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### COMMUNICATION

#### **BARILIUS TORSAL (TELEOSTEI: CYPRINIFORMES: CYPRINIDAE), A NEW FRESHWATER FISH FROM THE BRAHMAPUTRA DRAINAGE, INDIA**

Kavita Kumari, Manas Hoshalli Munivenkatappa, Archana Sinha, Simanku Borah & Basanta Kumar Das

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## BARILIUS TORSAL (TELEOSTEI: CYPRINIFORMES: CYPRINIDAE), A NEW FRESHWATER FISH FROM THE BRAHMAPUTRA DRAINAGE, INDIA

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Kavita Kumari<sup>1</sup> , Manas Hoshalli Munivenkatappa<sup>2</sup> , Archana Sinha<sup>3</sup> ,  
Simanku Borah<sup>4</sup>  & Basanta Kumar Das<sup>5</sup> 

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<sup>1,2,3,5</sup> ICAR-Central Inland Fisheries Research Institute, Monirampur (Post), Barrackpore, Kolkata, West Bengal 700120, India.

<sup>2</sup> ICAR-Central Marine Fisheries Research Institute Regional Centre, Andhra University (Post), Opposite SBI Kohinor Branch, Vishakapatnam, Andhra Pradesh 530003, India.

<sup>4</sup> ICAR-CIFRI Centre, HOUSEFEED Complex, Dispur (Last gate), Guwahati, Assam 781006, India.

<sup>1</sup> kavitacof@gmail.com, <sup>2</sup> manas2u@gmail.com, <sup>3</sup> sinhaarchana@yahoo.com,

<sup>4</sup> simankuborah@gmail.com (corresponding author), <sup>5</sup> basantakumard@gmail.com

**Abstract:** *Barilius torsai* is described from the Torsa, a tributary of Brahmaputra River system in West Bengal, India. The new species is distinguished from all its congeners by the presence of a complete lateral line with 52–53 scales, 29 pre-dorsal scales, pectoral fin notched, two well-developed pairs of barbels (rostral and maxillary), length of rostral barbel slightly larger than maxillary, which reaches the orbit. Tubercles on snout and lower jaw absent, 9–11 blue vertical bars along the body, dorsal fin hyaline with dark pigment concentrated along lower two-third of the dorsal-fin rays.

**Keywords:** Chedrini, Danioninae, taxonomy, Torsa, West Bengal.

**Abstract (Hindi):** बरीलियस तोरसाई का वर्णन भारत के पश्चिम बंगाल में ब्रह्मपुत्र नदी प्रणाली की सहायक नदी, तोरसा से किया गया। नयी प्रजाति के इसके सजातीय प्रजातियों से भिन्न होने के लक्षण हैं-52-53 शल्कयुक्त संपूर्ण पाश्र्व रेखा, 29 पूर्व पृष्ठीय शल्क, वक्षीय पंख खिंचेदार, दो जोड़े पूर्ण विकसित बारबेल (रोस्ट्रल एवं मैक्सिलरी), रोस्ट्रल बारबेल की लम्बाई मैक्सिलरी बारबेल से थोड़ा अधिक, जो नेत्र गुहा तक पहुँचती है। सनाउट एवं नचिला जबड़ा पर गाँठ अनुपस्थिति, शरीर पर 9-11 नीली उध्रवाधर लकीर, पारदर्शी पृष्ठीय पंख जसिके नचिले दो- तर्हाई भाग पर गहरे रंग के वर्णक की अधिकता है।

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**Author details:** KAVITA KUMARI is scientist, Fish Genetics and Breeding at ICAR-CIFRI, Barrackpore and working on taxonomy, systematics and stock characterisation of fish along with assessment of ecosystem health using molecular tools. MANAS HOSHALLI MUNIVENKATAPPA is scientist at ICAR-CMFRI and working on marine fisheries management, stock assessment, fish biology and Fisheries policy. ARCHANA SINHA is Principal scientist at ICAR-CIFRI and working on various aspects of small indigenous fish culture and conservation. SIMANKU BORAH is scientist at ICAR-CIFRI Regional Centre, Guwahati and working in the field of Fishery Biology. He is also involved in research related to ecology and habitat characterization of rivers and wetlands. BASANTA KUMAR DAS is Director, ICAR-CIFRI, Barrackpore and working on the aspects of Inland Fisheries Management.

**Author contribution:** KK—collected and analyzed specimens, examined the museum specimens, wrote final version of manuscript. MHM— analyzed specimens and helped in the manuscript preparation. AS—supervised study, helped in the revision of the manuscript, SB—examined the museum specimens, helped in revision of the manuscript. BKD—supervised study, helped in the revision of the manuscript.

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## INTRODUCTION

Fishes of the genus *Barilius* Hamilton (Cyprinidae:Danioninae: Chedrini) are one of the dominant small-sized fishes occurring in hill streams and upland rivers throughout India, Bangladesh, Myanmar, Nepal, Sri Lanka, China, Iraq, and Thailand (Selim & Vishwanath 2002; Jayram 2010; Tejavej 2012; Qin et al. 2019). *Barilius* was erected as a subgenus of *Cyprinus* with *Cyprinus barila* Hamilton, as the type (Qin et al. 2019). Howes (1980) identified two groups within *Barilius* (sensu lato), corresponding to the genera *Barilius* and *Opsarius* (Rainboth 1991). These bariliine fishes are characterised by their relatively elongate, compressed bodies with round belly, vertical bars on the flanks, 9–17 anal-fin rays and sub-laterally placed lateral line (Hamilton 1822; Howes 1980; Talwar & Jhingran 1991; Tejavej 2012). Of the 36 valid species of bariliine fishes, 24 have been recorded in India (Fricke et al. 2019; Qin et al. 2019). Currently, most bariliine fishes, including all southeastern Asian species are assigned to the genus *Opsarius* (Howes 1983; Rainboth 1991; Qin et al. 2019) and the genus *Barilius* is restricted to five species characterized by an extremely shallow body: *B. barila* (Hamilton, 1822), *B. evezardi* Day, 1872, *B. modestus* Day, 1872 and *B. vagra* (Hamilton, 1822) from India, and *B. mesopotamicus* Berg, 1932 from the Tigris-Euphrates basin, based on the diagnosis of *Barilius* sensu by Howes (1980), as well as morphological (Howes 1980; 1983) and molecular phylogenetic evidence (Tang et al. 2010; Liao et al. 2011; Qin et al. 2019).

During an ichthyological survey in the Torsa, a tributary of the Brahmaputra River during July and November 2015, a total of 83 individuals of a *Barilius* species were caught by cast net of mesh size 15–20 mm at Jaldapara, Alipurduar District, West Bengal, India. Examination of the collected specimens in July 2015 and detailed re-examination in November 2015 following standard literature (Jayaram 2010; Arunkumar & Singh 2000; Nath et al. 2010; Dishma & Vishwanath 2012; Knight et al. 2015) revealed that 11 of the 83 specimens could not be assigned to any of the known species. The new species is described herein as *Barilius torsai*.

## MATERIALS AND METHODS

Measurements were made with digital caliper with an accuracy of 0.1mm. Counts and measurements were made on the left side of the specimens wherever possible and based on standard methods following Dishma

& Vishwanath (2012). Colour pattern was recorded from fresh and preserved (10% formalin) specimens. Voucher specimens are deposited in the Museum of the Zoological Survey of India (ZSI), Kolkata and at the ICAR-Central Inland Fisheries Research Institute (CIFRI), Barrackpore.

### *Barilius torsai* sp. nov.

#### (Image 1)

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### Type material

Holotype: ZSI FF5542, 12.xi.2015, 26.729°N & 89.325°E, 71.41mm SL, Torsa River, Jaldapara, Alipurduar District, West Bengal, India, coll. A. Roy Chaudhary.

Paratype: ZSI FF5543, 26.vii.2015, 26.729°N & 89.325°E, 74.56mm SL, data same as for holotype, coll. A. Mitra; CIFRI F10003-10010, 8 ex., 26.vii.2015, 71.46–74.23 mm SL, data same as for holotype, coll. A. Mitra; CIFRI F10011, 12.xi.2015, 71.46mm SL, data same as for holotype, coll. A. Roy Chaudhary.

### Diagnosis

*Barilius torsai* is distinguished from all other species of *Barilius* by a combination of the following characters: lateral line complete with 52–53 scales, 29 pre-dorsal scales, pectoral fin notched, two well-developed pairs of barbels (rostral and maxillary), body with 9–11 blue vertical bars, dorsal fin hyaline with dark pigment concentrated along lower 2/3<sup>rd</sup> of dorsal-fin rays.

### Description

See Table 1 and Supplementary 1 for morphometric characters and image 1 for general appearance. Body shallow, its depth about one-fourth standard length (SL), laterally compressed with ventral profile more convex than the dorsal profile. Caudal peduncle long, narrower near the caudal base. Head small and compressed, length about one-fourth SL, snout slightly blunt. Mouth oblique, angle of gape not reaching vertical from the anterior margin of the orbit. No symphyseal process in the lower jaw. Eyes large, situated in the anterior half of the head, diameter about one-fourth head length (HL). Nostrils closer to anterior margin of eye than the snout tip. Two pairs of well-developed barbels (rostral and maxillary), length of rostral barbel slightly larger than maxillary, which reaches the orbit. Tubercles on snout and lower jaw absent.

Dorsal fin with two simple and seven branched rays, its origin posterior to the pelvic-fin origin, and closer to the caudal-fin base than tip of the snout. Pectoral fin



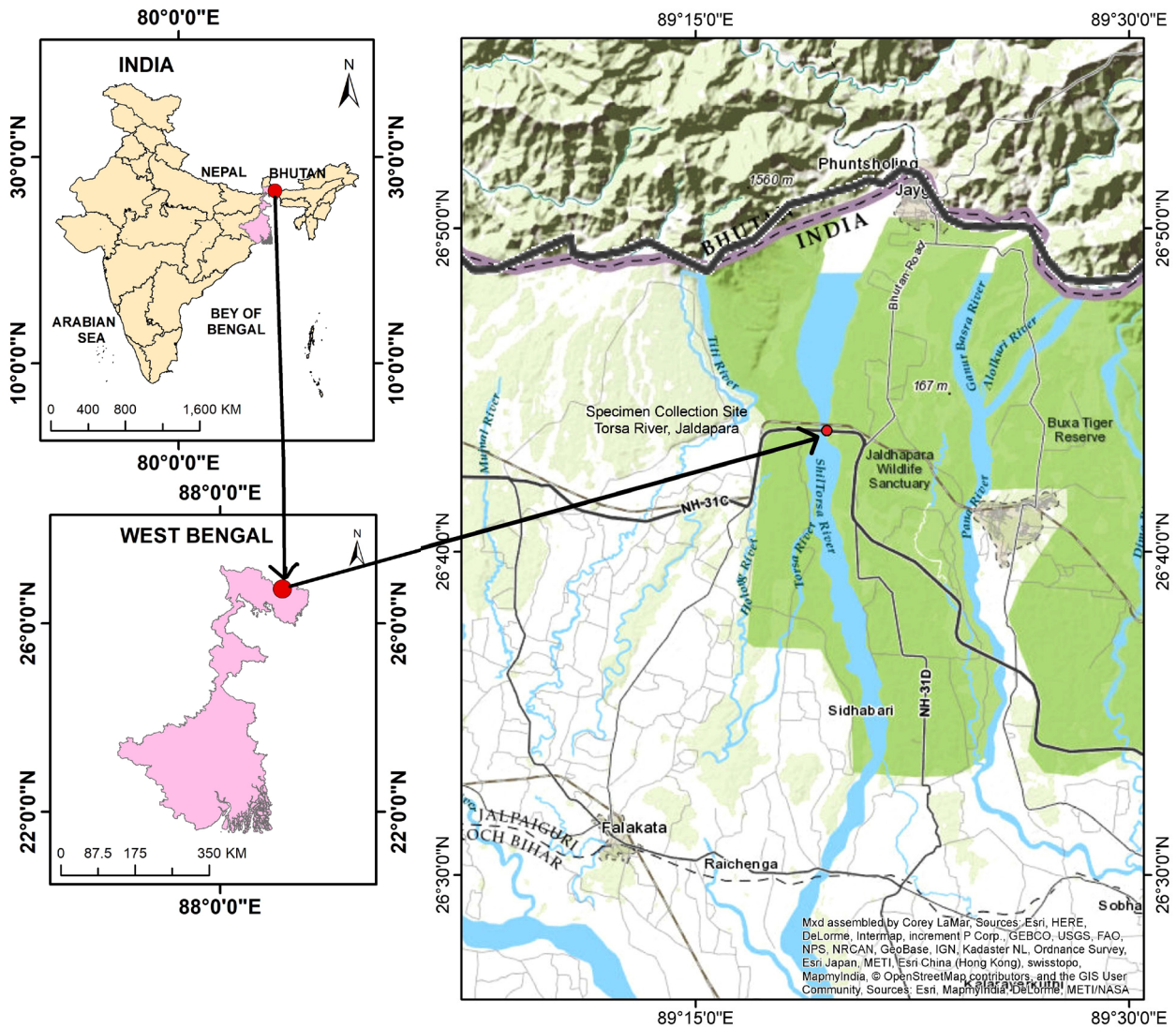


Figure 1. Type locality of *Barilius torsai* sp. nov. indicated in red.

with two simple and 11 branched rays, not reaching the pelvic-fin base, notched after third (between third and sixth ray). Pelvic fin with two simple and seven branched rays, its origin closer to the anal-fin than pectoral-fin origin, posterior tip not reaching anus/anal fin origin, muscular pad at base present. Anal fin with two simple and eight branched rays, its origin just below base of the last dorsal fin ray. Caudal fin deeply forked, lobes equal, with 17 principal rays. Scales cycloid and small. Lateral line complete, slightly curved, running along lower half of the body and passing almost through middle of the caudal base, with 52–53 scales in the lateral-line row up to the end of the caudal base. Scales in transverse line on body 11/1/5 between dorsal fin origin and pelvic fin base. 29 pre-dorsal scales.

**Colour**

In live and fresh specimens, dorsum appears greyish, sides and belly silvery. Body with 9–11 blue vertical bars, three to five anterior bars almost reaching lateral line, number of bars on either side of the body unequal. Pectoral, pelvic and anal fin hyaline. Caudal fin hyaline, with black margin on fork edges. Dorsal fin hyaline with dark pigment on rays, concentrated along lower two-third of dorsal-fin rays. In preserved specimens, silvery colouration disappears and all dark pigment in fins and body bar turns black. Dorsum appears black and ventral areas creamy.



Image 1. Holotype of *Barilius torsai* sp. nov. (ZSI FF5542; 71.41mm SL): A—lateral view | B—dorsal view. © Sujit Choudhury, ICAR-CIFRI, Barrackpore.



Image 2. Torsa River, Jaldapara, West Bengal, habitat of *Barilius torsai* sp. nov. © Sanjoy Kumar Das, ICAR-CIFRI, Barrackpore.

### Etymology

The specific name refers to the Torsa, type locality of the species, and a tributary of the Brahmaputra River System. An adjective.

### Distribution

Presently known only from the Torsa River in West Bengal, India (Figure 1, Image 2).

### DISCUSSION

Fifteen species of bariline fish are found in the Brahmaputra basin, and the larger northeastern Indian region. They are *Barilius vagra* (Hamilton, 1822); *B. barila* (Hamilton, 1822); *Opsarius arunachalensis* (Nath et al., 2010); *O. bendelisis* (Hamilton, 1807); *O. howesi* (Barman, 1986); *O. lairokensis* (Arunkumar & T. Singh, 2000); *O. profundus* (Mayanglambam & Vishwanath, 2012); *O. radiolatus* (Gunther, 1868); *O. Shacra* (Hamilton, 1822); *O. barna* (Hamilton, 1822); *O. chatricensis* (Selim & Vishwanath, 2002); *O. dimorphicus* (Tilak & Husain, 1990); *O. dogarsinghi* (Hora, 1921); *O. ngawa* (Vishwanath & Manojkumar, 2002), and *O. tileo* (Hamilton, 1822). *Barilius torsai* sp. nov. is a member of *Barilius*. It can be distinguished from members of *Opsarius* sensu Howes (1980; 1983) in having a shallow body (vs. deep), two pairs of barbels (vs. a single pair or absent), elongated pelvic axial scales (vs. lobate or fleshy), and absence of parallel rows of tubercles on the dentary (vs. presence). *Barilius torsai* can be distinguished from all other congeners by the presence of notched pectoral fin, and from its northeastern Indian congeners by the presence of a complete lateral line with 52–53 scales, greater number of pre-dorsal scales and

Table 1. Morphometric data of *Barilius torsai* sp. nov.

Parameter	Holotype	Paratype(s)
Standard length (SL; mm)	71.41	71.46–74.56
% SL		
Body depth at dorsal-fin origin	23.89	22.17–23.61
Body depth at anal-fin origin	17.74	17.79–18.24
Head length (HL)	26.58	26.66–26.84
Caudal-peduncle length	18.34	15.77–18.24
Caudal-peduncle depth	10.05	10.12–10.68
Pre-dorsal length	55.16	55.19–55.30
Pre-pelvic length	48.34	47.25–47.98
Pre-anus length	68.97	64.67–68.06
Pre-anal length	70.55	66.87–70.47
Dorsal-fin base length	13.98	13.99–14.48
Anal-fin base length	12.03	12.33–13.41
Dorsal-fin height	18.75	18.78–19.54
Pelvic-fin length	12.81	13.00–13.29
Anal fin height	14.33	14.30–14.31
Pectoral-fin length	18.13	17.18–18.10
Caudal-fin length	23.02	23.43–24.14
Body width at anal-fin origin	9.94	9.54–9.89
Body width at dorsal-fin origin	11.47	11.47–12.82
% HL		
Snout length	29.19	23.64–28.69
Interorbital width	31.51	29.69–31.03
Eye orbit diameter	23.5	23.78–25.59
Mouth gape width	20.02	21.11–28.04
Head-depth at eye	56.95	58.13–66.27
Head-depth at nape	67.12	68.96–73.06
Maximum head width	47.26	47.24–47.36
Head-width at eye	44.89	44.86–44.91
Maxillary barbel length	22.23	22.65–25.94
Rostral barbel length	23.97	23.99–29.74

hyaline dorsal fin with dark pigment concentrated along lower two-third of the dorsal-fin rays and lesser body depth at dorsal-fin origin except *B. barila*, *O. shacra*, *O. bendelisis*, *O. chatricensis* (Table 2). *Barilius torsai* further differs from species of *B. vagra* and *B. barila* in having greater number of predorsal scales (29 vs. 21–22 in *B. vagra* and 22 in *B. barila*), lateral line scales (52–53 vs. 40–45 in *B. vagra* and *B. barila*) and lesser number of branched pectoral fin rays (11 vs. 14–15 in *B. vagra* and 12 in *B. barila*).

In comparison to the species currently included within *Opsarius* sensu Howes (1980; 1983) *Barilius torsai* is similar to *O. shacra* and *O. arunachalensis* in its dorsal

and anal fin ray counts, but differs from *O. shacra* in having lesser number of lateral line scales (52–53 vs. 59–70), greater number of pre-dorsal scales (29 vs. 22–25), branched pectoral fin rays (11 vs. 14) and the dorsal fin with dark pigment along lower the two-third margin (vs. upper third). It differs from *O. arunachalensis* in having a greater body depth at dorsal-fin origin (22.17–23.89% SL vs. 20.21–20.83% SL), greater number of lateral line scales (52–53 vs. 40–45) and presence (vs. absence) of barbels and vertical bars on body.

*Barilius torsai* differs from *O. profundus* and *O. lairokensis* in having lesser body depth (22.17–23.89% SL vs. 32.1–37.4% SL in *O. profundus* and 25.54% SL in *O. lairokensis*), greater number of lateral line scales (52–53 vs. 30–35 in *O. profundus* and 41–44 in *O. lairokensis*) and greater number of predorsal scales (29 vs. 17–18 in *O. profundus* and 21 in *O. lairokensis*). *Barilius torsai* further differs from *O. bendelisis*, *O. howesi* and *O. radiolatus* in having greater number of predorsal scales (29 vs. 18–20 in *O. bendelisis*, 17–18 in *O. howesi* and 24–25 in *O. radiolatus*), lateral line scales (52–53 vs. 39–46 in *O. bendelisis*, 42–43 in *O. howesi* and 56–62 in *O. radiolatus*) and lesser number of branched pectoral fin rays (11 vs. 14 in *O. bendelisis*, 13 in *O. howesi* and 16 in *O. radiolatus*).

*Barilius torsai* differs from *O. barna*, *O. chatricensis*, *O. dimorphicus*, *O. dogarsinghi*, *O. ngawa*, and *O. tileo* in having greater number of predorsal scales (29 vs. 15–16 in *O. barna*, 15 in *O. chatricensis*, 25–27 in *O. dimorphicus*, 20 in *O. dogarsinghi*, 21–22 in *O. ngawa*, and 28 in *O. tileo*), lateral line scales (52–53 vs. 36–42 in *O. barna*, 38 in *O. chatricensis*, 60–66 in *O. dimorphicus*, 37–40 in *O. dogarsinghi*, 40–43 in *O. ngawa*, and 59+4 in *O. tileo*) and lesser number of branched anal fin rays (8 vs. 10–11 in *O. barna*, *O. dimorphicus* and *O. ngawa*, 10 in *O. chatricensis* and *O. tileo*, and 9 in *O. dogarsinghi*).

A new species of *Barilius* adds to our understanding of the diversity of freshwater fishes of the Torsa River and the eastern Himalayan ecoregion. New discoveries such as this also shows that our understanding of diversity and conservation of freshwater fishes of this region needs to be improved and more exploratory surveys are required.

#### Comparative material

*Barilius barila*: ZSI 54500, 85.31mm SL, Jammu, India; ZSI F2549/2, 51.71mm SL, Belsari River (tributary of Brahmaputra River), Assam, India; ZSI F4307/2, 51.79–84.80 mm SL, Barak River, Karong, Manipur, India; MUMF 5049, 5051, 83.22–89.53 mm SL, Khuga River, Churchandpur, Manipur, India.



**Table 2.** Comparative measurements of body depth, vertical bars on body and meristic counts of *Barilius torsai* sp. nov. with related species of *Barilius* and *Opsarius*.

Species	Body depth (% SL; mm)	Barbels (in pair)	Lateral line scales	Pre-dorsal scales	Vertical bars on body	Anal fin branched rays	Pectoral fin branched rays
<i>B. torsai</i>	22.17–23.89	2	52–53	29	9–11	8	11
<i>B. vagra</i>	25.22–26.71	2	40–45	21–22	10–14	10–12	14–15
<i>B. barila</i>	23.42–24.1	2	40–45	22	14–15	10–11	12
<i>O. shacra</i>	22.24–23.23	2	59–70	22–25	12–13	8	14
<i>O. bendelisis</i>	22.12–26.13	2	39–46	18–20	8–12	7–8	14
<i>O. profundus</i>	32.1–37.4	2	30–35	17–18	7–10	10 1/2	11
<i>O. howesi</i>	30.03–31.73	2	42–43	17–18	14–15	7–8	13
<i>O. radiolatus</i>	-	2	56–62	24–25	Absent	10–11	16
<i>O. lairokensis</i>	25.54	2	41–44	21	14–16	11	13
<i>O. arunachalensis</i>	20.21–20.83	0	40–45	21	Absent	8	11
<i>O. barna</i>	29.0–30.8	0	36–42	15–16	9–11	10–11	12
<i>O. chatricensis</i>	23.2	0	38	15	7–8	10	11
<i>O. dimorphicus</i>	24.9–28.8	1	60–66	25–27	Sopts	10–11	12–13
<i>O. dogarsinghi</i>	24.8–30.0	2	37–40	20	8–9	9	12
<i>O. ngawa</i>	24.8–28.3	2	40–43	21–22	13–14	10–11	12–13
<i>O. tileo</i>	29.9	1	59–4	28	Spots	10	13

*Barilius vagra*: MUMF Uncat, 41.67–55.69 mm SL, Arunachal Pradesh, India.

*Opsarius arunachalensis*: APFS/ZSI/P-502, P-503, 110–140 mm SL, Agari River mouth, Pasighat, East Siang District, Arunachal Pradesh, India.

*Opsarius barna*: MUMF 27061–27064, 73.1–83.21 mm SL, Dikrong River, Arunachal Pradesh, India.

*Opsarius bendelisis*: ZSI FF1357, 79.71mm SL, Cauvery River, India; ZSI FF4269, 120mm SL, Torsa River, Cooch Behar, northern Bengal, India; ZSI FF4270, 37.21–78.34 mm SL, Lataguri, Jalpaiguri District, northern Bengal, India.

*Opsarius chatricensis*: MUMF 503/1 (holotype), 86.43mm SL, Chatrickong River, 150km from Imphal, Ukhrul District, Manipur, India. Additional data from Selim & Vishwanath (2002).

*Opsarius dimorphicus*: Data from Tilak & Husain (1990).

*Opsarius dogarsinghi*: MUMF 207–210, 52.89–72.26 mm SL, Chakpi Stream, Manipur, India.

*Opsarius howesi*: ZSI FF2235, FF2236 61–70 mm SL, Jalpaiguri District, northern Bengal, India.

*Opsarius lairokensis*: MUMF 27075, 108.45mm SL, Moreh Bazar, Moreh, Chandel District, Manipur, India.

*Opsarius ngawa*: MUMF 149 (holotype), 96.56mm SL, Sherou River (tributary of Manipur river), 83km south of Imphal, Manipur, India; MUMF 27056–27058, 80.1–82.96 mm SL, Singda, Manipur, India.

*Opsarius profundus*: MUMF 27001 (holotype), 71.21mm SL, Koladyne River, Kolchaw, Lawntlai District, Mizoram, India.

*Opsarius radiolatus*: Data from Gunther (1868) and Nath et al. (2010).

*Opsarius shacra*: ZSI F12269, 51.15mm SL, Tribeni, Nepal; ZSI F13405/1, 38.78–73.19 mm SL, Teesta River drainage, Kalimpong Duars & Siliguri Terai, West Bengal, India; CIFRI F10001, 72.53–73.91 mm SL; Siang River, Pasighat, East Siang District, Arunachal Pradesh, India.

*Opsarius tileo*: MUMF 27076, 128.16mm SL, Umtrao River, Byrnihat, Norbong, Ribhoi District, Meghalaya, India.

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Supplementary 1. Biometric data of *Barilius torsai* sp. nov.

Measurements	Holotype	Paratype (s)									
	ZSI FF5542	ZSI FF5543	CIFRI F10003	CIFRI F10004	CIFRI F10005	CIFRI F10006	CIFRI F10007	CIFRI F10008	CIFRI F10009	CIFRI F10010	CIFRI F10011
Standard length (mm)	71.41	74.56	71.46	71.67	71.89	72.15	72.17	72.98	73.17	74.23	71.46
Body depth at dorsal-fin origin	17.06	16.53	16.07	16.92	16.95	17.03	16.6	16.59	16.58	16.59	16.04
Body depth at anal-fin origin	12.67	13.6	12.71	12.91	12.81	12.89	12.97	12.99	13.1	13.4	12.98
Head length (HL)	18.98	20.01	19.1	19.17	19.21	19.24	19.31	19.51	19.57	19.89	19.18
Caudal-peduncle length	13.1	11.76	12.96	12.91	13.07	12.46	12.49	12.79	12.87	13.54	12.89
Caudal-peduncle depth	7.18	7.96	7.62	7.39	7.28	7.33	7.34	7.57	7.66	7.56	7.26
Pre-dorsal length	39.39	41.23	39.48	39.57	39.73	39.87	39.88	40.33	40.41	41.02	39.44
Pre-pelvic length	34.52	35.23	34.12	34.17	34.12	34.56	34.19	34.65	34.67	35.17	34.29
Pre-anus length	49.25	48.22	48.23	48.27	48.93	49.11	48.63	48.72	48.57	49.19	48.64
Pre-anal length	50.38	49.86	49.89	49.79	49.32	50.39	49.89	49.87	49.98	50.84	50.36
Dorsal-fin base length	9.98	10.8	10.01	10.17	10.06	10.2	10.43	10.31	10.27	10.53	10.02
Anal-fin base length	8.59	10	8.91	8.97	8.87	9.27	9.37	9.67	9.81	9.92	8.95
Dorsal-fin height	13.39	14.57	13.57	13.78	13.5	13.67	13.58	13.89	14.2	14.46	13.58
Pelvic-fin length	9.15	9.91	9.29	9.42	9.47	9.39	9.43	9.57	9.71	9.79	9.34
Anal-fin height	10.23	10.67	10.22	10.25	10.28	10.32	10.32	10.44	10.47	10.62	10.22
Pectoral-fin length	12.95	12.81	12.35	12.81	13.01	12.84	12.79	12.91	12.88	12.87	12.4
Cauda- fin length	16.44	18	16.74	16.83	16.97	17.31	17.29	17.57	17.54	17.88	16.94
Body width at anal-fin origin	7.1	7.11	6.99	6.98	6.95	6.97	6.98	6.97	7.01	7.34	7
Body width at dorsal-fin origin	8.19	9.56	8.2	8.89	8.39	8.78	9.14	9.27	8.74	9.5	8.25
Snout length	5.54	4.73	4.87	4.77	4.78	4.79	4.76	5.6	4.98	5.53	5.5
Interorbital distance	5.98	5.94	5.78	5.7	5.96	5.78	5.89	5.86	5.91	5.91	5.82
Eye orbit diameter	4.46	5.12	4.68	4.56	4.72	4.65	4.9	4.65	4.98	4.97	4.9
Mouth gape width	3.8	5.61	4.04	4.21	4.73	5.17	5.35	5.28	5.38	5.47	4.05
Head depth at eye	10.81	13.26	12.31	12.15	11.17	12.37	11.23	11.35	12.31	11.94	11.24
Head depth at nape	12.74	14.62	13.69	13.52	13.25	13.42	14.02	14.13	13.79	13.72	13.7
Maximum head width	8.97	9.46	9.03	9.08	9.08	9.09	9.146	9.24	9.25	9.4	9.06
Head width at eye	8.52	8.98	8.57	8.61	8.62	8.64	8.67	8.76	8.78	8.93	8.61
Maxillary barbel length	4.22	5.19	4.33	4.97	4.69	4.74	5.01	5.02	4.98	5.11	4.35
Rostral barbel length	4.55	5.95	4.59	4.6	4.7	5.12	5.32	4.79	4.89	5.39	4.62



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