower jaw without symphyseal knob.

Dorsal fin inserted posterior to pelvic-fin origin with ii, 7½ rays and closer to caudal-fin base than tip of snout; longer than pelvic and anal fin; tip of last branched ray extending to middle of anal fin base. Pectoral fin with i, 11 rays, shorter than head length; their tips pointed or nearly so; not reaching pelvic-fin origin. Pelvic fin with i, 8 rays, its origin much nearer to anal-fin origin than pectoral-fin origin, shorter than head length and pectoral fin; pelvic fin not reaching

Table 1. Morphometric data for *Barilius profundus* sp. nov. (n=13)

	Holotype MUMF 27001	Range*	Mean	SD
Standard length (mm)	71.1	50.9–71.1		
In % of standard length				
Body depth at dorsal fin origin	32.0	32.0–37.3	34.6	2.5
Head length	18.6	18.6–21.0	19.8	1.0
Predorsal length	59.9	58.9–64.0	61.4	3.9
Prepelvic length	51.6	45.8–62.3	54.0	4.5
Pre-anus length	67.8	67.8–74.6	71.2	4.6
Preanal length	70.6	70.6–76.3	73.4	4.6
Prepectoral length	28.1	26.9–30.2	28.5	1.9
Pectoral fin length	20.8	20.8–24.5	22.6	1.2
Pelvic fin length	13.9	13.9–17.6	15.7	0.8
Dorsal fin height	21.6	21.6–25.7	23.6	1.4
Dorsal fin base length	16.1	14.9–17.5	16.2	1.3
Anal fin length	16.6	16.6–20.4	18.5	1.0
Caudal peduncle length	14.0	11.1–15.4	13.2	1.0
Caudal peduncle depth	11.6	11.4–15.6	13.5	0.9
In % of head length				
Snout length	43.1	34.9–43.1	39.0	0.6
Eye diameter	40.1	38.3–42.9	40.6	0.3
Interorbital distance	50.0	45.2–53.3	49.2	0.6
Maximum head width	67.4	58.5–79.2	68.8	1.3
Head height at supraoccipital	118.9	111.6–136.8	124.2	1.7
Counts				
D rays	ii, 7½	ii, 7½		
P rays	i, 11	i, 11		
V rays	i, 8	i, 8		
A rays	ii, 10½	ii, 10½		
C rays	i, 9+8, i	i, 9+8, i		
L.I	32+2	30-32+2-3		
L.tr.	½/7/1/2½	½/7/1/2½		
Predorsal scales	18	17–18		
Circumpeduncular scales	12	12		
Transverse bands on body	8	7–10		

L.I - lateral line longitudinal scales; L.tr. - lateral transverse scales; * - measurements of all individuals provided in Appendix 1.

anal opening. Anal-fin origin just below base of last dorsal fin ray, with ii, 10½ rays; not reaching caudal peduncle when adpressed; fin margin concave. Anal fin shorter than head length. Anal opening located immediately anterior to anal-fin origin. Caudal fin deeply forked with i, 9+8, i principal rays, both upper and lower lobes equal in length.

Scales moderate. Circumpeduncular scales 12, lateral transverse scale ½/7/1/2½. Lateral line complete

with 30–32 + 2–3 scales. Vertebrae 18+17= 35 including complex vertebra.

Colour: In a fresh specimen, dorsal and dorsolateral surfaces of head and body faintly brown, ventral portion anterior to pelvic-fin origin silver coloured. Belly creamy to golden yellowish and with 7–10 dark blue bars on the sides; first anterior-most dark blue bar extends beyond lateral line, sometimes first two or three anterior-most bars touch lateral line. Dorsal

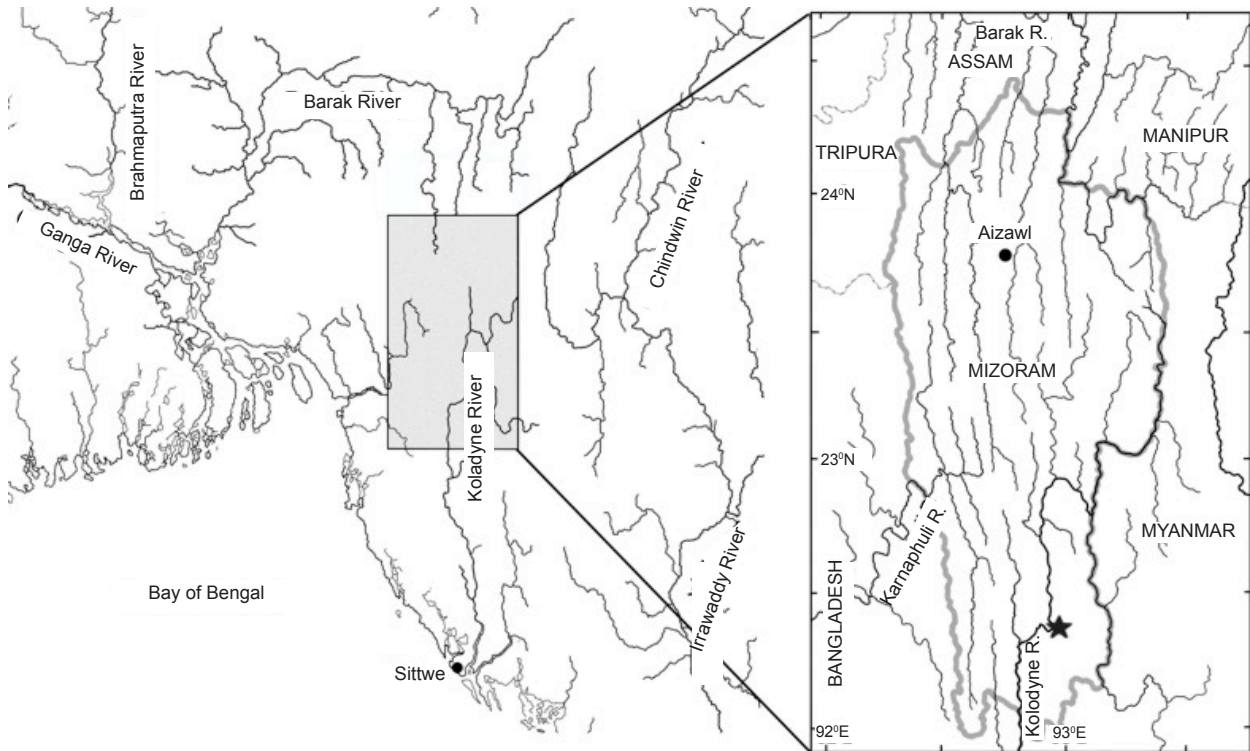


Figure 1. Map showing type locality of *Barilius profundus* sp. nov. indicated as a star.



Image 2. Koladyne River at Kolchaw, Mizoram, habitat of *Barilius profundus* sp. nov.

fin hyaline with a row of elongated black marks. Pectoral, pelvic and anal fins golden yellow with hyaline distal margins. Caudal fin edged with black, faintly yellowish-green at the base.

In 10% formalin, body creamy, slightly dark dorsally. Dorsal fin hyaline with a row of elongated black marks. Caudal fin hyaline, edged with black. Pectoral, anal and ventral fins hyaline without dark bands.

Etymology

The species name ‘profundus’ (Latin, meaning deep) is in reference to its great body depth, an adjective.

Distribution

Presently known only from the Koladyne River at Mizoram (Fig. 1, Image 2).

DISCUSSION

Barilius profundus sp. nov. is close to its nearest congeners, *B. dogarsinghi* and *B. barna* in having a dorsal fin with $7\frac{1}{2}$ branched rays and a pelvic fin with eight branched rays. However, the new species differs from *B. dogarsinghi* in having greater body depth at dorsal-fin origin (32.0–37.3% SL vs. 24.8–30.0), eye diameter (38.3–42.9 % HL vs. 29.2–33), and branched anal-fin rays ($10\frac{1}{2}$ vs. $9\frac{1}{2}$); lesser pre-dorsal scales (17–18 vs. 20), lateral line scales (30–32 + 2–3 vs. 37–40 + 2). It differs from *B. barna* in having greater body depth at dorsal-fin origin (32.0–37.3% SL vs. 29.0–30.8); presence (vs. absence) of barbels; longer

predorsal distance (58.9–64.0% SL vs. 53.9–54.9), anal-fin distance (16.6–20.4% SL vs. 13.3–15.1); shorter caudal peduncle (11.4–15.6% SL vs. 16.1–16.9); more predorsal scales (17–18 vs. 15–16); lesser lateral line scales (30–32 + 2–3 vs. 36–39 + 2–3), and branched pectoral-fin rays (11 vs. 12).

Barilius profundus sp. nov. differs from *B. barila*, *B. tileo*, *B. shacra* and *B. vagra* in having greater body depth at dorsal-fin origin 32.0–37.3 % SL (vs. 23.4–24.0 in *B. barila*, 29.9 in *B. tileo*, 22.2–23.2 in *B. shacra* and 25.2–26.7 in *B. vagra*), 17–18 predorsal scales (vs. 22 in *B. barila*, 28 in *B. tileo*, 22–25 in *B. shacra* and 21–22 in *B. vagra*) and 30–32 + 2–3 lateral line scales (vs. 40–42 + 2–3 in *B. barila*, 59+4 in *B. tileo*, 59–70 in *B. shacra* and 40–42 + 3 in *B. vagra*). *Barilius profundus* sp. nov. further differs from *B. bendelisis* in having greater body depth at dorsal-fin origin (32.0–37.3% SL vs. 22.1–26.1), 30–32 + 2–3 lateral line scales (vs. 39–42 + 2–4), scales without dark spot (vs. with dark spot); from *B. radiolatus* in having greater body depth at dorsal-fin origin (32.0–37.3% SL vs. 22.2), 30–32 + 2–3 lateral line scales (vs. 58), ventral fin not reaching vent (vs. reaching vent); from *B. bonarensis* in having greater body depth at dorsal-fin origin (32.0–37.3% SL vs. 21.7–22.2), 30–32+2–3 lateral line scales (vs. 47); from *B. dimorphicus* in having greater body depth at dorsal-fin origin (32.0–37.3% SL vs. 24.9–28.8), 30–32 + 2–3 lateral line scales (vs. 60–66), 17–18 predorsal scales (vs. 25–27). The new species differs from *B. ngawa*, *B. chatricensis* and *B. lairokensis* in having greater body depth at dorsal-fin origin (32.0–37.3 % SL vs. 24.8–28.3 in *B. ngawa*, 23.2 in *B. chatricensis*, 25.5 in *B. lairokensis*), 17–18 predorsal scales (vs. 21–22 in *B. ngawa*, 15 in *B. chatricensis*, 21 in *B. lairokensis*), 30–32 + 2–3 lateral line scales (40–41 + 2–3 in *B. ngawa*, 36+2 in *B. chatricensis*, 41+3 in *B. lairokensis*).

In case of *Barilius radiolatus*, *B. bonarensis*, *B. dimorphicus* and *B. shacra*, the specimens are not available for examination. Thus, the lateral line scale counts used for comparison are from the published data, which might include the pored scales behind the hypural plate which are normally 2–3. However, the differences in the counts are great and we can confirm these to be different.

Kar & Sen (2007) listed three species of *Barilius* viz., *B. barna*, *B. vagra* and *B. shacra* from the Koladyne River basin but they neither gave descriptions

of the species nor mentioned where the collections were eventually deposited. The three species are not represented from the basin in our collections. However, we compared *B. profundus* sp. nov. with *B. barna*, *B. vagra* from the Dikrong and Barak rivers (both Brahmaputra drainage) respectively and with *B. shacra* using the published data. As noted above, the three species are readily distinguishable from the new species.

Comparative material

Barilius barila: MUMF 5049, 5051, 83.2–89.5 mm SL, Khuga River, Churchandpur, Manipur, India.

Barilius barna: MUMF 27061–27064, 73.0–83.1 mm SL, Dikrong River, Arunachal Pradesh, India.

Barilius bendelisis: MUMF 27067–27068, 100.3–105.8 mm SL, Iyei River, Noney, Manipur, India; MUMF 27069–27072, 72.4–105 mm SL, western side of Maram Khulen & Laironching, Manipur, India.

Barilius chatricensis: MUMF 503/1 (holotype), 86.4mm SL, Chatrickong River, Ukhrul District, Manipur, India. 150 km from Imphal. Additional data from Selim & Vishwanath (2002).

Barilius dogarsinghi: MUMF 207–210, 52.9–72.2 mm SL, Chakpi stream, Manipur, India.

Barilius ngawa: MUMF 149 (holotype), 96.5mm SL, Sherou River (tributary of Manipur river), 83km south of Imphal, Manipur, India; MUMF 27056–27058, 80.0–82.9 mm SL, Singda, Manipur, India.

Barilius lairokensis: MUMF 27075, 105.0 mm SL, Moreh bazar, Moreh, Chandel District, Manipur, India.

Barilius vagra: MUMF 4091–4093, 88.0–107.3 mm SL, Barak River, Vanchengphai, Tamenglong District, Manipur, India.

Barilius tileo: MUMF 27076, 128.1mm SL, Umtrao River, Byrnihat, Norbong, Ribhoi District, Assam, India.

Barilius dimorphicus: Data from Tilak & Husain (1990).

Barilius bonarensis: Data from Chaudhuri (1912).

Barilius shacra: Data from Talwar & Jhingran (1991).

Barilius radiolatus: Data from Gunther (1868).

Keys to species of the genus *Barilius* of northeastern India

1. Barbels present 2
Barbels absent *B. barna*
2. Barbels 1 pair *B. tileo*
Barbels 2 pair 3
3. Scales with blue black spot, predorsal scales 18-20 *B. bendelisis*
Scales without blue black spot 4
4. Predorsal scales 15–18 5
Predorsal scales 20–26 6
5. Lateral line scales 32–35, depth of body 32.0–37.3% SL *B. profundus sp. nov.*
Lateral line scales 38, depth of body 24.6–29.2 % SL *B. chatricensis*
6. Mandibular knob not distinct, dorsal fin with a transverse blue black band *B. dogarsinghi*
Mandibular knob distinct, dorsal fin without transverse band 7
7. Lateral line scales 59–70 *B. shacra*
Lateral line scales 42–45 8
8. Pectoral fin as long as head, body with 14–15 bars *B. barila*
Pectoral fin shorter than head, body with 10–16 bars 9
9. Bars width: one-third of inter-bar width *B. vagra*
Bars and inter-bar with equal width 10
10. Caudal lobes equal *B. ngawa*
Caudal lobes unequal, lower lobe longer than the upper *B. lairokensis*

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Author Contribution: The study: MD survey, collection, morphometric and anatomic study of bariline fishes of northeastern India and their phylogenetics; WV supervision of taxonomy and phylogeny of freshwater fishes of northeastern India. Current paper: MD detailed examination of the bariline fishes of the Koladyne and its tributaries in Mizoram and comparison with specimens in ZSI, Kolkata and in MUMF. WV supervision in establishing new species and discuss taxonomic status.

Appendix 1. Biometric data of *Barilius profundus* sp. nov.

Measurements	Holotype	Paratypes (N=12)											
	MUMF 27001	MUMF 27002	MUMF 27003	MUMF 27004	MUMF 27005	MUMF 27021	MUMF 27022	MUMF 27023	MUMF 27024	MUMF 27025	MUMF 27026	MUMF 27027	MUMF 27028
Standard length	71.1	67.7	55.2	61.5	54.5	69.9	64.1	60.9	64.6	58.9	69.8	50.9	55.2
Body depth at dorsal fin origin	22.8	23.5	20.3	22.0	18.6	23.9	23.4	22.4	24.1	21.3	25.6	17.1	18.5
Head length	13.2	12.6	11.2	12.6	11.4	13.5	12.7	12.2	12.4	11.5	13.3	10.7	10.6
Predorsal length	43.2	39.9	34.6	38.7	32.5	42.0	39.5	36.3	39.9	37.7	42.1	30.9	33.1
Prepelvic length	37.2	37.1	30.8	38.3	29.5	38.0	36.7	35.0	36.5	33.3	37.9	23.3	30.4
Pre-anus length	48.2	48.1	40.5	44.9	37.2	50.3	44.8	44.5	48.2	42.6	50.6	38.3	41.0
Preanal length	50.2	50.9	40.7	46.9	40.0	51.1	48.5	45.0	48.9	43.8	50.6	38.3	41.0
Prepectoral length	20.3	20.3	16.0	17.5	15.4	18.8	18.5	18.4	18.1	17.0	20.4	15.1	15.6
Pectoral fin length	14.8	14.6	13.1	15.1	12.2	15.2	14.9	14.4	14.1	13.2	15.2	11.9	12.2
Pelvic fin length	9.9	10.0	9.7	9.6	8.7	10.9	9.9	10.1	10.2	9.1	10.9	8.5	8.6
Dorsal fin height	15.4	15.0	12.9	14.8	12.4	16.3	15.0	14.9	15.3	14.7	16.8	13.1	12.4
Dorsal fin base length	11.6	10.5	8.4	10.0	8.8	10.7	11.0	10.0	11.1	10.3	12.1	7.6	8.7
Anal fin length	11.8	11.7	10.1	11.4	10.6	12.3	12.0	11.4	11.4	10.8	13.8	10.4	10.2
Caudal peduncle length	10.1	7.5	6.5	6.9	8.4	7.9	8.6	8.0	8.0	8.1	9.8	7.5	7.3
Caudal peduncle depth	8.4	8.9	6.6	7.0	6.7	8.3	7.6	7.6	8.1	7.4	8.9	6.1	6.6
Snout length	5.7	4.7	4.5	4.4	4.3	5.4	5.4	5.0	5.0	4.7	5.5	3.8	4.1
Eye diameter	5.3	5.0	4.7	5.0	4.9	5.3	5.1	4.7	5.2	4.9	5.1	4.6	4.3
Interorbital distance	6.6	6.4	5.6	5.7	5.4	7.1	6.3	6.1	6.1	5.9	7.1	5.1	5.4
Max. Head width	8.9	8.3	6.6	8.9	7.6	10.7	9.2	8.4	9.9	7.4	10.2	6.7	6.9
Head height at supraoccipital	15.7	15.5	12.5	15.1	12.8	16.5	16.2	14.5	15.7	14.1	18.2	12.4	12.8
Counts													
D	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½	ii, 7½
P	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11	i, 11
V	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8	i, 8
A	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½	ii, 10½
C	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i	i, 9+8, i
L. I.	32+2	31+3	30+3	32+3	30+3	30+3	32+2	31+2	31+3	32+3	32+3	31+3	30+3
L. tr.	½/7/1/½	½/7/1/½	½/7/1/1½	½/7/1/½	½/7/1/½	½/7/1/½	½/7/1/1½	½/7/1/½	½/7/1/½	½/7/1/½	½/7/1/½	½/7/1/½	½/7/1/½
Predorsal scales	18	18	18	18	18	17	17	18	17	18	17	18	18
Circumpeduncular scales	12	12	12	12	12	12	12	12	12	12	12	12	12
Dark blue bars on body	8	8	8	8	9	10	7	7	7	10	7	9	7

