



Balitora laticauda, a new species of stone loach (Teleostei: Cypriniformes: Balitoridae) from Krishna River, northern Western Ghats, India

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Author Contribution: SB collected the specimens and provided the data on habitat. SJ and ND analyzed the data and wrote the paper.

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Abstract: A new species of stone loach *Balitora laticauda* is described from the Krishna River, northern Western Ghats, India. It differs from all known species of the genus in a combination of characters including: 10 transverse bands on the dorsal surface, deeper caudal peduncle, two prominent rows of papilla encircling upper lip where the proximate row has small papillae while distal row has larger papillae, 66–68 lateral line scales, 8–9 simple rays in pectoral fin, two simple rays in the pelvic fin and pectoral fin not surpassing pelvic fin base. The new species also differs from its related species in the ratios such as caudal peduncle length to depth (2.21–2.89), standard length to body depth (7.48–8.72), head length to head depth (2.11–2.50), head length to interorbital distance (2.20–2.96), head depth to head length (0.42–0.47), eye diameter to head length (0.13–0.17) and head width to gape of mouth (3.12–4.78). As percent of standard length *B. laticauda* sp. nov. differs from other related species with respect to caudal peduncle depth (6.3–7.4%), caudal peduncle length (15.0–20.0%), body width at anus (8.7–11.5%), body depth at anus (9.1–11.4%), pre-dorsal fin length (43.7–47.4%), pre-pectoral fin length (12.9–16.2%), pre-anal fin length (74.3–79.3%), pre-pelvic fin length (44.4–48.3%), pelvic fin length (19.3–23.7%), pectoral fin length (24.1–28.9%) and body depth at dorsal (11.5–13.4%).

Keywords: *Balitora* species, India, new fish, Western Ghats.

INTRODUCTION

Hill stream stone loaches of genus *Balitora* (Cypriniformes: Balitoridae) are distributed in South and South-East Asia and are currently represented by 18 species. Species of the genus *Balitora* inhabit clear and fast or moderately flowing streams and associated rivers in the mountain regions and are often found clinging to submerged rocks.

The first species described in this genus, *Balitora brucei* Gray, 1830, is distributed in northern and northeastern India. The other known species from India, *Balitora mysorensis* Hora, 1941 was described from the Cauvery River system. Other species in this genus *B. eddsi*

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Conway & Mayden, 2010 is known from Nepal, *B. burmanica* Hora, 1932 from Myanmar, *B. annamitica* Kottelat, 1988 from Cambodia and *B. meridionalis* Kottelat, 1988 from Thailand. *Balitora elongata* Chen & Li, 1985, *B. kwangsiensis* (Fang, 1930), *B. lancangjiangensis* (Zheng, 1980), *B. longibarbata* (Chen, 1982), *B. ludongensis* Liu & Chen, 2012, *B. nantingensis* Chen et al. 2005, *B. nujiangensis* Zhang & Zheng, 1983 and *B. tchangi* Zheng, 1982 are known from China, while *B. haithanhi* Nguyen, 2005, *B. nigrocorpa* Nguyen, 2005, *B. vanlani* Nguyen, 2005 and *B. vanlongi* Nguyen, 2005, from Vietnam. In the present communication, a new species of *Balitora* from the Krishna River system of northern Western Ghats of India is described.

MATERIALS AND METHODS

Morphological characterization

Counts and measurements generally follow Kottelat (1988) and Conway & Mayden (2010). Measurements were taken point to point using dial calipers to the nearest 0.1mm. Body depth and body width were measured at dorsal fin origin (D) and at anus (A). Subunits of body are presented as percent of standard length (SL) and subunits of head are presented as percent of head length (HL). In the species description values for holotype are marked with asterisk (*) and values in parentheses are ranges. If there is no variation in a character the values are not marked with asterisk. All pored lateral line scales were counted. The holotype and seven paratypes of the new species are deposited in the Zoological Survey of India, Western Regional Centre, Pune (ZSI–WRC) and one paratype in the museum collection of the Wildlife Information Liaison Development, Coimbatore (WILD).

Comparative material

Balitora mysorensis: Holotype, ZSI Kolkata F13512/1, Shivasamudram (approx. 12.294°N & 77.168°E, 530m), Mysore, coll. B.S. Bhimachar; ZSI–WRC P/3056, 2 exs., upstream of Shivasamudram falls near the town of Tirumakudalu Narasipura (12.219°N & 76.953°E), Mysore District, Karnataka, coll. Rahul Kumar (Biometric data in Appendix 3).

Balitora brucei: ZSI Kolkata F11092/1, 1 ex., Nong–piomg stream below Cherrapunji (approx.

25.298°N & 91.699°E, 1436m), Khashi Hills, Assam, coll. S.L. Hora; ZSI–WRC P/2669, 1 ex., Jim Corbett National Park (approx. 29.576°N & 78.819°E, 560m), Uttarakhand, coll. S. Chikane, June 2009. Additional information from Kottelat (1988).

Balitora burmanica: ZSI Kolkata F11034/1, 2 exs., syntypes, Meekalan (approx. 16.117°N & 98.418°E, 136m), Burma, specimens donated by Genova Museum. Additional information from Kottelat (1988).

Data for *Balitora annamitica* and *B. meridionalis* was taken from Kottelat (1988), for *B. eddsi* from Conway & Mayden (2010), for *B. nantingensis* and *Balitora nujiangensis* from Chen et al. (2005), for *Balitora ludongensis*, *B. kwangsiensis* and *B. longibarbata* from Liu et al. (2012), for *B. longibarbata* and *B. tchangi* from Zheng et al. (1982), for *B. elongata* from Li & Chen (1985), for *B. lancangjiangensis* from Zheng (1980). Descriptions of four species of *Balitora* described by Nguyen (2005) were not available, inspite of several attempts to contact the authors, therefore these species (viz. *B. haithanhi*, *B. nigrocorpa*, *B. vanlani* and *B. vanlongi*) are not considered in the diagnosis of the new species, however, these species are from Vietnam and are less likely to be conspecific.

RESULTS

Taxonomy

Balitora laticauda sp. nov.

(Images 1, 2a, 2b, 3a, 4a, 4b and Table 1)

Type material

Holotype: 10.i.2012, 69.5mm SL, Stream of Krishna River drainage at Venegaon Village near Krishna River bridge (17.499°N & 74.118°E, 590m), Satara District, Maharashtra, India, coll. Sunil Bhoite, ZSI–WRC P/2848.

Paratypes: 10.i.2012, 1 ex., 79.8mm SL, Venegaon Village near Krishna River bridge (17.499°N & 74.118°E, 590m), Satara District, Maharashtra, India, coll. Sunil Bhoite, ZSI–WRC P/2849; 10.i.2012, 1 ex., 63.6mm SL, Venegaon Village near Krishna River bridge (17.499°N & 74.118°E, 590m), Satara District, Maharashtra, India, coll. Sunil Bhoite, ZSI–WRC P/2850; 8.xii.2009, 2 exs., 59.7mm and 62.7mm SL, Nagthane Village on Urmodi River (17.568°N &

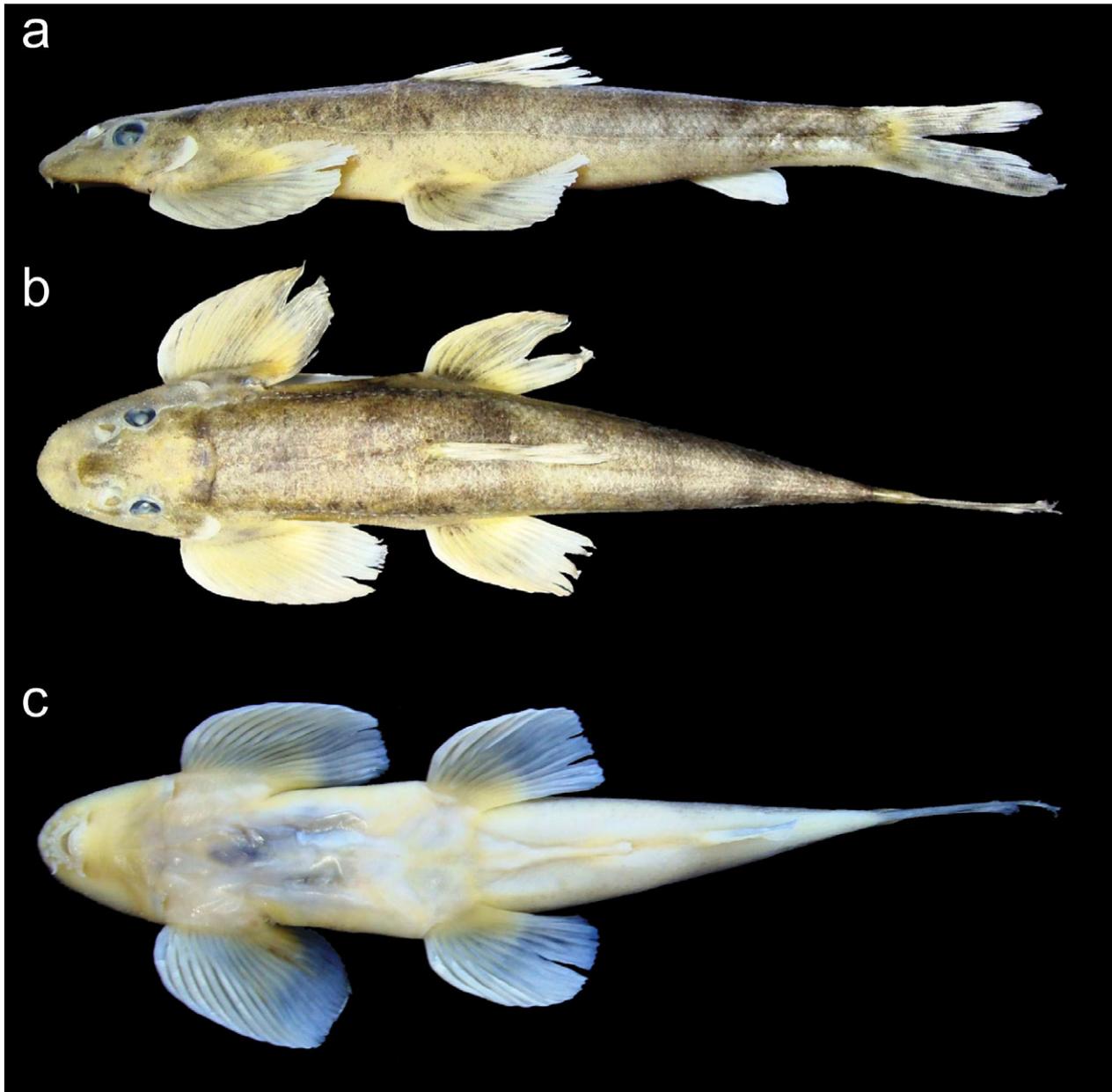


Image 1. Holotype of *Balitora laticauda* sp. nov., holotype (ZSI-WRC P/2848) in (a) lateral view, (b) dorsal view and (c) ventral view.

74.053°E, 606m), a tributary of Krishna River in Satara District, Maharashtra State, India, coll. Sunil Bhoite, ZSI-WRC P/2851; 10.i.2012, 1 ex., 48.7mm SL, Venegaon Village near Krishna River bridge (17.499°N & 74.118°E, 590m), Satara District, Maharashtra, India, coll. Sunil Bhoite, WILD-12-PIS-019; 8.xii.2009, 1 ex., 61.5mm SL, Nagthane Village on Urmodi River (17.568°N & 74.053°E, 606m), a tributary of Krishna River in Satara District, Maharashtra State, India, coll. Sunil Bhoite, ZSI-WRC P/3058; 2.v.2012, 2 ex., 54mm and 84.4mm SL, Khodashi village below

Khodshi Dam (17.308°N & 74.167°E, 562m), Krishna River, in Satara District, Maharashtra State, India, coll. Madhavi Chavan, ZSI-WRC P/3057.

Diagnosis

Balitora laticauda sp. nov. differs from closely related species *B. mysorensis* based on seven most prominent characters viz. 10 transverse bands on the dorsal surface (vs. 7), caudal peduncle length versus depth ratio 2.21–2.89 (vs. 2.95–3.30), body depth at anus 9.1–11.4 %SL (vs. 8.4–9.0 %SL), depth of caudal

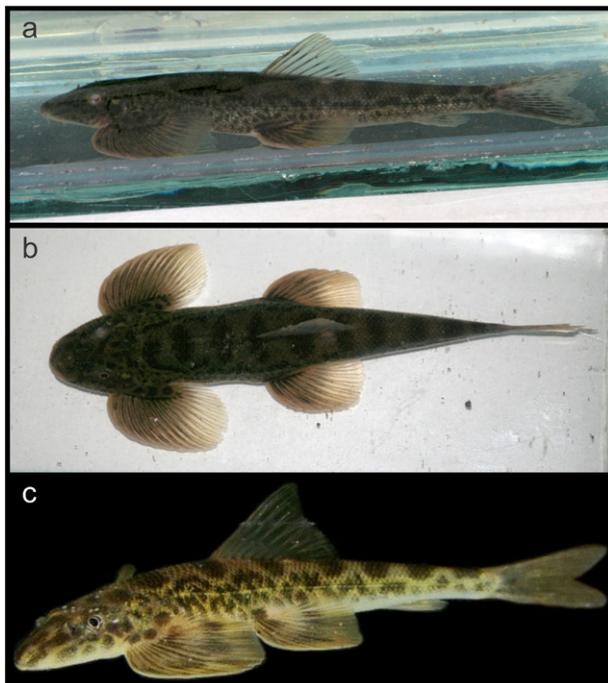


Image 2. *Balitora laticauda* sp. nov., holotype (ZSI-WRC P/2848) in life showing (a) lateral and (b) dorsal view and *B. mysorensis* (ZSI-WRC P/3056) in life (c). Note the difference in the number of dorsal bands.

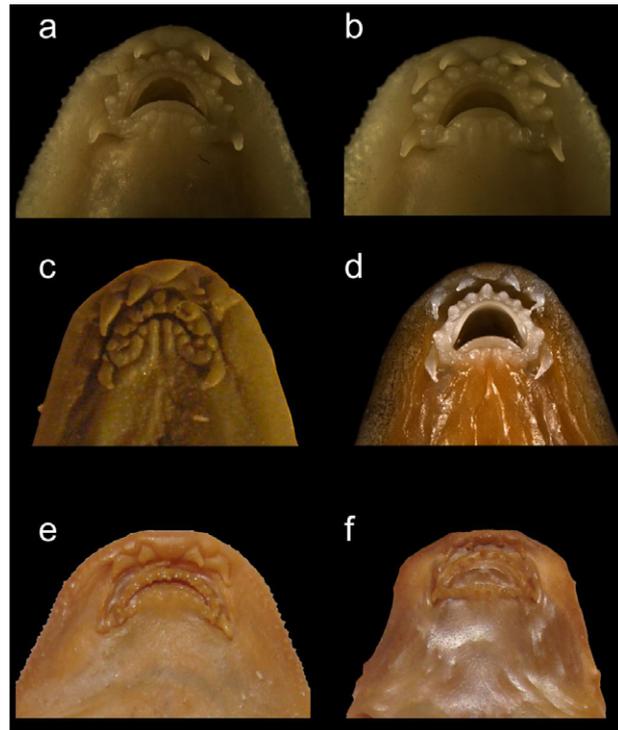


Image 4. Ventral view of head of (a) *Balitora laticauda* sp. nov., holotype (P/2848), (b) *B. laticauda* sp. nov., paratype (P/2849), (c) *B. mysorensis*, holotype (F13512/1), (d) *B. mysorensis* (ZSI-WRC P/3056), (e) *B. brucei* (F11092/1) and (f) *B. burmanica*, syntype (F11032/1).

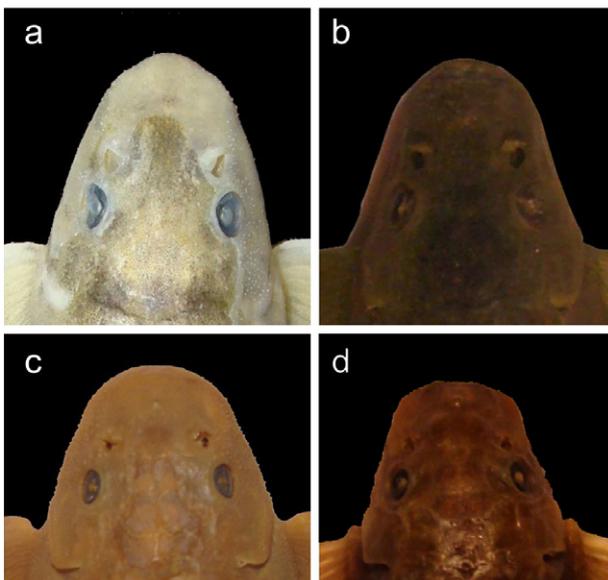


Image 3. Dorsal view of head of (a) *Balitora laticauda* sp. nov., holotype (P/2848), (b) *B. mysorensis*, holotype (F13512/1), (c) *B. brucei* (F11092/1) and (d) *B. burmanica*, syntype (F11032/1).

peduncle 6.3–7.4 %SL (vs. 5.—5.4 %SL), body width at anus 8.7–11.5 %SL (vs. 7.8–8.8 %SL), length of lower caudal lobe 16.1–24.3%SL (vs. 24.7–26.5 %SL) and length of median caudal ray (12.3–16.5

%SL (vs. 11.0–11.3 %SL). The new species differs from all other known species in this genus based on a combination of characters including 66–68 lateral line scales, 8–9 simple rays in pectoral fin, two simple rays in the pelvic fin and pectoral fin not surpassing pelvic fin base. It also differs from other species in the ratios such as caudal peduncle length to depth (2.21–2.89), standard length to body depth (7.48–8.72), head length to head depth (2.11–2.50), head length to interorbital distance (2.20–2.96) and head width to gape of mouth (3.12–4.78). As percent of standard length, *B. laticauda* sp. nov. differs from other species by having caudal peduncle depth 6.3–7.4 %SL; caudal peduncle length 15.0–20.0 % SL; body width at anus 8.7–11.5 % SL; body depth at anus 9.1–11.4 %SL; pre–dorsal fin length 43.7–47.4 %SL; pre–pectoral fin length 12.9–16.2 %SL; pre–anal fin length 74.3–79.3 %SL; pre–pelvic fin length 44.4–48.3 %SL; pelvic fin length 19.3–23.7 %SL; pectoral fin length 24.1–28.9 %SL; body depth at dorsal 11.5–13.4 %SL; head depth 42.1–47.3 %HL; eye diameter 10.8–20.7 % HL and gape of mouth 16.9–27.1 % head width.

Table 1. Morphometric and meristic characters of *Balitora laticauda* sp. nov. and *B. mysorensis*

Morphometry	<i>Balitora laticauda</i> sp. nov.			<i>Balitora mysorensis</i> Holotype+2 topotypes	
	Holotype	Paratypes (n=8)		Mean (sd)	Range
		Mean (sd)	Range		
Standard length (mm)	69.5	64.3 (12.1)	(48.7–84.4)	58.1 (16.7)	(38.8–68.3)
Total length (mm)	84.4	77.5 (13.5)	(59.2–98.3)	84.0 (0.9)	(83.4–84.7)
%SL					
Head length	21.9	20.8 (0.6)	(20.1–21.9)	20.8 (1.8)	(19.6–22.9)
Dorsal head length	21.6	20.6 (1.4)	(18.4–22.3)	19.0 (1.0)	(18.4–19.7)
Predorsal length	45.2	46.1 (1.2)	(43.7–47.4)	44.5 (0.3)	(44.2–44.7)
Dorsal to caudal distance	55.7	55.6 (1.2)	(53.6–57.2)	56.2 (0.6)	(55.8–56.6)
Prepectoral fin length	16.2	14.8 (1.1)	(13.0–16.1)	15.3 (0.4)	(15.1–15.6)
Prepelvic length	44.4	46.6 (1.2)	(44.8–48.3)	46.2 (0.3)	(46.0–46.4)
Preanus length	68.1	70.1 (1.4)	(68.7–73.1)	70.8 (0.8)	(70.3–71.4)
Preanal length	77.0	77.4 (1.6)	(74.3–79.3)	78.8 (0.4)	(78.5–79.1)
Ventral fin to anus distance	24.3	25.1 (1.5)	(22.6–27.5)	25.0 (0.8)	(24.4–25.5)
Anal fin to anus distance	7.8	6.7 (0.5)	(5.7–7.3)	7.7 (1.1)	(6.9–8.5)
Body depth (D)	13.4	12.2 (0.6)	(11.5–13.1)	11.7 (1.2)	(11.0–13.1)
Body depth (A)	11.1	10.1 (0.8)	(9.1–11.4)	8.7 (0.4)	(8.4–9.0)
Depth of caudal peduncle	7.0	7.0 (0.4)	(6.3–7.4)	5.2 (0.2)	(5.1–5.4)
Length of caudal peduncle	17.5	17.7 (1.8)	(15.0–20.0)	16.1 (1.0)	(15.2–17.3)
Body width (D)	17.9	18.1 (1.3)	(16.3–19.7)	16.7 (0.7)	(16.0–17.4)
Body width (A)	12.0	9.7 (0.9)	(8.7–11.5)	8.3 (0.7)	(7.8–8.8)
Height of dorsal fin	18.5	18.8 (1.3)	(16.3–20.5)	16.8 (3.5)	(13.9–20.6)
Dorsal fin base	15.1	15.1 (0.7)	(13.9–16.1)	14.8 (2.5)	(13.0–16.6)
Length of upper caudal lobe	18.0	19.3 (1.8)	(15.7–21.0)	18.4 (1.7)	(17.2–19.6)
Length of lower caudal lobe	24.0	21.5 (2.8)	(16.1–24.3)	25.6 (1.3)	(24.7–26.5)
Length of median caudal rays	14.6	14.1 (1.4)	(12.3–16.5)	11.2 (0.2)	(11.0–11.3)
Height of anal fin	11.6	12.8 (1.1)	(11.3–13.9)	13.6 (3.8)	(11.3–18.0)
Anal fin base	6.5	6.1 (0.6)	(5.2–7.3)	6.3 (0.2)	(6.2–6.4)
Length of pelvic fin	21.7	21.5 (1.2)	(19.3–23.7)	21.6 (1.2)	(20.6–22.9)
Length of pectoral fin	24.1	26.4 (1.5)	(24.4–28.9)	25.1 (1.2)	(23.9–26.3)
%HL					
Head depth at eye	38.0	37.4 (1.9)	(34.5–39.6)	39.8 (1.0)	(39.0–40.5)
Head depth at nape	46.0	44.2 (2.4)	(40.9–47.3)	44.8 (0.7)	(44.0–45.5)
Head width (at nares)	66.1	69.5 (4.1)	(63.6–75.2)	63.2 (1.1)	(62.5–64.0)
Maximum head width	79.3	87.4 (5.7)	(77.7–93.3)	75.8 (4.5)	(70.8–79.4)
Eye diameter	13.2	15.5 (2.8)	(10.8–20.7)	15.0 (2.6)	(13.3–18.0)
Interorbital width	39.5	39.8 (4.0)	(33.7–45.4)	35.0 (2.1)	(32.6–36.2)
Snout length	58.2	56.3 (3.2)	(52.7–61.8)	61.2 (1.3)	(59.8–62.1)
Gape of mouth	21.7	23.3 (3.2)	(16.9–27.1)	19.8 (1.2)	(18.9–20.6)
Meristics					
D	iii, 8		iii, 7–8		iii, 8–9
A	iii, 5		iii, 5		ii, 5
P	ix, 10		viii–ix, 10–11		viii–ix, 10–12
V	ii, 9		ii, 8–9		ii, 8–9
Lateral line scales	67		66–68		68–69
Lateral line to ventral fin scales	8		6–9		6
Lateral line to dorsal fin scales	8		8–9		9
Predorsal scales	20		19–25		21

DESCRIPTION

Morphometric data and meristic counts are listed in Table 1. General body shape as in Image 1. Coloration of live specimen as in Image 2. Dorsal and ventral view of head as in Images 3a and 4a, b respectively. Appendix 1 provides general body structure of paratypes from a different locality than holotype. Appendix 2 provides biometric data of all the type material.

Head depressed, longer than broad, studded with tubercles, more prominent on lateral margin of dorsal side. Tubercles prominent on cheeks, snout, lateral and ventral surface of head up to base of pectoral fin, between orbits with a distinct row on dorsal margin of eye, encircling the eyes. Eyes small, dorso-laterally positioned, not visible from underside of head, closer to operculum than to snout. Snout oblique and rounded. A skin flap divides nostril. Mouth inferior, deep groove between rostral fold and upper lip. Gape of mouth about half of head width at nares. Barbels three pairs, two rostral and one maxillary. Upper lip encircled with two rows of uneven papillae; first row having small papillae (16* in number) positioned continuously end to end, second row having large papillae (8* in number) positioned discontinuously with wide interspaces. Lower lip with 8* large papillae, two in the middle are elongated. Gill opening extending from level of posterior border of eye to middle point of pectoral-fin base.

Body dorso-ventrally flattened before dorsal fin origin, become laterally flattened posterior to dorsal fin. Dorsal profile of body convex, shows rapid increase from snout to nostril, becomes flattened till nape, increases gradually till origin of dorsal fin, decreases gradually till end of caudal peduncle. Lateral line complete. Slightly bent towards dorsal surface at the posterior border of pectoral fin. Lateral line scales 67* (66–68). Ventral profile flat upto anal fin origin gradually descends till caudal peduncle end. Chest naked without scales. On ventral surface, scales present posterior to anal opening till caudal end. Scales anterior to anal opening till posterior of pelvic fin base indistinct. Body deepest at dorsal fin origin. Body width more than body depth at both dorsal fin origin and anus.

Outer margin of dorsal fin straight. Dorsal fin originates exactly opposite to pelvic fin origin, closer

to tip of snout than end of caudal peduncle; pelvic fin length lesser than head length; with three simple and eight branched rays, last branched ray bifurcates at base. Paired fins horizontally placed. Pectoral fin elongated, longer than head, its origin slightly behind posterior border of eye. Anterior margin of first pectoral fin thickened and curved. Posterior profile of pectoral fin straight with large gap between posterior border and pelvic fin origin; with ix* (viii–ix) simple rays and 10* (10–11) branched rays. Pelvic fin equal to or slightly shorter than head; fin origin closer to snout tip than caudal peduncle end; with two simple rays and 9* (8–9) branched rays. Thickened pads of skin along ventral surface of the anteriormost paired-fin rays, first 9* (8–9) in case of pectoral fin, first four in case of pelvic fins. Anal fin with three simple and five branched rays with last branched ray bifurcating at base. Caudal fin emarginate, lower lobe longer than upper. Caudal peduncle slender, length 2.21–2.89 times its depth. Maximum size up to 84.4mm SL and 98.3mm TL.

Color pattern (fresh, Image 2): Dorsal surface grey with ten dark brown vertical bands behind occiput to base of caudal fin. Ventral surface pale yellow to white, laterally dark grey above lateral line and becomes faint from lateral line to ventral surface. A mid-lateral row of very irregular dark brown spots between opercle and middle of caudal fin base. Below the lateral line small irregular dark brown blotches scattered randomly on lateral surface of the body. A faint brown stripe extending from occiput to end of caudal base. Parts of head grayish-brown above, pale yellow below; with irregular brown patches on dorsal surface. Dorsal side of pectoral fin base with 3–4 dark brown spots. Dorsal and anal fins with light brown markings on centre of fin rays which appear to be oblique band. Pectoral and pelvic fins with dark brown markings extending from its base to middle of fin rays, hyaline distally. Caudal fin with irregular dark brown spots along midway and hyaline at tips and posterior margins.

Color pattern (preserved): Two specimens (Holotype ZSI Pune P/2848 and paratype ZSI Pune P/2849), which were originally preserved in formalin before finally transferred in the alcohol, have lost their original color pattern. However, the other paratypes were preserved directly in alcohol and have retained their color pattern as in the live specimens.

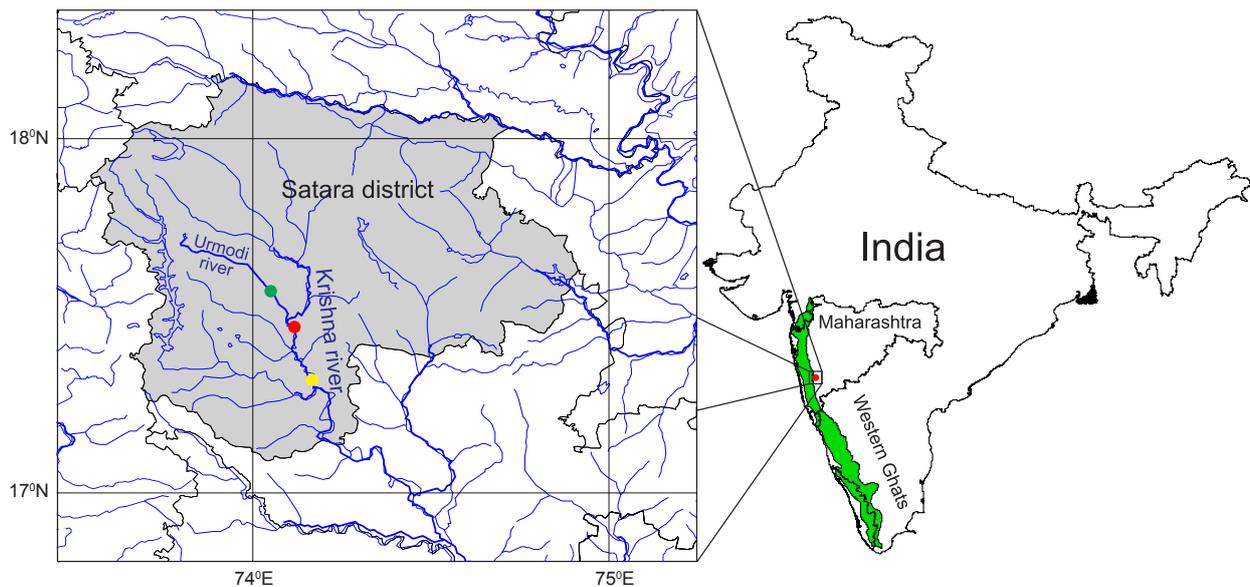


Figure 1. Distribution of *Balitora laticauda* sp. nov. Red solid circle is the type locality for the holotype (ZSI-WRC P/2848) and paratypes ZSI-WRC P/2849, P/2850 and WILD-12-PIS-019, while green solid circle is locality for paratypes ZSI-WRC P/2851, ZSI-WRC P/3058 and yellow solid circle is the locality for paratype ZSI-WRC P/3057.

Etymology

Specific name “*laticauda*” is derived from Latin ‘*latus*’ meaning ‘broad’ and ‘*cauda*’ meaning ‘tail’ and refers to the deeper caudal peduncle of the species as compared to two geographically closely related species, *Balitora mysorensis* and *B. brucei*.

Distribution

Known from the type localities, Venegaon Village near Krishna River bridge, Nagthane Village on Urmodi River and Khodashi Village below Khodshi Dam on Krishna River, Satara District, Maharashtra State, India (Fig. 1).

Habitat

The fish mostly lives in streams with clear and swift current of water, rocky bottom, consisting of gravel, cobbles or large rocks associated with other species viz. *Rasbora daniconius*, *Pethia ticto*, *Puntius sahyadriensis*, *Hypselobarbus kolus*, *Tor khudree*, *Mastacembelus armatus*, *Channa gachua* and *Lepidocephalichthys thermalis*. There are no specific threats observed in the vicinity of type localities. However, potential threat to the habitat include severe sand mining upstream of type locality and agricultural run-off entering into the river. Habitat at the type locality is shown in Image 5.

Other remarks

Local name (in Marathi language) of the species is Palmas (Pal = lizard, mas = fish; lizard–fish) because of its general appearance of a lizard and habit of clinging to the rocks in streams and river.

Common name

We suggest ‘Palmas Stone Loach’ as a common name for the species.



Image 5. Stream at Venegaon Village, type locality of *Balitora laticauda* sp. nov., showing its habitat

DISCUSSION

Kalawar & Kelkar (1956) included *Balitora shimogensis* Silas & Kalawar in their list of species from Panchaganga River, a tributary of Krishna River in northern Western Ghats of Kolhapur District, Maharashtra with a remark that the species will be described elsewhere. However, to our knowledge, till date the species has not been described and Kottelat (1988) considered it as nomen nudum for lack of any distinguishing characters and tentatively referred to it as a synonym of *B. mysorensis*. Since Panchaganga River is also a tributary of Krishna River system and lies just downstream of the type locality of *B. laticauda* sp. nov., it is quite possible that Kalawar & Kelkar (1956) might have actually referred to *B. laticauda* sp. nov. However, in the absence of any description and diagnostic characters of *B. shimogensis*, it is impossible to investigate this further.

Balitora laticauda sp. nov. differs from its very closely related species *B. mysorensis*, in terms of both geographical distribution and general body structure, based the following characters. *Balitora laticauda* sp. nov., as compared to *B. mysorensis*, has higher ratio of caudal peduncle length versus depth (2.21–2.89 vs. 2.95–3.3), higher depth of body at anus (9.1–11.4 %SL vs. 8.4–9.0 %SL), higher depth of caudal peduncle (6.3–7.4 %SL vs. 5.1–5.4 %SL), higher body width at anus (8.7–11.5 %SL vs. 7.8–8.8 %SL), shorter length of lower caudal lobe (16.1–24.3 %SL vs. 24.7–26.5 %SL) and higher length of median caudal ray (12.3–16.5 %SL vs. 11.0–11.3 %SL). However, the most striking differences which separate these two species are—(a) more number of transverse bands on the dorsal surface of *B. laticauda* sp. nov. (10) as compared to *B. mysorensis* (7), (b) lower lobe of caudal fin much shorter in *B. laticauda* sp. nov. as compared to *B. mysorensis*, (c) two rows of distinct and prominent papillae encircling upper lip where the proximal row has small papillae while distal row has large papillae in the case of *B. laticauda* sp. nov. (Image 3a and 3b) versus less distinct rows of large and smaller papillae in case of *B. mysorensis* (Image 3c and 3d), and (d) more stout caudal peduncle in *B. laticauda* sp. nov. as compared to *B. mysorensis*. Our comparison of *B. laticauda* sp. nov. and *B. mysorensis* is based on the study of *B. mysorensis* type material and type description given by Hora (1941) as well as

two specimens collected from the type locality of *B. mysorensis*. Note that the holotype of *B. mysorensis* is in a very bad condition so the morphometric data we used is compiled from the original description by Hora (1941). Apart from distribution of the two species in different river systems, drastic differences between the new species and *B. mysorensis* suggest that they are not conspecific.

While comparing *Balitora laticauda* sp. nov. with *B. mysorensis*, we have not considered the description of *B. mysorensis* provided by Menon (1987), as it is based on two specimens collected from Tungabhadra River, a tributary of Krishna River system in Karnataka, while the type of *B. mysorensis* is known from Cauvery River system in southern India. Even though Menon (1987) has mentioned that the type material of *B. mysorensis* was examined, he has provided no information about the type and has not provided any comparative account between the specimens from Tungabhadra and Cauvery rivers. It is therefore essential to investigate whether the *B. mysorensis* specimens studied in Menon (1987) are really conspecific with *B. mysorensis sensu stricto*. *Balitora laticauda* sp. nov. differs from the description of *B. mysorensis* given in Menon (1987) by having smaller head length (20.1–21.9 %SL vs. 23.30–24.75 %SL), higher head depth (42.1–47.3 %HL vs. 32.0–41.66 %HL) and more number of lateral line scales (66–68 vs. 64–65).

Among the other species of *Balitora*, which are geographically closer to the new species, *B. laticauda* sp. nov. differs from *B. brucei* in deeper caudal peduncle (6.3–7.4 %SL vs. 5.1–5.8 %SL), broader body width at anus (8.7–12.0 %SL vs. 5.4–8.1 %SL), lower ratio of caudal peduncle length to depth (2.21–2.89 vs. 3.20–4.00) and more number of lateral line scales (66–68 vs. 61–66). *Balitora laticauda* sp. nov. differs from *B. burmanica* in deeper caudal peduncle (6.3–7.4 %SL vs. 5.1–6.3 %SL), broader body width at anus (8.7–12.0 %SL vs. 6.4–7.4 %SL), lower ratio of caudal peduncle length to depth (2.21–2.89 vs. 3.00–4.00) and more number of lateral line scales (66–68 vs. 62–65). Further, both *B. brucei* and *B. burmanica* have broader head (Image 3) and completely different structure of mouth as compared to *B. laticauda* sp. nov. (Image 4).

Balitora laticauda sp. nov. differs from *B. eddsi* of Nepal in shorter pre-dorsal length (43.7–47.4 %SL vs. 48.1–50.4 %SL), longer pre-anal distance (74.3–79.3

%SL vs. 68.5–70.1 %SL), deeper body at anus (9.1–11.4 %SL vs. 6.8–8.2 %SL), deeper caudal peduncle (6.3–7.4 %SL vs. 5.4–5.7 %SL), longer caudal peduncle (15.0–20.0 %SL vs. 22.0–23.2 %SL), longer pelvic fin (19.3–23.7 %SL vs. 12.8–14.0 %SL), longer pectoral fin (24.1–28.9 %SL vs. 19.6–21.7 %SL) and lower ratio of caudal peduncle length to depth (2.21–2.89 vs. 4.10–4.20).

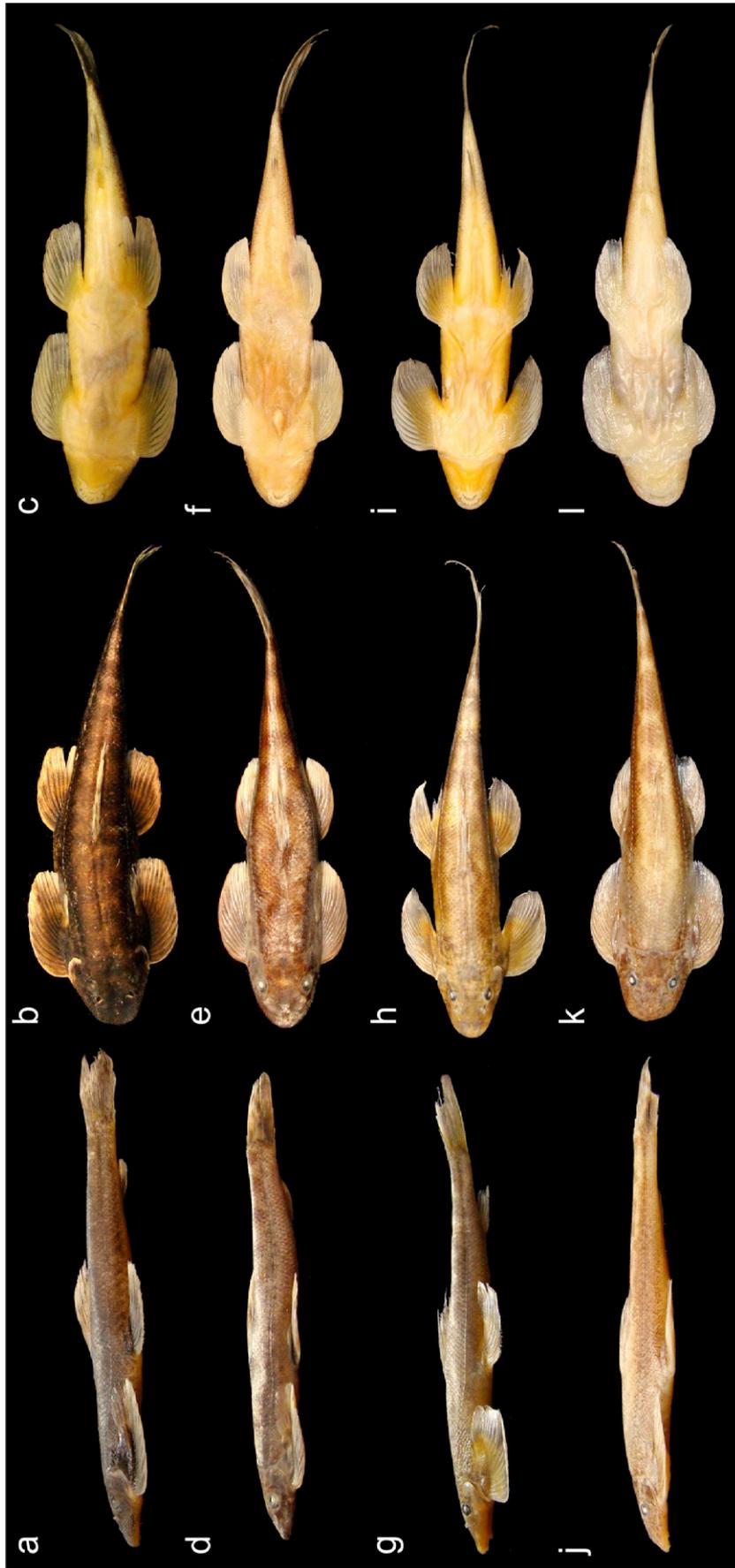
With respect to other species of genus *Balitora*, *B. laticauda* sp. nov. differs from *B. annamitica* in shorter pre-anus length (68.1–73.1 %SL vs. 73.2–75.2 %SL), broader body width at anus (8.7–12.0 %SL vs. 7.0–7.8 %SL), shorter pelvic fin (19.3–23.7 %SL vs. 23.4–24.4 %SL) and more number of lateral line scales (66–68 vs. 62–64). *Balitora laticauda* sp. nov. differs from *B. meridionalis* in shorter pre-pelvic length (44.4–48.3 %SL vs. 48.1–48.9 %SL), broader body width at anus (8.7–12.0 %SL vs. 8.1–8.5 %SL), shorter pelvic fin (19.3–23.7 %SL vs. 22.3–22.4 %SL) and more number of lateral line scales (66–68 vs. 61–62). *Balitora laticauda* sp. nov. differs from *B. nantingensis* in shorter pre-pectoral fin length (12.9–16.2 %SL vs. 23.3–26.3 %SL), more number of lateral line scales (66–68 vs. 62–64) and more number of transverse bands on the dorsal surface (10 vs. 6). *Balitora laticauda* sp. nov. differs from *B. ludogensis* in shallower body depth (11.5–13.4 %SL vs. 15.0–19.5 %SL), flatter head (42.1–47.3 %HL vs. 51.2–67.2 %HL) and less number of lateral line scales (66–68 vs. 69–74). *Balitora laticauda* sp. nov. differs from *B. kwangsiensis* in shallower flatter head (42.1–47.3 %HL vs. 47.72–57.6 %HL), smaller eye diameter (10.8–20.7 %HL vs. 19.7–21.4 %HL) and higher ratio of caudal peduncle depth to length ratio (62.6–89.6 %HL vs. 37.8–50.9 %SL). *Balitora laticauda* sp. nov. differs from *B. longibarbata* in shallower body depth (11.5–13.4 %SL vs. 15.5–17.2 %SL), flatter head (42.1–47.3 %SL vs. 50.5–60.3 %SL) and less number of lateral line scales (66–68 vs. 73–77). *Balitora laticauda* sp. nov. differs from *B. tchangii* in less number of lateral line scales (66–68 vs. 71) and higher ratio of head to interorbital distance (2.2–2.96 vs. 2). *Balitora laticauda* sp. nov. differs from *B. lancangjiangensis* higher ratios of standard length to body depth (7.48–8.72 vs. 5.91–6.72), head length to head depth (2.11–2.50 vs. 1.72–2.00) and head width to gape of mouth (3.12–4.78 vs. 2.33–2.85). *Balitora laticauda* sp. nov. differs from *B. elongata* in having

less number of pectoral fin simple rays (viii–ix vs. x–xi) and less number of pelvic fin simple rays (ii vs. iii–iv). *Balitora laticauda* sp. nov. differs from *B. nujiangensis* in having less number of pelvic fin simple rays (ii vs. iii) and pectoral fin not surpassing pelvic fin base (vs. surpassing).

The Western Ghats of India is rich in freshwater fish diversity with about 290 known species, 65% of which are endemic to the river systems originating from the Western Ghats (Dahanukar et al. 2011), while about 40% are endemic to the Western Ghats mountain ranges (Dahanukar et al. 2004). Recent updates in the IUCN Redlist has suggested that out of the total 290 species known from the Western Ghats, 37% fall under the threatened categories - Critically Endangered, Endangered or Vulnerable, owing to several anthropogenic threats including pollution, biological resource use (food fish and aquarium trade), invasive species, residential and commercial developments and natural system modification (Dahanukar et al. 2011). While freshwater fish diversity is subjected to severe threats, new species are still being discovered from this region suggesting that our understanding of the diversity in this region is still far from being complete. With increasing consciousness regarding conservation of flora and fauna of biodiversity hotspots such as Western Ghats, description of this new species bolsters the views expressed by Dahanukar et al. (2011) and Raghavan et al. (2012) that taxonomic work on the fish fauna of the Western Ghats is essential to understand the unknown diversity of this region, so as to design and implement potent conservation action plans.

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Appendix 1. Comparative images of balitorids from India. (a-c) *Balitora laticauda* sp. nov. paratype (ZSI-WRC P/3057, 84.4mm SL) from Krishna River at Karad, (d-f) *B. laticauda* paratype (ZSI-WRC P/3058, 61.5mm SL) from Urrmodi River, (g-l) *B. mysorensis* (ZSI-WRC P/3056, 67.1mm SL) from its type locality at Sivasamudra falls and (j-l) *B. brucei* (ZSI-WRC P/2669, 59.7mm SL) from Jim Corbett National Park.

Appendix 2. Biometric data (mm) of *Balitora laticauda* sp. nov. holotype and eight paratypes.

Character	Holotype	Paratype 1	Paratype 2	Paratype 3	Paratype 4	Paratype 5	Paratype 6	Paratype 7	Paratype 8
	P/2848	P/2849	P/2850	WILD-PIS-019	P/2851	P/2851	P/3058	P/3057	P/3057
Standard length	69.5	79.8	63.6	48.7	62.7	59.7	61.5	54.0	84.4
Total length	84.4	95.1	77.3	59.2	77.2	73.7	75.9	63.8	98.3
Head length	15.2	16.6	12.8	10.1	13.1	12.8	13.5	11.0	17.0
Dorsal head length	15.0	15.5	12.6	9.9	13.7	13.0	12.9	12.1	15.5
Gape of mouth	3.3	4.5	2.8	2.4	2.9	3.0	2.3	2.8	4.3
Predorsal length	31.5	37.9	27.8	22.9	28.8	27.6	29.0	24.9	38.2
Dorsal to caudal distance	38.7	42.8	36.4	26.8	35.0	33.5	33.5	30.7	47.5
Prepectoral fin length	11.3	10.9	9.4	7.8	9.0	9.3	9.9	8.0	11.0
Prepelvic length	30.8	37.9	28.8	22.7	29.4	28.3	28.6	26.1	37.8
Preanus length	47.3	55.7	43.8	33.9	43.6	42.2	43.4	37.1	61.7
Preanal length	53.5	62.9	49.1	36.2	48.6	46.2	48.8	41.1	66.3
Ventral fin to anus distance	16.9	20.6	16.4	12.7	14.2	15.0	15.1	12.9	23.2
Anal fin to anus distance	5.4	5.5	4.3	3.2	4.3	4.2	4.5	3.6	4.8
Head depth at eye	5.8	6.6	4.6	3.6	5.1	4.9	4.7	4.2	6.5
Head depth at nape	7.0	7.2	5.4	4.2	6.2	6.1	5.5	4.9	7.8
Body depth (D)	9.3	10.0	7.4	5.6	8.2	7.6	7.2	6.9	10.2
Body depth (A)	7.8	8.5	6.0	4.4	6.4	6.1	6.6	6.2	7.8
Depth of caudal peduncle	4.9	5.4	4.4	3.1	4.6	4.4	4.6	4.0	5.6
Length of caudal peduncle	12.2	12.0	12.7	8.6	11.8	10.4	10.5	10.7	13.3
Snout length	8.8	10.2	7.5	5.4	7.6	7.2	7.1	6.1	9.1
Head width (at nares)	10.0	12.5	8.8	6.9	9.5	8.1	8.6	7.8	12.2
Maximum head width	12.0	14.0	11.8	8.9	11.7	9.9	10.9	10.3	15.8
Body width (D)	12.4	15.1	10.4	8.2	12.1	10.4	10.7	10.4	16.7
Body width (A)	8.3	9.1	5.7	4.6	6.8	5.2	5.8	5.1	7.7
Eye diameter	2.0	2.6	1.9	1.7	1.8	2.0	2.1	2.3	1.8
Interorbital width	6.0	5.6	5.2	3.9	5.9	5.5	5.3	4.7	6.0
Height of dorsal fin	12.9	14.1	12.7	9.1	12.2	11.3	11.8	11.1	13.8
Dorsal fin base	10.5	11.9	9.2	7.2	8.7	9.4	9.9	8.4	12.8
Length of upper caudal lobe	12.5	14.7	12.6	9.5	12.8	12.5	12.4	damaged	13.3
Length of lower caudal lobe	16.7	16.5	13.3	10.4	14.8	14.0	15.0	damaged	13.6
Length of median caudal rays	10.2	12.0	8.6	6.0	9.4	8.6	10.2	6.7	11.5
Height of anal fin	8.1	11.1	7.5	5.7	8.4	8.1	8.6	6.8	9.5
Anal fin base	4.6	5.1	3.3	3.6	3.6	3.7	3.7	3.3	5.3
Length of pelvic fin	15.1	17.0	13.7	9.4	13.8	12.9	13.5	12.8	17.5
Length of pectoral fin	16.7	22.4	16.5	12.7	16.9	14.6	15.8	15.6	21.2
D	iii, 8	iii, 8	iii, 8	iii, 8	iii, 8	iii, 8	iii, 8	iii, 8	iii, 7
A	iii, 5	iii, 5	iii, 5	iii, 5	iii, 5	iii, 5	ii, 5	ii, 5	ii, 5
P	ix, 10	viii, 10	ix, 10	viii, 11	viii, 11	viii, 11	vii, 11	vii, 11	vii, 11
V	ii, 9	ii, 9	ii, 8	ii, 8	ii, 8	ii, 8	ii, 8	ii, 8	ii, 8
L.I. scales	67	66	68	67	67	66	68	67	68
LL to ventral scales	8	8	7	9	8	8	6	8	6
LL to dorsal scales	8	8	8	9	8	8	9	8	9
Predorsal scales	20	25	19	23	20	19	20	21	21

Appendix 3. Biometric data (mm) of *Balitora mysorensis* holotype (ZSI Kolkata F13512/1) and two specimens collected from the type locality.

Character	Holotype*	P/3056 (#1)	P/3056 (#2)
Standard length	38.8	67.1	68.3
Total length	-	84.7	83.4
Head length	8.9	13.3	13.4
Dorsal head length	-	12.3	13.5
Gape of mouth	-	2.7	2.5
Predorsal length	-	29.7	30.5
Dorsal to caudal distance	-	38.0	38.1
Prepectoral fin length	-	10.5	10.3
Prepelvic length	-	31.2	31.4
Preanus length	-	47.2	48.8
Preanal length	-	52.7	54.0
Ventral fin to anus distance	-	16.4	17.4
Anal fin to anus distance	-	5.7	4.7
Head depth at eye	-	5.2	5.4
Head depth at nape	4.0	5.9	6.1
Body depth (D)	5.1	7.4	7.5
Body depth (A)	-	5.7	6.1
Depth of caudal peduncle	2.1	3.5	3.5
Length of caudal peduncle	6.2	11.6	10.4
Snout length	5.5	8.0	8.3
Head width (at nares)	-	8.3	8.6
Maximum head width	6.3	10.6	10.4
Body width (D)	6.2	11.2	11.9
Body width (A)	-	5.2	6.0
Eye diameter	1.6	1.8	1.9
Interorbital width	2.9	4.8	4.9
Height of dorsal fin	8.0	10.7	9.5
Dorsal fin base	-	11.1	8.9
Length of upper caudal lobe	-	11.6	13.4
Length of lower caudal lobe	-	17.8	16.9
Length of median caudal rays	-	7.6	7.5
Height of anal fin	7.0	7.7	7.7
Anal fin base	-	4.1	4.4
Length of pelvic fin	8.9	14.2	14.1
Length of pectoral fin	10.2	16.0	17.2
D	iii, 9	iii, 8	iii, 8
A	ii, 5	ii, 5	ii, 5
P	ix, 12	viii, 10	viii, 10
V	ii, 9	ii, 8	ii, 8
L.I. scales	-	68	69
LL to ventral scales	-	6	6
LL to dorsal scales	-	9	9
Predorsal scales	-	21	21

* - = data not available

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