

**REDESCRIPTION OF *NEOLISSOCHILUS DUKAI* DAY 1878 (CYPRINIFORMES: CYPRINIDAE)
FROM TEESTA RIVER, DARJEELING, WEST BENGAL**

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ABSTRACT

Neolissochilus dukai was redescribed based the collections from the type locality of Teesta River, Darjeeling, West Bengal as it was synonymised with *Neolissochilus hexagonolepis*. The topotypes showed exactly similar in the meristic and morphometric characters as per the original description.

KEY WORDS: Redescription, *Neolissochilus dukai*, topotype.

INTRODUCTION

Neolissochilus (*Barbus* =) *dukai* was described by Day (1868) from Teesta River, Darjeeling, West Bengal and since its description no further reports were available from the type locality. Hence it is synonymised with *Neolissochilus hexagonolepis* (Talwar and Jhingran, 1991; Menon, 1999). However, recently its occurrence as *Puntius* (= *Neolissochilus*) *dukai* from East Ramganga River in undivided state of Uttar Pradesh (Joshi and Joshi, 1996) was reported and the specimens were not traceable in National Bureau of Fish Genetic Resources, Lucknow. Based on this, IUCN Red list reported the distribution range of this species outside its type locality (Devi and Boguskaya, 2009). Shaw and Shebbeare (1937) reported *Barbus* (= *Lissochilus*) *dukai* from Bengal and also there was a collection by Herre (1937) from Darjeeling (Khaironizam *et al.*, 2015). Also another report on the fishes of Teesta River, West Bengal (Paul *et al.*, 2009) documented the occurrence of *Neolissochilus hexagonolepis* but not *N. dukai*. The topotypes collected from Teesta River, near Darjeeling showed much similarities with the description of Day (1878) and here in we redescribe *Neolissochilus dukai* Day 1878.

MATERIALS AND METHODS

Fish collections were made between 1996-2011 led by M. Arunachalam at river sites Measurements were made point to point using digital calipers. Methods used for the meristic and morphometric data are based on Hubbs and Lagler (1964). Morphometric characters from 18 to 31 are the additional truss measurements (Strauss and Bookstein, 1982). We also provide one meristic character, pre-anal scales (Jayaram, 1991) which are the scales from the anus to the isthmus. Additionally the character of total length is included in order to compare from the earlier workers and they also use this character for diagnosis. Body measurements are expressed as percentage of Standard Length (%SL); head measurements are expressed as percentage of Head Length (%HL).

Comparative materials: *Barbus stracheyi*: Day, 1871 ZSI F 2175.

Barbus compressus: Day, 1869 ZSI F 5513.

Barbus dukai: Day, 1878 ZSI F 2388, 1, 103.9 mm SL.

Neolissochilus dukai: CMA 220, 3, 83.65-158.18 mm SL, Teesta River at Savoke, Othlavari, Darjeeling District, M. Arunachalam and team, 27 November 2012.

Barbus blythii: 1869 ZSI F5553, 1, 46.37 mm SL.

Neolissochilus wynaadensis: (Day), CMA 345, 4, 78.09-114.24 mm SL, M. Arunachalam, P. Sivakumar, M. Muralidharan, and J.A. Johnson, 17 September 2001. - CMA 347, 3, 106.29-109.28 mm SL, from the same locality, B. Madhusoodana Kurup, Cochin University of Science and Technology, 12 June 2000. - MSUMNH196, 1, 106.1 mm SL, Abby falls, Cauvery River basin, Karnataka, M. Arunachalam and team, 22 March 2004. - CMA175, 4, 87.97-105.22 mm SL, Abby falls, Karnataka, M. Arunachalam and team, 22 March 2004. - ZSI/WRC Kozhikode F6868, 3, 85.9-108.6 mm SL, Vattapoi, Wynaad, Kerala, P.M. Sureshan, 02 March 1994. - CMA346, 1, 205.2, mm SL, Abby falls, Karnataka, M. Arunachalam and team, 22 March 2004.

Neolissochilus hexagonolepis (McClelland, 1839)

ZSI/SRS F 7088, (Fig. 2B), 3, 185.95-285.75 mm SL, Tadi River in the mid hill of Nepal, D.B. Swar, June 2002. - CMA 217, 4, 207.55-317.11mm SL, Pasighat market, Arunachal Pradesh, M. Arunachalam and team, 13 November 2010. - CMA 218, 4, 137.84-233.73 mm SL, Ranga River at Beetapul colony, Arunachal Pradesh, M. Arunachalam and team, 17 June 2011. - CMA 219, 4, 138.86-238.88 mm SL, Arunachal Pradesh, M. Arunachalam and team, 1 December 2011.

Neolissochilus capudelphinus Arunachalam, Sivakumar and Murugan, 2017

Paratypes: MSUMNH191, 1, 216.21 mm SL; CMA170, 23, 129.8-163.04 mm SL, upstream of the diverted water from Periyar River, 12 km from the town of Cumbum, Tamil Nadu (9°37'59.3"N, 77°11'52.8"E), and also from another location in a newly constructed dam called Shanmughanadhi Reservoir, Tamil Nadu (9°43'41.7"N, 77°21'31.2"E), M. Arunachalam and team, 16 March 2003.

Neolissochilus minimus Arunachalam, Sivakumar and Murugan, 2017

Paratypes; MSUMNH192, 1, 127.34 mm SL; CMA 171, 12, 69.45-126.14 mm SL; from the diverted water of Periyar River in the forest reserves of Cumbam Valley (9°37'59.3"N, 77°11'52.8"E) at an altitude of 455 m, M. Arunachalam and team, 03 March 2003.

Neolissochilus microphthalmus Arunachalam, Sivakumar and Murugan, 2017

Paratypes: MSUMNH193, 1, 163.72 mm SL; CMA172, 10, 63.49-160.80 mm SL; Ambayathode in the forest reserves in the Kannur District, Kerala, M. Arunachalam and team, 09 February 2003.

Neolissochilus acutirostris Arunachalam, Sivakumar and Murugan, 2017

Paratypes: MSUMNH194, 1, 160.17 mm SL; CMA173, 18, 44.31-206.34 mm SL; Abby falls (11°40'38.2"N, 75°43'8.0"E; altitude, 963 m), a stream in the Cauvery River drainage in Kodagu District, Karnataka, M. Arunachalam and team, 22 March 2004.

Neolissochilus tamiraparaniensis Arunachalam, Sivakumar and Murugan, 2017

Paratypes: ZSI/SRS F 7090, 4, 108.7-166.30 mm SL; MSUMNH195, 1, 246.56 mm SL; CMA174, 34, 63.09-238.24 mm SL; Gadana River of Tamiraparani River basin (east flowing in southern Tamil Nadu, 08°47'59.3"N, 77°11'18.0.11"E), M. Arunachalam and team, 24 February 2004.

Abbreviations: ZSI, Zoological Survey of India, Kolkatta

ZSI/WRC, Zoological Survey of India, Wester Regional Station, Kozhikode, Kerala.

ZSI/SRS, Zoological Survey of India, Southern Regional Station, Chennai, Tamil Nadu.

MSUMNH, Manonmaniam Sundaranar University Museum of Natural History, Alwarkurichi, Tamil Nadu.

CMA, Collection of M.Arunachalam

RESULTS***Neolissochilus dukai* (Day 1878)**

(Figs. 1A; Tables 1, 2).

Neolissochilus dukai is distinguished from *N. hexagonolepis* by having less branched pectoral fin rays (14 vs. 15-17), less upper transverse scale rows (3.5 vs. 5), and less lateral line to pelvic scale rows (2.5 vs. 4) and morphometric characters of occiput to dorsal-fin origin (25.83-26.29 vs. 28.76-33.00 %SL), post-dorsal length (53.50-57.66 vs. 48.50-51.91 %SL), snout to opercle (66.72-72.10 vs. 93.28-96.43 %HL), inter-orbital width (34.17-36.98 vs. 37.64-46.16 %HL), head width (49.93-53.94 vs. 57.07-66.23 %HL), head depth at pupil (23.79-32.60 vs. 50.60-59.60 %HL) and head depth at occiput (35.16-39.51 vs. 72.25-80.39 %HL), long maxillary barbel (49.67-52.68 vs. 25.25-33.20 %HL) and long rostral barbel (69.52-74.09 vs. 18.48-25.62 %HL).

It is distinguished from *N. wynaadensis* by having strong dorsal spine (vs. weak), less lower transverse scale rows (3.5 vs. 5-6), and less lateral line to pelvic scale rows (2.5 vs. 4), less pre-anal scale rows (23 vs. 25-26) and morphometric characters of body depth (26.73-28.97 vs. 22.83-25.40 %SL), post-dorsal length (53.50-57.66 vs. 33.12-39.28 %SL), dorsal-spinous height (17.39-20.59 vs. 13.90-16.62 %SL), occiput to pectoral-fin insertion (21.28-21.56 vs. 16.19-19.15 %SL) and occiput to pelvic-fin insertion (38.79-41.17 vs. 34.96-36.57 %SL), head depth at pupil (23.79-32.60 vs. 51.16-65.25 %HL), long maxillary barbel (49.67-52.68 vs. 23.86-29.09 %HL) and long rostral barbel (69.52-74.09 vs. 16.72-22.55 %HL).

It is distinguished from *N. capudelphinus* by having strong dorsal spine (vs. weak), less upper transverse scale rows (3.5 vs. 6), and less lateral line to pelvic scale rows (2.5 vs. 5), less lower transverse scale rows (3.5 vs. 5-6), less lateral-line scales (28 vs. 30-32), less pre-dorsal scales (9-10 vs. 11-12), less circumpeduncular scale rows (12 vs. 14), less circumferential scale rows (18 vs. 24) and morphometric characters of snout length (32.76-35.33 vs. 36.24-61.50 %HL), snout to opercle (66.72-72.10 vs. 59.15-66.35 %HL), inter-orbital width (34.17-36.98 vs. 42.35-65.22 %HL), head width (49.93-53.94 vs. 70.84-88.34 %HL), head depth at nostril (30.29-39.91 vs. 41.95-59.66 %HL), head depth at pupil (23.79-32.60 vs. 68.35-82.00 %HL) and head depth at occiput (35.16-39.51 vs. 80.80-98.77 %HL), long maxillary barbel (49.67-52.68 vs. 20.26-31.79 %HL), long rostral barbel (69.52-74.09 vs. 14.80-26.74 %HL), post-dorsal length (53.50-57.66 vs. 32.28-35.17 %SL), pre-anal length (72.30-75.71 vs. 76.22-79.97 %SL) and pre-pectoral length (26.79-28.71 vs. 20.17-24.98 %SL).

It is distinguished from *N. minimus* by having strong dorsal spine (vs. weak), less upper transverse scale rows (3.5 vs. 5-6) and less lower transverse scale rows (3.5 vs. 6), and less lateral line to pelvic scale rows (2.5 vs. 4-5), less pre-dorsal scales (9-10 vs. 11-13), less circumpeduncular scale rows (12 vs. 14), less circumferential scale rows (18 vs. 23-24), less pre-anal scale rows (23 vs. 26-28) and morphometric characters of inter-orbital width (34.17-36.98 vs. 25.22-32.20 %HL), head depth at nostril (30.29-39.91 vs. 65.73-73.95 %HL), head depth at pupil (23.79-32.60 vs. 36.07-75.08 %HL) and head depth at occiput (35.16-39.51 vs. 60.97-72.13 %HL), long maxillary barbel (49.67-52.68 vs. 26.28-37.14 %HL), long rostral barbel (69.52-74.09 vs. 22.01-34.28 %HL), post-dorsal length (53.50-57.66 vs. 30.04-37.76 %SL) and pre-pectoral length (26.79-28.71 vs. 38.16-50.38 %SL).

It is distinguished from *N. microphthalmus* by having strong dorsal spine (vs. weak), less upper transverse scale rows (3.5 vs. 4-5), less lower transverse scale rows (3.5 vs. 5), less lateral line to pelvic scale rows (2.5 vs. 4), less pre-dorsal scales (9-10 vs. 11-13), more pre-anal scale rows (23 vs. 20-22) and morphometric characters of head width (49.93-53.94 vs. 55.28-75.39 %HL), head depth at pupil (23.79-32.60 vs. 46.69-68.00 %HL), and head depth at occiput (35.16-39.51 vs. 65.35-81.22 %HL), long maxillary barbel (49.67-52.68 vs. 19.41-28.65 %HL), long rostral barbel (69.52-74.09 vs. 13.68-25.93 %HL), post-dorsal length (53.50-57.66 vs. 30.96-36.87 %SL), pectoral-fin insertion to anal-fin origin (43.89-46.93 vs. 48.62-53.24 %SL) and dorsal-fin origin to pectoral-fin insertion (28.01-28.73 vs. 30.06-34.73 %SL).

It is distinguished from *N. acutirostris* by having strong dorsal spine (vs. weak) and less upper transverse scale rows (3.5 vs. 5), and less lateral line to pelvic scale rows (2.5 vs. 4), less lateral line scales (28 vs. 29-32), less circumferential scale rows (18 vs. 20), less transverse breast scale rows (7 vs. 9), pre-anal scale rows (23 vs. 27-28) morphometric characters of head depth at pupil (23.79-32.60 vs. 45.88-61.42 %HL) and head depth at occiput (35.16-39.51 vs. 62.13-81.93 %HL), long maxillary barbel (49.67-52.68 vs. 18.20-26.85 %HL), long rostral barbel (69.52-74.09 vs. 10.99-22.33 %HL), post-dorsal length (53.50-57.66 vs. 30.38-33.88 %SL), occiput to dorsal-fin origin (25.83-26.29 vs. 26.83-30.37 %SL) and pelvic-axillary scale length (7.79-9.05 vs. 5.21-7.12 %SL).

It is distinguished from *N. tamiraparamiensis* by having strong dorsal spine (vs. weak), less upper transverse scale rows (3.5 vs. 5-6), less lateral line to pelvic scale rows (2.5 vs. 4-5), less pre-dorsal scales (9-10 vs. 11-12), less circumferential scale rows (18 vs. 20-22) and morphometric characters of head width (49.93-53.94 vs. 54.95-88.24 %HL), head depth at pupil (23.79-32.60 vs. 57.23-92.77 %HL), and head depth at occiput (35.16-39.51 vs. 75.84-85.12 %HL), long rostral barbel (69.52-74.09 vs. 40.20-51.69 %HL), depth of caudal peduncle (10.70-12.20 vs. 15.12-21.38 %SL), post-dorsal length (53.50-57.66 vs. 29.17-42.80 %SL), pectoral-fin insertion to anal-fin origin (43.89-46.93 vs. 49.70-63.49 %SL) and distance from pectoral-fin to vent (45.61-48.32 vs. 17.57-28.23 %SL).

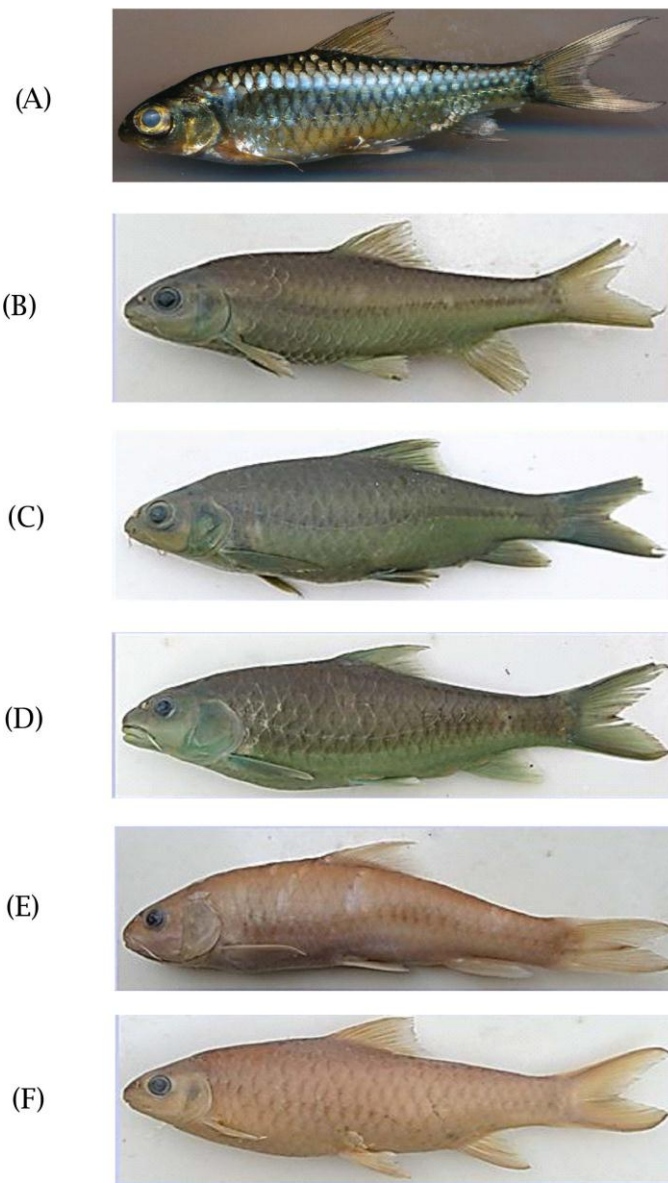


Figure 1. (A) Preserved specimen of *Neolissochilus dukai* CMA 220, 3, 83.65-158.18 mm SL, Darjeeling (D.K) Teesta River Savoke, Othlavari, M. Arunachalam and team, 27 November 2012, (B) Preserved specimen of *Neolissochilus capudelphinus* CMA170, 138.42 mm SL, upstream of the diverted water from Periyar River, M. Arunachalam and team 16 March 2003, (C) *Neolissochilus minimus*. CMA171, 126.14 mm SL, from the diverted water of Periyar River in the forest reserves of Cumbam Valley, M. Arunachalam and team, 03 March 2003, (D) *Neolissochilus microphthalmus*. CMA172, 160.98 mm SL, Ambayathode in the forest reserves in the Kannur District, Kerala, M. Arunachalam and team, 09 February 2003, (E) *Neolissochilus acutirostris*. CMA173, 206.34 mm SL, Abby falls, a stream in the Cauvery River drainage in Kodagu District, Karnataka, M. Arunachalam and team, 22 March 2004 and (F) *Neolissochilus tamiraparaniensis*. CMA174, 160.80 mm SL, Gadana River of Tamiraparani River basin (east flowing in southern Tamil Nadu), M. Arunachalam and team, 24 February 2004. (figures 1B-F were reproduced after obtaining permission from the Editor, FISHTAXA, 2017, Arunachalam et. al. volume 2: p. 12, Figure 4A-E).

Table 1. Morphometric characters variation in *Neolissochilus dukai*, *N. hexagonolepis*, *N. wynaadensis*, *N. capudelphinus*, *N. minimus*, *N. microphthalmus*, *N. acutirostris* and *N. tamiraparaniensis*. Body character measurements are represented as % standard length and head character measurements are represented as % head length.

Measurements from point to point	<i>N. dukai</i>	<i>N. hexagonolepis</i>	<i>N. wynaadensis</i>	<i>N. capudelphinus</i>	<i>N. minimus</i>	<i>N. microphthalmus</i>	<i>N. acutirostris</i>	<i>N. tamiraparaniensis</i>
	CMA 220 n=3	ZSI/SRS F 7088 CMA 219 n=4	MSUMNH 196. - CMA 175 n=5	ZSI/SRS F 7152.- MSUMNH 191. -CMA 170. n=6	ZSI/SRS F 7155. - MSUMNH 192. - CMA 171. n=14	ZSI/SRS F 7153. - MSUMNH 193. - CMA 172 n=12	ZSI/SRS F 7152. - MSUMNH 194. -CMA 173. n=6	ZSI/SRS F 7089, 7090- MSUMNH 195. - CMA 174. n=40
Standard length (mm)	83.65-158.18	209.86-238.88	87.97-106.1	129.8-230.74	69.45-128.92	63.49-173.2	44.31-225.75	63.09-246.56
% of Standard Length								
Snout to urocentrum	95.53-96.23	96.81-98.45	91.83-94.04	90.20-93.66	91.05-94.71	90.09-94.83	92.18-95.85	91.02-96.14
Pre- anal length	72.30-75.71	73.70-78.13	73.54-78.15	76.22-79.97	73.61-85.36	72.78-78.39	73.05-80.18	73.70-83.53
Pre- dorsal length	46.61-48.33	46.21-49.85	48.19-51.67	47.81-51.37	65.20-74.60	47.31-52.90	47.50-51.48	47.06-56.15
Pre- pelvic length	49.66-51.65	48.64-51.60	51.31-56.22	50.45-52.19	47.55-55.63	48.33-54.51	51.39-54.28	49.95-58.79
Pre- pectoral length	26.79-28.71	21.22-23.10	24.88-32.16	20.17-24.98	38.16-50.28	23.61-29.18	23.74-30.74	19.53-32.64
Caudal peduncle length	14.82-15.85	15.46-18.93	13.17-19.32	12.38-16.08	11.13-16.71	12.82-17.43	10.99-13.79	13.11-23.51
Dorsal-fin origin to pelvic-fin insertion	26.22-28.06	24.27-25.70	22.31-25.97	25.07-30.23	11.02-34.81	25.11-30.38	23.18-28.56	23.59-29.00
Dorsal spinous height	17.39-20.59	19.54-25.03	13.90-16.62	14.32-17.25	15.82-27.82	12.63-18.19	11.21-22.25	11.82-24.87
Anal fin height	17.07-19.18	15.94-21.30	15.91-18.41	17.16-20.45	14.80-22.19	16.09-20.16	13.88-21.73	14.46-26.84
Depth of caudal peduncle	10.70-12.20	10.80-11.89	9.41-10.99	9.03-12.80	11.08-19.41	10.13-12.35	9.38-12.34	15.12-21.38
Caudal fin length	30.04-32.53	27.70-32.50	27.39-31.56	29.39-35.37	11.59-41.73	27.03-35.52	25.78-40.37	29.70-35.20
Dorsal fin height	23.13-26.96	22.05-26.86	19.99-24.38	20.22-23.65	21.90-31.40	20.03-25.86	19.60-29.67	20.53-31.90
Pectoral fin length	18.88-20.50	18.46-21.45	16.97-19.88	19.71-21.64	20.63-23.63	18.84-22.63	18.52-23.67	17.88-29.86
Pelvic fin length	17.15-17.74	16.67-19.05	13.87-17.57	18.15-20.12	17.66-21.81	16.31-19.67	16.12-20.23	12.30-25.65
Pelvic axillary scale length	7.79-9.05	6.16-8.03	4.54-7.26	6.63-9.70	5.49-18.43	6.57-9.00	5.21-7.12	8.23-12.23
Occiput to dorsal - fin origin	25.83-26.29	28.76-33.00	24.92-27.30	25.45-29.72	25.36-33.86	24.31-30.41	26.83-30.37	22.72-35.20
Occiput to pectoral- fin insertion	21.28-21.56	20.35-22.01	16.19-19.15	18.47-20.12	18.36-27.23	16.56-22.02	15.12-38.21	17.62-32.12
Occiput to pelvic- fin insertion	38.79-41.17	41.88-45.15	34.96-36.57	36.86-40.15	35.20-43.99	33.28-42.35	36.25-39.21	33.66-46.25
Dorsal-fin insertion to pelvic- fin insertion	22.56-23.75	24.27-25.70	20.89-24.81	24.95-29.83	24.67-37.90	22.94-28.45	22.89-32.31	22.18-32.87
Dorsal-fin origin to pectoral- fin insertion	28.01-28.73	31.49-34.82	28.22-31.28	32.03-37.76	24.69-40.21	30.06-34.73	28.79-34.97	31.75-41.44
Dorsal-fin origin to anal - fin origin	34.67-36.82	35.61-38.75	33.05-36.24	36.79-40.12	33.31-42.15	35.16-37.67	33.18-36.99	33.68-44.43
Dorsal-fin insertion to caudal - fin	34.73-37.21	34.99-40.59	36.97-40.82	36.97-39.65	34.65-40.20	37.26-41.59	34.26-37.55	34.92-45.89
Dorsal-fin insertion to anal - fin insertion	25.92-27.27	25.85-26.07	23.26-26.64	26.62-29.44	24.53-30.01	23.42-27.05	24.15-27.59	25.15-37.13
Dorsal-fin base length	14.05-16.12	13.56-14.77	12.59-16.85	15.45-16.99	14.87-26.24	14.29-18.38	12.81-19.08	13.12-23.05
Anal-fin base length	7.10-7.89	6.85-8.05	5.07-8.94	7.99-11.17	6.65-13.76	7.12-9.86	5.46-13.92	6.64-17.75
Pectoral-fin insertion to pelvic- fin insertion	24.91-26.52	26.78-30.69	24.78-28.17	28.13-31.07	7.33-32.17	24.93-28.30	23.23-28.41	26.40-37.88

Pectoral-fin insertion to anal-fin origin	43.89-46.93	49.19-53.29	48.26-51.65	54.91-57.17	28.02-56.13	48.62-53.24	45.50-52.82	49.70-63.49
Pelvic-fin insertion to anal -fin origin	20.05-20.94	22.52-23.66	22.23-26.03	27.59-29.08	21.95-50.62	21.83-28.22	22.47-27.35	21.68-30.69
Post-dorsal length	53.50-57.66	48.50-51.91	33.12-39.28	32.28-35.17	30.04-37.76	30.90-36.87	30.38-33.88	29.17-42.80
Body depth	26.73-28.97	27.39-28.58	22.83-25.40	24.88-30.41	25.94-34.22	25.19-30.02	22.88-26.96	22.91-34.39
Distance from pectoral -fin to vent	45.61-48.32	49.72-53.77	46.07-53.11	51.86-55.64	45.12-54.73	46.48-53.04	44.88-48.78	17.57-28.23
Distance from pelvic -fin to vent	21.43-24.59	23.23-25.41	20.89-26.37	23.84-27.75	19.25-26.32	18.70-25.21	19.87-28.18	19.69-36.20
Head length (mm)	22.65-42.46	51.60-56.00	25.17-29.54	20.55-25.66	21.07-27.60	24.45-29.11	25.76-29.77	16.77-31.42
% of Head Length								
Snout to opercle	66.72-72.10	93.28-96.43	65.18-69.94	59.15-66.35	61.76-88.30	64.29-68.07	62.09-72.31	58.84-81.63
Snout length	32.76-35.33	32.02-37.79	30.81-40.28	36.24-61.50	29.07-43.53	34.61-44.89	29.71-40.81	32.13-58.87
Upper jaw length	28.10-32.36	27.58-29.64	24.04-34.54	23.69-41.41	26.89-64.99	29.70-37.38	25.75-42.00	24.76-50.20
Pre- nasal length	22.41-24.71	24.13-25.10	20.02-23.65	22.85-34.59	18.97-37.85	19.68-30.91	19.38-25.31	18.05-48.40
Orbit width	19.19-24.18	19.39-20.80	18.30-23.67	16.80-33.21	20.06-42.76	17.21-29.00	17.18-30.17	21.34-42.21
Inter- orbital width	34.17-36.98	37.64-46.16	30.42-38.79	42.35-65.22	25.22-32.20	35.84-64.88	35.46-49.78	34.61-65.20
Inter -nasal width	20.22-22.91	22.11-27.26	16.60-22.34	21.87-30.91	18.28-55.55	18.83-25.62	20.53-24.50	19.84-35.12
Head width	49.93-53.94	57.07-66.23	53.54-60.08	70.84-88.34	42.20-77.30	55.28-75.39	50.47-61.06	54.95-88.24
Gape width	19.69-21.08	24.28-29.41	24.72-40.55	32.96-51.12	26.56-66.36	24.31-38.25	17.97-31.14	24.32-49.71
Lower jaw to isthmus	59.49-61.50	25.79-29.21	51.51-71.25	59.27-68.78	48.20-74.89	59.28-67.77	66.27-72.98	55.49-87.66
Head depth at nostril	30.29-39.91	29.55-35.70	29.16-47.30	41.95-59.66	65.73-73.95	31.50-47.78	28.25-39.08	28.44-62.35
Head depth at pupil	23.79-32.60	50.60-59.60	51.16-65.25	68.35-82.00	36.07-75.08	46.69-68.00	45.88-61.42	57.23-92.77
Head depth at occiput	35.16-39.51	72.25-80.39	65.27-71.75	80.80-98.77	60.97-72.13	65.35-81.22	62.13-81.93	75.84-85.12
Maxillary barbel length	49.67-52.68	25.25-33.20	23.86-29.09	20.26-31.79	26.28-37.14	19.41-28.65	18.20-26.85	45.20-51.51
Rostral barbel length	69.52-74.09	18.48-25.62	16.72-22.55	14.80-26.74	22.01-34.28	13.68-25.93	10.99-22.33	40.20-51.69

Description: Counts and measurements of 3 specimens ranging from 83.6 to 158.18 mm SL. Body elongated and compressed. Dorsal fin commences rather nearer the snout than to the base of the caudal fin, and little in advance of the insertion of the pelvic- fin vertically by a width of 2.5 scales with pre-dorsal length 46.6-48.3 %SL and pre- pelvic length of 49.7-51.7 %SL.

Anal fin distant 72.3-75.7 %SL with distance between the pectoral- fin insertion and anal -fin origin, 43.9-46.9 %SL nearly 1.7 times more than the distance between the pectoral- fin insertion and pelvic- fin insertion, which is 24.9-26.5 %SL. Dorsal and ventral margin convex. Trunk and peduncle compressed, peduncle moderately shallow 10.7-12.2 %SL at its shallowest region, 1.3 times the distance from the anal- fin insertion to caudal fin base, at 3rd lateral- line body scale.

Head long, 22.6-42.4 mm with long cranium of 74.0-79.7 %HL, head depth 35.2-39.5, 49.7-52.7 and 69.5-74.1 %HL at nostril, pupil and occiput respectively. Head width at pre- opercle moderately broad, 49.9-53.9 %HL and inter-orbital width rather convex, 34.2-37.0 %HL. Eyes moderate 19.2-24.2 %HL, sides of the snout and below the eye with large tubercles. Snout long and pointed, 32.8-35.3 %HL and gape width, 19.7-21.1 %HL. Lower jaw keratinous but not sharp. Barbels moderately long and the rostral pairs are slightly longer than the orbit, the maxillary pair almost reaches the angle of the pre-opercle, the maxillary pair from 30.3-39.9 %HL and rostral pair from 23.8-32.6 %HL.

Dorsal fin commences rather nearer to the snout than the base of the caudal fin, and little in advance of the insertion of the ventral by a distance of 2.5 scales. Fin moderately high 23.1-27.0 %SL with a concave distal margin. Last unbranched ray strong and osseous, with its stiff portion as long as the head excluding the snout, the fin is $\frac{3}{4}$ as high as the body below it, having its upper edge very concave. Anal fin deep, 17.1-19.2 %SL. Last unbranched ray longer than third branched ray. Pelvic fin exceeding to two scale rows before vent 17.2-17.7 %SL and first branched ray produced. Distal margin of branched rays nearly straight when fin is erect. Pectoral fin extending to third scale row before pelvic

fin, 18.9-20.5 %SL with tip slightly produced and distal margin nearly straight when fin is erect. Caudal fin moderately forked, 30.0-32.5 %SL with marginal rays of upper lobe longest and slightly more than 2.2 times the length of median rays. Marginal rays of both lobes slightly produced, with fin margin becoming concave at 3rd and 4th branched rays of both lobes and remainder margin nearly straight.

Tuberculation: Sides of snout and below the eye with large tubercles.

Coloration: Leaden tinge along the upper portion of the body, becoming dull white shot with gold on the sides and beneath, edges of scales darkest. Fins yellow, with a dark band having a lighter outer edge along the upper and lower edge of the caudal fin.

Distribution and natural History: India – Teesta River near Darjeeling

Table 2. Meristic characters of *Neolissochilus dukai*, *N. hexagonolepis*, *N. wynaadensis*, *N. capudelpinus*, *N. minimus*, *N. microphthalmus*, *N. acutirostris* and *N. tamiraparaniensis*.

Meristic characters	<i>N. dukai</i>	<i>N. hexagonolepis</i>	<i>N. wynaadensis</i>	<i>N. capudelpinus</i>	<i>N. minimus</i>	<i>N. microphthalmus</i>	<i>N. acutirostris</i>	<i>N. tamiraparaniensis</i>
	CMA 220 n=3	ZSI/SRS F 7088 CMA 219 n=4	MSUMNH 196. - CMA 175 n=5	ZSI/SRS F 7152.- MSUMNH 191. -CMA 170. n=6	ZSI/SRS F 7155. - MSUMNH 192. - CMA 171. n=14	ZSI/SRS F 7153. - MSUMNH 193. - CMA 172 n=12	ZSI/SRS F 7152. - MSUMNH 194. -CMA 173. n=6	ZSI/SRS F 7089, 7090-MSUMNH 195. - CMA 174. n=40
1 Dorsal fin rays	iv.9	iii-iv.9	iv.9	iv.9	iv.9	iv.9	iv.9	iv.9
2 Anal fin rays	iii.5	ii-iii.5	iii.5	iii.5	iii.5	iii.5	iii.5	iii.5
3 Pelvic fin rays	i.8	i.8 -9	i.8	i.8	i.8	i.8	i.8	i.8
4 Pectoral fin rays	i.14	i.15 - 17	i.15	i.13-14	i.13-15	i.14-15	i.15	i.13-15
5 Caudal fin rays	10+9	10+9	10+9	10+9	10+9	10+9	10+9	10+9
6 Upper transverse scale rows	3.5	5	4	6	5-6	4-5	5	5-6
7 Lower transverse scale rows	3.5	4	5-6	6	6	5	5-6	5-6
8 Lateral- line to pelvic scale rows	2.5	4	4	5	4-5	4	4	4-5
9 Lateral-line scales	28	27-28	28-29	30-32	28-31	28-29	29-32	28-30
10 Pre-dorsal scales	9-10	10-11	10	11-12	11-13	8-9	10	11-12
11 Circumpeduncular scale rows	12	12	12	14	14	12	12	12-14
12 Circumferential scale rows	18	16-18	18-19	24	23-24	18	20	20-22
13 Transverse breast scale rows	7	7-8	7-8	7-8	7-8	7-8	9	7-9
14 Pre- anal scale rows	23	23-24	25-26	22-25	26-28	20-22	27-28	23-25

Discussion

Report on the occurrence of *Barbus* (= *Lissochilus/Neolissochilus*) *dukai* by Shaw and Shebbeare (1937) noted that their small specimen with 7 inch showed a lateral line scale rows of 26 however, Day (1878) mentioned that *B. dukai* had 28-29 lateral line scale rows. In the original description of Day (1878) the length of head was 4.75- 5 times of total length and in the topotypes the head length is 4.7-4.8 in TL; dorsal fin height of 3/4 of body depth is similar. Meristic characters of pre dorsal scales were 9 in original description (vs.9) and lateral line to pelvic scale rows was 2.5 (vs.2.5). The topotypes collected from Teesta River, Darjeeling showed much similarity with the description of Day (1878). Also the syntype by Day (ZSI F 2388, 1, 103.9 mm SL) showed the lateral line scales of 28.

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REFERENCES

- Arunachalam M., Sivakumar P. and Murugan M. (2017).** Descriptions of five new species of *Neolissochilus* Rainboth, 1985 (Cypriniformes: Cyprinidae) from streams/rivers of the Western Ghats, peninsular India, *Fish Taxa*. 2(1): 1-27.
- Devi R. and Boguskaya N.(2009).** The IUCN Red List of Threatened Species.
- Day F. (1878).** The Fishes of India; being a natural history of the fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon, part 4, William Dawson & Sons Ltd., London, Pp: 553-778.
- Herre A.W. (1940).** New species of fishes from the Malay Peninsula and Borneo. *Bulletin of the Raffles Museum*. 16: 5-26.
- Hubbs C. L. and Lagler K. F. (1964).** Fishes of the Great lakes region. Ann Arbor: University of Michigan press. Pp213.
- Jayaram K.C. (1991).** Revision of the genus *Puntius* Hamilton from the Indian region (Pisces: Cypriniformes, Cyprinidae, Cyprininae). *Records of the Zoological Survey of India*, Occasional Paper. 135: 1-178.
- Joshi K. D. and Joshi P. C. (1996).** *Puntius dukai* Day (Piscus : Cyprinidae) a new record from Uttar Pradesh hills. *Journal of Bombay Natural Historical Society*. 99: 102-103.
- Khaironizam M.Z., Zakaria-Ismail M. and Armbruster J.W. (2015).** Cyprinid fishes of the genus *Neolissochilus* in Peninsular Malaysia. *Zootaxa*. 3962: 139-157.
- McClelland J. (1839).** Indian Cyprinidae. *Asiatic Researches*. Pp334 .
- Menon A.G.K. 1999.** Check list – Fresh water fishes of India. Records of the Zoological Survey India, Occ. Paper No. 175: 366 p.
- Paul M., Gupta S. and Banerjee S. (2009).** Fish fauna of major Rivers of Darjeeling District, with special reference to their conservations status. *Rec. Zool. Survey India*. 109(4): Pp15-23.
- Shaw G. E. and Shebbeare E. O. (1937).** *J. Royal Asiatic Soc. Bengal*. 3: 1-75.
- Strauss R.E. and Bookstein F.L. (1982).** The truss: body form reconstruction in morphometrics. *Systematic Zool*. 31 (2): 113-135.
- Talwar P.K. and Jhingran A.G. (1991).** Inland Fishes of India and Adjacent Countries, Oxford and IBH, New Delhi. Pp 1158.