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Morpho-meristic characteristics of moustached *Danio*, *Danio dangila* (Hamilton, 1822) from North-East hilly region of India

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Abstract

Morphological analysis (morphometric and meristic) was done with the objective to study and analyze the Morphometric, Meristic measurements and identification of *Danio dangila* (Hamilton, 1822) from different areas of North-East India mainly from Assam, Meghalaya, Alipurduar during the period of July 2015 to September 2016. Eighteen Morphometric measurement and ten meristic counts were studied for twenty five numbers of *Danio dangila*. The coefficients of correlation (r) for various characters were found between 0.162-0.988. Some significant high correlation (like 0.988, 0.977 and 0.952) and low correlation like (0.162, 0.463) is found in some parameters. This study can be helpful for future research and preparing of conservation strategy.

Keywords: Morphometric, meristic, *Danio dangila*, correlation, regression, Ornamental

1. Introduction

Danio dangila is one of the popular ornamental fish of the Danionin group. It belongs in Cyprinidae family under Cypriniformes order^[1]. This species is characterized by an olive back and silvery sides with mottled pattern. Their bright silvery appearance and bands have been attracting the hobbyists, locally and globally^[2]. Due to their small size, they can be reared in aquarium throughout their life span and thereby this species has been treated as a 'classified ornamental fish'. This species is distributed in India, Bangladesh, Nepal, Bhutan and Myanmar^[3]. They are hardy and highly compatible with other species in a community tank. *Danio dangila*, (Hamilton, 1822) is assessed as Least Concern since it has a wide distribution^[3]. Although there is considerable reduction in the population due to exploitation from nature for ornamental trade^[4, 5, 6]. Presently ornamental fishes are collected from their natural habitat by the fish collectors engaged by some middlemen who in turn supply this fish to traders or exporters. Morphometric and meristic characters are helpful in easy and correct identification of fish species in laboratory as well as at natural places^[7]. Although *D. Dangila* (Hamilton, 1822) is assessed as Least Concern^[3] but it is continuously decreasing due to their habitat loss and over exploitation from natural habitats^[6]. Morphometric characters are important for identifying fish species and their habitat as well as ecological criteria in any stream, lake or sea. Morphometric study is very powerful and authentic technique. It is common to use morphometric measurements to identify and classify fishes^[3]. Information of the morphometric measurements of fishes and the study of statistical relationship among them are essential for taxonomic work^[6, 8-12]. The fish specimens were taxonomically identified and confirmed by many workers^[13, 14, 3, 15-18, 22]. Identification of a species is one of the important tool of research works for identifying a specimen. The studies of morphological and meristic characters of a fish give substantial information with regard to exact identification key of the species^[19]. So the present study is designed with objective to analyze Morphomeristic measurements for *Danio dangila*.

2. Material and Methods

2.1 Morphometric Analysis

Specimens of *Danio dangila* (Hamilton, 1822) (SL: 9.0- 7.2 cm) from different areas of North-East India mainly from Assam, Meghalaya, Alipurduar (Fig.1) during the period of July 2015-September 2016 were studied.

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A total of 25 specimens were examined for morphometric analysis. All measurements were taken with digital-callipers and were recorded to the nearest centimetre. In the present

study, 18 morphometric and 10 meristic characters were taken to study.



Fig 1: Collection site of *Danio dangila*

2.2 Statistical Analysis

Information of the morphometric measurements of fish and the study of statistical relationship among them are essential for taxonomic work [13]. The various statistical values, correlation coefficients, regression analysis and charts were made using Microsoft Office Excel 2010. The total length recorded in the present study was ranged between 5.8 cm to 8.8 cm (mean 13.34± 1.56). The methods of Dwivedi and Menezes (1974) and Jayaram (1994) were followed for morphometric measurements and meristic counts [20, 16].

3. Results and Discussion

Different Morpho-meristic characters are taken from all specimens. List of common names/local names are given in Table 1. *D. dangila* (Hamilton, 1822) has elongated, laterally compressed body; two pairs of barbels are present; lower jaw is elongated; body has olive colour in dorsal side with silvery sides, several narrow blue lines are present which forms mottled pattern; a dusky spot at the upper angle of the gill opening (Fig.2.b). It may vary from previous found specimen but it may vary due to several reasons. The maximum and minimum total length was 2.75 cm to 8.7 cm. and mean and standard deviation is 5.69 and 1.25 respectively. Different morphometric characters are expressed in the percentage of total fish length have been taken for statistical analysis (Table. 3 and Fig. 4) like mean, standard deviation, range, range difference, correlation coefficient and regression equation (Y=a+bX). A comparative statement of the meristic characters between earlier works and present study of *Danio dangila* is also given in Table 2. The higher values of coefficient of correlation (r) of Standard Length (0.988), Pectoral Fin Length (0.900), Caudal Fin Length (0.907),

caudal base Length (0.952), Pre Pectoral Length (0.938), Pre Anal Length (0.977), Pre Pelvic Length (0.964) showed highest degree of correlation or interdependence. Higher degree of co-relation (r) is found of Body depth (0.493), Pelvic Fin Length (0.576), Anal Fin Length (0.746), Dorsal Fin Length (0.816), Pre Dorsal Length(0.797), Caudal Peduncle Length (0.887), Snout Length(0.883), Maxillary Barbel (0.804), Eye diameter (0.836). Sub-maxillary Barbel (0.655) and Head length (0.162) indicated low degree of correlation in relation to total length. Meristic data is given in Table 4. From the present study some morphological variation is also revealed which is different from previous works. This may due to the environmental variation as fish are very sensitive to environmental changes and quickly adapt themselves by changing necessary morphometric characters [10]. Morphological characters shows high plasticity in response to differences in environmental conditions, such as food abundance and temperature which is a well-known factor [23-25]. This fish is also studied under captive condition which is different from their natural habitat. So there is strong probability to change their morphometric characters with this changing habitat.

Table 1: List of common names/local names of *Danio dangila* (Hamilton, 1822)

Common names/Local Names	Place/Language
Moustached Danio	English
Laputi	Assamese
Tapo /Tapio	ArunachalPradesh
Zer /Khoruno	Nagaland
Nipati	Bengali
Shalynnai	Meghalaya
Nungnga	Manipur

Table 2: A comparative statement of the meristic characters between earlier works and present study of *Danio dangila* (Hamilton, 1822)

Meristic characters	Earlier works	Present study
Dorsalsoft rays	11-12 Kullander, S.O., 2015.	11-13
	8-10 Angami, 2015 (D ii)	
	9-11 Talwar and Jhingran,1991	
	11-13 Rahman(1989 and 2005)	
Anal soft rays	15 – 19 Kullander, S.O., 2015.	16
	13-14 Angami, 2015	

	12-15 Talwar and Jhingran,1991	
	16-18 Rahman(1989 and 2005)	
Lateral line scale	36-40Kullander, S.O., 2015.	34-36
	38 Rahman(1989 and 2005)	
Vertebrae	34-38 Kullander, S.O., 2015.	34-36

Fin formula: D.11-13, P.7-10, V.7, A.16, C.18-20, L.34-36, Ltr. 7-9^{1/2}

Table 3: Mean, S.D, Correlation coefficient, Range, Range Difference and Regression equation (Y=a+bx) between different Morpho-meristic characters of *Danio dangila* (Hamilton, 1822)

SL. No.	In the percentage of total fish length (TL)	Mean	S.D	Range	Range difference	R	Regression equation	R ²
1.	Standard Length (SL)	5.69	1.25	2.6-7.2	4.6	0.988	y = 0.7741x + 0.4399	0.976
2.	Body depth(BD)	1.96	0.56	0.87-2.8	1.93	0.493	y = 0.1715x + 0.7964	0.243
3.	Head length(HL)	1.05	0.31	0.2-1.4	1.20	0.162	y = 0.0319x + 0.831	0.0263
4.	Pectoral Fin Length (PCL)	1.14	0.39	0.23-1.56	1.33	0.900	y = 0.2207x - 0.3539	0.8114
5.	Pelvic Fin Length (PVL)	0.92	0.31	0.21-1.3	1.09	0.576	y = 0.112x + 0.1526	0.3325
6.	Anal Fin Length (AFL)	1.30	0.41	0.32-1.81	1.49	0.746	y = 0.1909x - 0.0033	0.5565
7.	Caudal Fin Length (CFL)	1.26	0.48	0.23-2.02	1.79	0.907	y = 0.2719x - 0.5917	0.8221
8.	Dorsal Fin Length (DFL)	1.16	0.47	0.21-1.6	1.39	0.816	y = 0.2437x - 0.4962	0.6659
9.	Caudal Base Length (CBL)	0.58	0.17	0.09-0.76	0.68	0.952	y = 0.1059x - 0.1386	0.9059
10.	Pre Dorsal Length (PDL)	1.83	0.74	0.34-3.11	2.77	0.797	y = 0.3714x - 0.6914	0.6347
11.	Pre Pectoral Length (PPCL)	1.27	0.30	0.35-1.52	1.17	0.938	y = 0.1797x + 0.0484	0.8803
12.	Pre Anal Length (PAL)	3.19	1.18	0.32-4.65	4.33	0.977	y = 0.7221x - 1.7069	0.9549
13.	Pre Pelvic Length (PPVL)	2.26	0.93	0.03-3.3	3.27	0.964	y = 0.5626x - 1.5513	0.9298
14.	Caudal Peduncle Length(CPL)	0.65	0.19	0.2-1.0	0.8	0.887	y = 0.1063x - 0.0732	0.7877
15.	Snout Length(SNL)	0.46	0.12	0.21-0.67	0.46	0.883	y = 0.0702x - 0.011	0.7805
16.	Maxillary Barbel (MB)	1.29	0.17	0.9-1.7	0.8	0.804	y = 0.0886x + 0.6896	0.6472
17.	Sub-maxillary Barbel(SMB)	0.84	0.15	0.5-1.2	0.7	0.655	y = 0.0647x + 0.4033	0.4291
18.	Eye diameter (ED)	0.37	0.08	0.1-0.4	0.3	0.836	y = 0.0463x + 0.0525	0.6987

Table 4: Meristic data of *Danio dangila* (Hamilton, 1822)

Sl. No.	Parameters	Value
1.	Dorsal Fin Ray(DFR)	11-13
2.	Caudal Fin Ray (CFR)	19-22
3.	Anal Fin Ray (AFR)	16-18
4.	Pelvic Fin Ray (PvFR)	7-10
5.	Pectoral Fin Ray(PcFR)	10
6.	Lateral Line Scale(LLS)	35-36
7.	Transverse Scale (TS)	10-11
8.	Caudal Peduncle Scale (CPS)	9-11 ^{1/2}
9.	Gill Racker(GR)	7-12
10.	Vertebrae (V)	34

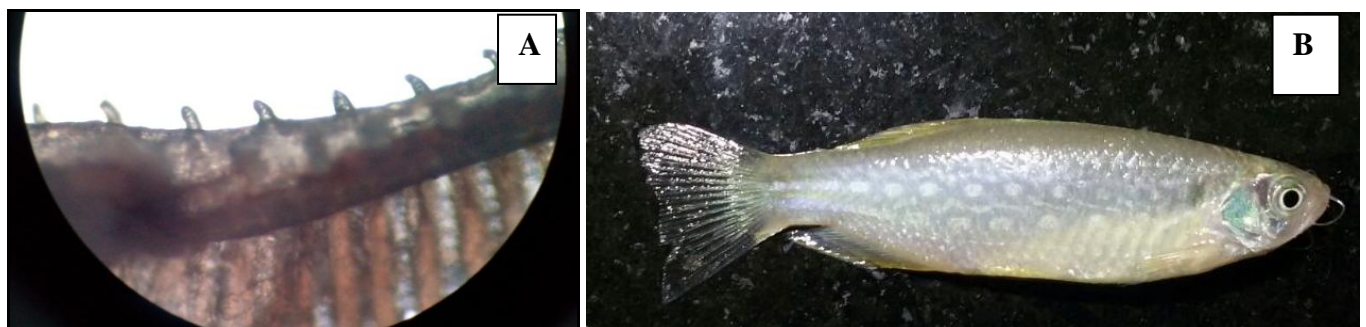


Fig 2: (a) Microscopic view of Gill racker of *Danio dangila* (under 10X); (b) Lateral view of *Danio dangila* (Hamilton,1822)

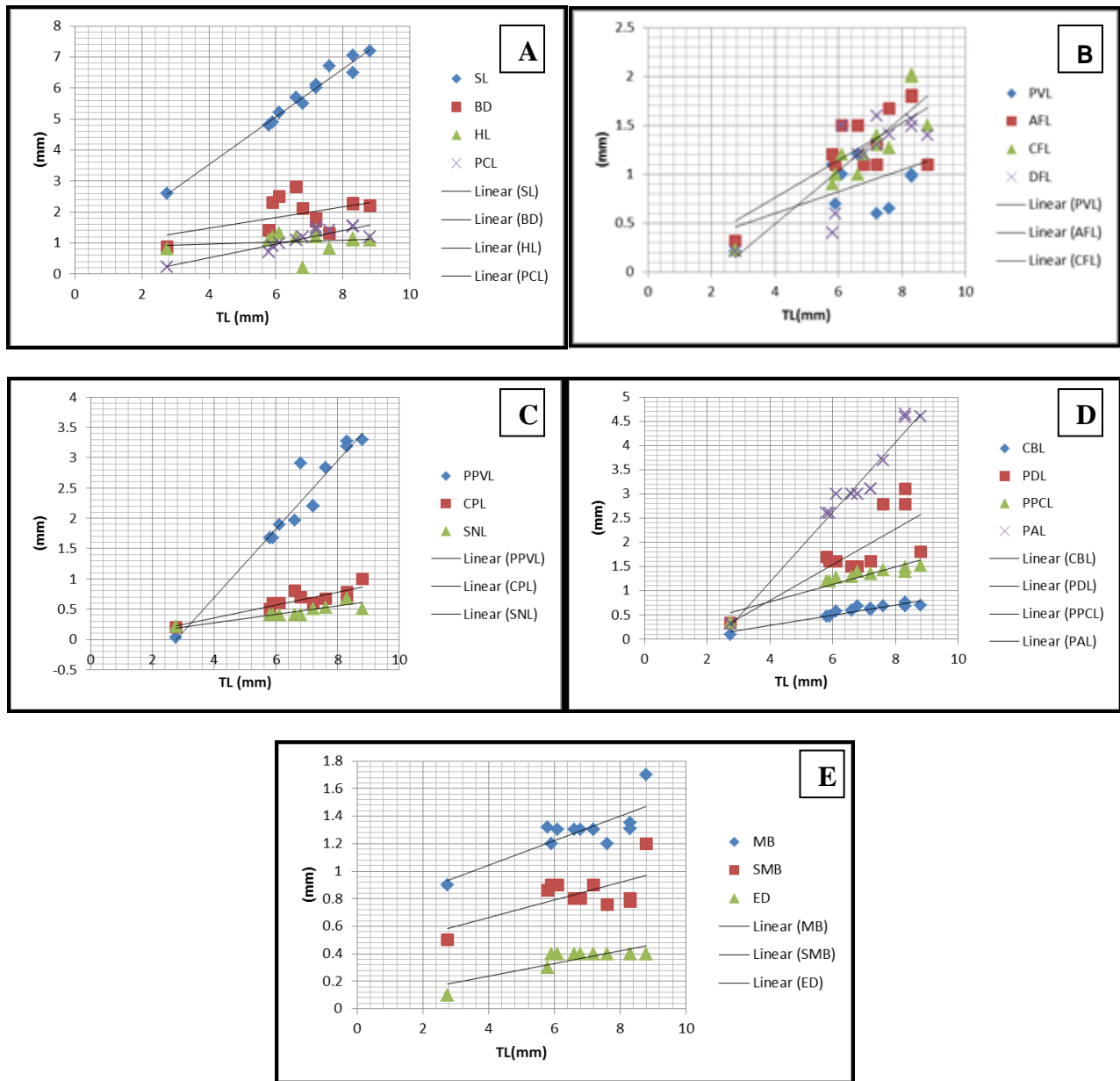


Fig 4: Relationship of TL with (a) SL, BD HL and PCL; (b) PVL, AFL, CFL and DFL; (c) CBL, PDL, PPCL and PAL; (d) PPVL, CPL SnL (e) MB, SMB, ED

4. Conclusion

Information of present study gives a clear idea of morphometric characteristics of *D. dangila* which can be helpful to fishery researchers for further study and identification as well as it can also help to plan future conservation strategy of this Danionin species from North-East hilly region of India.

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6. References

1. Talwar PK, Jhingran AG. Inland fishes of India and adjacent countries. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, 1991; 1:366
2. Vinod K, Mahapatra BK, Mandal BK. *Brachydanio rerio* (Hamilton) and *Danio dangila* (Hamilton) - promising species for ornamental fisheries in Meghalaya and strategies for judicious exploitation. Workshop on

Integration of fish biodiversity conservation and development of fisheries in North-eastern region through community participation; National Bureau of Fish Genetic Resources, Lucknow and the North-eastern council (NEC), 12-13 December 2001, Shillong, Meghalaya. 2001, 225-230.

3. Vishwanath W. Fishes of North East India, A field guide to species identification. NATP, NBFGR, Lucknow. 2002, 158.
4. Mahapatra BK, Vinod K, Mandal BK. Studies on fecundity of Zebra danio, *Brachydanio rerio* (Hamilton) from Meghalaya, North-Eastern India. Journal of Current Science. 2004; 5(1):103-108.
5. Mahapatra BK, Vinod K, Mandal BK, Bujarbaruah KM. Ornamental fisheries in North-eastern India. Research Bulletin No. 49, ICAR Research Complex for NEH Region, Umiam, Meghalaya. 2006, 48.
6. Mahapatra BK, Vinod K, Lakra WS. Biology of the ornamental cyprinid fish *Danio dangila* (Hamilton, 1822) from the North-eastern hill region of India. Indian Journal of Fisheries. 2016; 63(4):122-125.

7. Jhingran VG. Fish and Fisheries of India. xxiii. Hindustan Publication Corporation. New Delhi. 1991, 727.
8. Bagenal TB, Tesch AT. Conditions and Growth Patterns in Fresh Water Habitats. Blackwell Scientific Publications, Oxford. 1978, 75-89.
9. Banerjee T, Mahapatra BK, Patra BC. Length-weight relationship and condition factor of captive raised moustached *Danio dangila* (Hamilton, 1822). International Journal of Fisheries and Aquatic Studies. 2016; 4(5): 359-361.
10. Maji D, Pradhan A, Bhattacharya S, Mahapatra BK. Morpho-meristic characteristics of a rare species *Synaptura commersonii* (Lacepède, 1802) from North-East coast of India, West Bengal. International Journal of Fisheries and Aquatic Studies. 2016; 4(5):237-241.
11. Mahapatra BK., Vinod K, Mandal BK. Ornamental Fishery - A new horizon for R & D in Meghalaya. National Seminar on Approaches for increasing agricultural productivity in hill and mountain ecosystem, 18-20 October, 2001, ICAR Research Complex for NEH Region, Umiam, Meghalaya, 2001.
12. Rahman AKA. Freshwater Fishes of Bangladesh, 1st edition, Zoological Society of Bangladesh, Department of Zoology, University of Dhaka, Dhaka-1000. 1989, 102-104.
13. Menon AGK. Further observation on the fish fauna of Manipurstate, Records of Indian Museum. 1954; 52(1):21-26.
14. Dutta MJS, Srivastava MP. Natural History of Fishes and systematic of Fresh Water Fishes of India. Narendra Publishing House, Delhi. 1988, 347-348.
15. Nath P Dey SC. Culture fisheries an unfocused treasure of Arunachal Pradesh, Fishing Chimes, 1982; 5(4):22-25.
16. Jayaram KC. The Freshwater fishes of India. Calcutta Laser Graphics (p) Ltd. Calcutta. 1994, 335-336.
17. Angami VK, Ahmed SU. Length-weight relationship of *Danio dangila* (Ham.) from the drainages of Nagaland. Life Science Bulletin. 2010; 7(1):59-61.
18. Kullander SO. Taxonomy of chain, *Danio* an Indo-Myanmar species assemblage, with description of four new species (Teleostei: Cyprinidae). Ichthyological Exploration of Freshwaters. 2015; 25(4):357-380.
19. Dhanya VMR, Jaiswar AK, Palaniswamy R, and Chakraborty SK. Morphometry and length-weight relationship of *Coilia dussumieri*, Valenciennes, 1848 from Mumbai waters. Journal of Indian Fisheries Association. 2004; 31:65-70.
20. Dwivedi SN, Menezes MR. A note on the morphometry and ecology of *Brachionus orientalis* (Blotch and Schenider) in the estuary of Goa; Geobios.1974;8: 80-83
21. Hamilton F. An account of the fishes found in the river Ganges and its branches. Edinburgh & London. 1822; i vii+1405:139.
22. Mahapatra BK, Pradhan A, Lakra WS. Morphometrics, Length-Weight Relationship and Condition Factor of *Coilia dussumieri* Valenciennes, 1848 from North-East Coast of India. International Journal of Fisheries and Aquatic Studies. 2015; 3(2):35-39.
23. Allendorf FW, Phelps SR. Loss of genetic variation in Hatchery stock of cutthroat trout. Transactions of the American Fisheries Society. 1988; 109:537-543.
24. Swain DP, Ridell BE, Murray CB. Morphological differences between hatchery and wild populations of Coho salmon (*Oncorhynchus kisutch*): environmental versus genetic origin. Canadian Journal of Fisheries and Aquatic Sciences. 1991; 48:1783-1791.
25. Wimberger PH. Plasticity of fish body shape the effects of diet, development, family and age in two species of Geophagus (Pisces, Cichlidae). Biological Journal of Linnean Society. 1992; 45:197-218.