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Debarghya Maji
ICAR-Central Institute of Fisheries Education, Kolkata Centre 32 GN Block, Sector-V, Salt Lake City, Kolkata-700091, West Bengal, India

Alakesh Pradhan
ICAR-Central Institute of Fisheries Education, Kolkata Centre 32 GN Block, Sector-V, Salt Lake City, Kolkata-700091, West Bengal, India

Shreya Bhattacharya
ICAR-Central Institute of Fisheries Education, Kolkata Centre 32 GN Block, Sector-V, Salt Lake City, Kolkata-700091, West Bengal, India

BK Mahapatra
ICAR-Central Institute of Fisheries Education, Kolkata Centre 32 GN Block, Sector-V, Salt Lake City, Kolkata-700091, West Bengal, India

Correspondence
Debarghya Maji
ICAR-Central Institute of Fisheries Education, Kolkata Centre 32 GN Block, Sector-V, Salt Lake City, Kolkata-700091, West Bengal, India

Morpho-meristic characteristics of a rare species *Synaptura Commersonnii* (Lacepède, 1802) from North-East coast of India, West Bengal

Debarghya Maji, Alakesh Pradhan, Shreya Bhattacharya and BK Mahapatra

Abstract
Three specimen of a rare species, *Synaptura commersonnii* (Lacepède, 1802) were collected from Sankarpur coastal waters, North-east coast of India. In the present study detailed morphometric and meristic data for this species are provided. Eighteen characters have been studied in percentage of total fish length from which ten characters were genetically controlled, seven characters were intermediate and one character was environmentally controlled. The meristic characters were also counted especially to draw fin formula of this fish. Some variation in the count of fin rays, lateral line scales have been observed. However positive correlation has been observed between total length and external body parts.

Keywords: Rare species, *Synaptura commersonnii*, morpho-meristic, linear relationship Sankarpur, West Bengal.

1. Introduction
Flatfishes commonly known as Sole fish represent an interesting and diverse order of marine, estuarine and to a lesser extent, freshwater euteleostean fishes. They are well known organisms as they occur in all the world's oceans, and are represented by a large number of species and genera (Nair, 2010) [13]. In some regions, their populations are sufficiently large to constitute major fishery resources. Flatfishes are deep bodied, laterally compressed fishes, easily recognizable by the presence of both eyes on one side. The flat fishes come under the Order Pleuronectiformes having 11 families, 152 genera and 822 species globally (Nair, 2010) [13].
In West Bengal coast only 3 families are available viz. Bothidae, Soleidae and Cyanoglossidae which consist a total of 8 species viz. *Pseudorhombus arsius* (Hamilton-Buchanan), *P. javanicus* (Bleeker), *Paraplagusia bilineata* (Bloch), *Cynoglossus cynoglossus* (Hamilton-Buchanan), *C. lingua* Hamilton-Buchanan, *C. semifasciatus* Day, *Zebrias quagga* (Kaup) and *Synaptura commersonnii* (Lacepede) [4].
Synaptura commersonnii locally known as Commerson Sole widely distributed fish and reported from the Indo-West Pacific: Red Sea to the Persian Gulf, west coast of India and Sri Lanka; also off Mauritius and Seychelle [18]. Some work has been done on this species by Nair (2010) [13] from Fort Kochi, Ernakulam (Kerala). Although its availability reported from West Bengal coast by Chatterjee *et al.* (2000) [3] but no morphometric work on *S. commersonnii* has been done before from this locality. Fish are very sensitive to environmental changes and quickly adapt themselves by changing necessary morphometries (Hossain *et al*., 2010) [6]. Information of the morphometric measurements of fishes and the study of statistical relationship among them are essential for taxonomic work (Bhattacharya *et al*, 2015) [2]; (Mahapatra *et al*, 2015) [9]. (Mahapatra and Kar, 2015) [10]. (Narejo, 2010) [11], and Tandon *et al.* (1992) [16]. Morphometric characters can be successfully employed for ascertaining the genetically controlled and environmentally controlled characters. The various morphometric characters may be categorized on the basis of range difference into genetically (narrow range), intermediate (moderate range) and environmentally (vast range) controlled characters (Johal *et al*., 1994) [7]. The present paper reports the details morphometric and meristic data of *Synaptura commersonnii* from the North east coast of India.

2. Materials and Methods

3 specimens of *Synaptura commersonnii* (SL: 198.5–201.7 mm) were collected (Coll: Mr. Alakesh Pradhan and Dr. B. K. Mahapatra) from the sea beach of Sankarpur (20.5818° N and 85.8934° E), West Bengal, India (Fig. 1), which were captured by using shore seine nets. Photographs were taken on the field in fresh condition (Fig. 2) and specimens were preserved in 10% formaldehyde and brought to the laboratory for further analysis. The voucher specimens were deposited in the Fish Museum of the ICAR-Central Institute of Fisheries Education, Kolkata Centre (Registration No. CIFE/KOL/MW/0220). The detailed measurements and counts were recorded following the methodology provided by Day (1878) [4]. Talwar and Kacker (1984) [15]. Holden and Raitt (1974) [5]. A total of eighteen morphometric and meristic characters were taken with a Mitutoyo digital caliper to the nearest 0.01 mm.

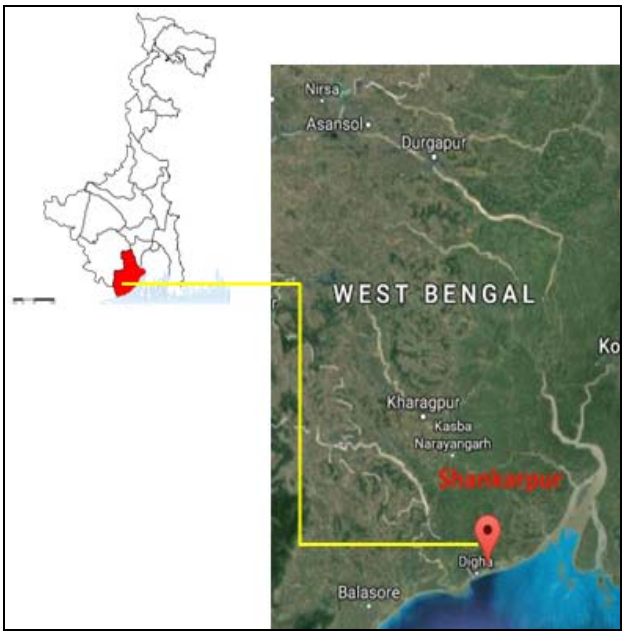

Fig 1: Collection site

3. Results and Discussion

The specimen *S. commersonnii* (Fig. 2) has been collected from Shankarpur coastal waters. This fish has been employed for different morphometric characters which are expressed in the percentage of total fish length and head length have been taken for statistical analysis (Table.2) like mean, standard deviation, range, range difference, correlation coefficient and regression equation (Y=a+bX). The average total length of 3 specimen was 219 mm with average body depth 59.79 in TL. Body very elongate, a bony process on snout; body depth 30.25% of SL; eye diameter 2.19% of SL. Head length and head width measured 8.47 and 10.78 times in eye diameter. Average Standard length was 3.31 times in average body depth and 5.39 times in head length. The mean standard length, body depth, head length, snout length, caudal fin length, caudal base length, intra orbital length, pectoral fin length (O), pectoral fin length (B), lower jaw length, upper jaw length, head width, dorsal fin length, dorsal base length, anal fin length, anal fin base length, eye diameter (U) and eye diameter (L) 197.63, 59.79, 36.69, 11.13, 19.35, 7.99, 1.56, 6.44, 7.67, 10.78, 12.04, 46.67, 8.19, 187.95, 7.35, 175.72, 4.89 and 4.33 respectively. In present specimen the higher values of coefficient of correlation (r) of standard length (0.993), eye diameter (U) (0.992), anal fin base length (0.985), anal fin length (0.983), upper jaw length (0.934), lower jaw length (0.931), caudal fin length (0.924), dorsal fin length (0.913), showed high degree of correlation again values of eye diameter(L) (0.606) and pectoral fin length(O) (0.586) indicated moderate degree of correlation in relation to total length and values of body depth (0.476), pectoral fin length (B) (0.466), caudal fin base length (0.455), head width (0.385), snout length (0.344), head length (0.290) and intra orbital depth (0.087) shows lower degree of correlation in relation to total length. The linear regression analysis (Table.1) showed that among all the characters compared with total length, dorsal fin base length (b=2.631),standard length (b=1.016) showed high growth rate, head width (b=0.203), caudal fin length (b=0.165), body depth (b=0.135), showed moderate growth rate and rest characters viz. anal fin base length (b=0.256), anal fin length (b=0.074), lower jaw (b=0.061), head length (b=0.059), snout length(b=0.053), caudal fin base length (b=0.049), dorsal fin length (b=0.028), upper jaw (b=0.027), pectoral fin length (O) (b=0.026), pectoral fin length (B) (b=0.023), eye diameter (U) (b=0.014), eye diameter (L) (b=0.049), intra orbital length (b=0.004) showed low growth rate. From this data it can be inferred that these characters showed an allometric and moderate growth.

The variation in fin rays and scales counting has been observed and falls under some specific range in all the fishes which are presented in Table 2. The fin formula comprised: D 65-68; A 55-59; P (O) 6 and P (B) 7; C 12. Lateral line with 190-196 scales. Linear relationships have been observed between all the independent and dependent characters (Fig. 3).

Fig 2: *Synaptura commersonnii*; A. Ocular side (Dorsal) B. Blind side (Ventral)

Table 1: Mean, SD, Correlation coefficient, Range, Range Difference and Regression equation (Y=a+bx) between different morphometric characters of *Synaptura commersonnii*

Sl. No.	In the percentage of total fish length (TL)	Mean.	S.D	Range	Range difference	Correlation coefficient	Regression equation
1.	Standard length (SL)	197.63	4.56	192.7-201.7	9	0.993	y = 1.0168x - 23.283
2.	Body depth (BD)	59.79	1.27	58.53-61.07	2.54	0.476	y = 0.1358x + 30.281
3.	Head length (HL)	36.69	0.91	35.69-37.49	1.8	0.290	y = 0.0596x + 23.736
4.	Caudal fin length (CFL)	19.35	0.80	18.75-20.26	1.51	0.924	y = 0.1654x - 16.589
5.	Caudal base length (CBL)	7.99	0.48	7.51-8.48	0.97	0.455	y = 0.0495x - 2.7645
6.	Intra orbital length (IOD)	1.56	0.23	1.3-1.72	0.42	0.087	y = 0.0044x + 0.5965
7.	Pectoral fin length (Ocular) PecL(O)	6.44	0.20	6.23-6.63	0.4	0.586	y = 0.0264x + 0.7066
8.	Pectoral fin length (Blind) PecL(B)	7.67	0.22	7.45-7.89	0.44	0.460	y = 0.0227x + 2.732
9.	Snout length (SnoL)	11.13	0.68	10.40-11.76	1.36	0.344	y = 0.053x - 0.383
10.	Lower jaw length (LJ)	10.78	0.29	10.45-10.98	0.53	0.931	y = 0.0606x - 2.3903
11.	Upper jaw length (UJ)	12.04	0.13	11.4-12.13	0.73	0.934	y = 0.0274x + 6.0782
12.	Head width (HW)	46.67	2.34	44.22-48.89	4.67	0.385	y = 0.2027x + 2.6312
13.	Dorsal fin length (DFL)	8.19	0.13	8.09-8.34	0.25	0.913	y = 0.0275x + 2.2048
14.	Dorsal base length (DBL)	187.95	11.75	176.39-199.89	23.5	0.997	y = 2.6316x - 383.81
15.	Anal fin length (AFL)	7.35	0.33	7.23-7.89	0.66	0.983	y = 0.0735x - 8.4432
16.	Anal base length (ABL)	175.72	1.16	174.66-176.96	2.30	0.985	y = 0.2564x + 120.01
17.	Eye diameter (Lower) ED(L)	4.33	0.22	4.12-4.56	0.44	0.992	y = 0.0492x - 6.3508
18.	Eye diameter (Upper) ED(U)	4.89	0.10	4.72-4.99	0.27	0.606	y = 0.0143x + 1.775

Table 2: Meristic counts of the studied fish, *Synaptura commersonnii*

In formula	D. 65-68, P. (O). 6, P. (B).7, V. 2, A. 55-59, C.12, Ll. 190-196, D Base-Ll O Sc.47-50, AF Base-Ll O Sc. 44-47.

Table 3: A comparative statement of the meristic characters between earlier works and present study of *Synaptura commersonnii*

Meristic characters	Earlier workers											Present study 2016
	Cantor 1849	Day 1877	FAO	Norman 1928	Weber & Beaufort 1928	Munroe 1955	Fowler 1956	Ramana than 1977	Radhama nyamma 1988	Krishanan & Mishra 1993	Nair 2010	(n=3)
Dorsal rays	78-81	70-81	75-81	70-81	71-81	70-81	70-81	70-80	71-82	73	68-74	65-68
Anal rays	65-66	60-63	61-64	58-66	57-63	58-66	58-66	56-67	60-68	57	56-63	55-59
Pectoral rays	6	9	*	*	8-9/6-8	*	5-6	6-8 O/B	7-8	7/7	7-8	6/7 O/B
Pelvic rays	5/4	4	*	*	2-4	*	*	2-3	2-3	4	4	2
Caudal rays	12	12	*	*	*	*	12	*	12-14	12	9-12	12
Lateral line scale	*	155-160	*	160	156-170	160	160	155-170	115-125	140	115-125	190-196

*Data not available

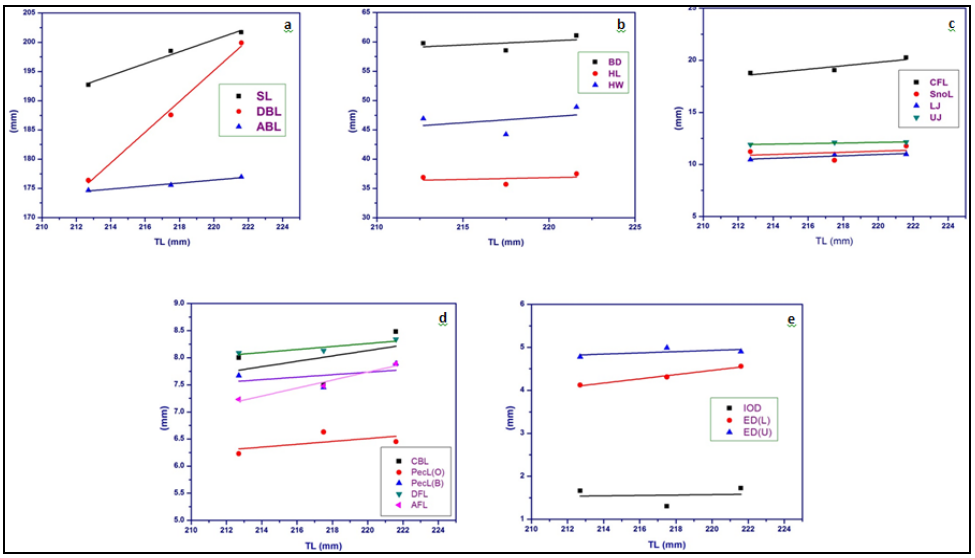

Fig 3: Relationship of TL with (a) SL, DBL and ABL; (b) BD, HL and HW; (c) CFL, SnoL, LJ and UJ; (d) CBL, PecL (O), PecL (B), DFL and AFL; (e) IOD, ED (L) and ED (U).

It is revealed from the present study that some meristic characters are different with earlier study (Table 3). Present study shows that ten characters were genetically controlled, seven characters were intermediate and one character was observed to be environmentally controlled in percentage of total length. In relation to percentage of head length three characters were observed to be genetically controlled, three were intermediate and one character was observed to be environmentally controlled. The morphological characters as observed in the present fish specimen collected from West Bengal coast differing from the earlier workers in which specimen examples were collected from different places of east coast of Bay of Bengal and Arabian sea; i.e. Norman, 1928 [12] from South Canara, Krishanan and Mishra, 1993 [8] from Pentakota (Vishakhapatnam), Nair, 2010 [13] from Fort Kochi (Ernakulam). It is evident from the present study that some morphological variation as noted may be due to prevailing environmental condition. Fishes are very sensitive to environmental changes and quickly adapt themselves by changing necessary morphometric characters. It is well-known factor that morphological characters shows high plasticity in response to differences in environmental conditions, such as food abundance and temperature (Allendorf and Phelps, 1988 [1]. Swain *et al.,* 1991[14] and Wimberger, 1992) [17].

4. Conclusions

The basic data generated based on Morpho-meristic characteristics in Commerson Sole, *S. commersonnii* probably the first detail morphological study of this species from North east coast of India especially from West Bengal coast. The variation in the morphological characters from other earlier works may be due to the alteration of the habitat through man made intervention and natural calamities. The coastal water near the shore area is always disturbed by the trawl catch and by other mechanised fishing boat operations. The natural calamities like Cyclone and Tsunami in North-East coast had created a big disturbance in marine ecosystems and habitat which may play an important role to change in morphological characters.

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6. References

1. Allendorf FW, Phelps SR. Loss of genetic variation in Hatchery stock of cutthroat trout. Trans. Am Fish Soc. 1988; 109:537-543.
2. Bhattacharya S, Mahapatra BK, Maity J. Morphological Identification of a Near Threatened Ornamental Fish, Ctenops nobilis. Zoology. 2015; 4(8):220-222.
3. Chatterjee *et al*: Fish &: Fisheries of Digha Coast of Wesl Bengal. Rec. Zool. Surv. India, Occ. Paper, 2000, 188.
4. Day F. The Fishes of India; Being a Natural History of the Fishes Known to Inhabit the Seas and Freshwaters of India, Burma and Ceylon. Bernard Quaritch, Piccadilly, London. 1878, 778. 196 pls.
5. Holden MJ, Raitt DFS. Manual of fishery science. Part 2. Methods resource investigation and their application, FAO Fish. Tech. Pap. 1974; 115(1):214.
6. Hossain MAR, Nahiduzzaman M, Saha D, Khanam MUH, Alam MS. Landmark-Based morphometric and meristic variations of the endangered carp, Kalibaus *Labeo calbasu*, from stocks of two isolated Rivers, the Jamuna and Halda and a Hatchery. Zool Stud 2010; 49(4):556-563.
7. Johal MS, Tandon KK, Sandhu GS. Mahseer in Lacustrine Waters, Gobindsagar Reservoir. Morphometry of *Tor putitora*.IN P. Nautiyal (Eds), Mahseer the Game fish., Jagdamba, Prakashan publisher, Srinagar, Garhwal, 1994,67-85.
8. Krishanan, Mishra SS. On a collection of fish from Kakinara-Gopalpur sector of the east coast of the India. Rec. Zool. Surv. India, 93(1-2):201-240.
9. Mahapatra BK, Pradhan A, Lakra WS. Morphometrics, Length-Weight Relationship and Condition Factor of *Coilia dussumieri* Valenciennes,1848 from North-East Coast of India. Intl. J. Fish. Aqua. Stud. 2015; 3(2):35-39.
10. Mahapatra BK, Kar S. *Hara nareshi*, A new species of catfish (Pisces: Erethistidae) from the Barak river system

of Assam, India. Rec. Zool. Surv. India. 2015; 115(Part-1):1-5.
11. Narejo NT. Morphometric characters and their relationship in *Gudusia chapra* (Hamilton) from Keenjhar lake (Distt: Thatta), Sindh. Pak. J. Zool. 2010; 42(1):101-104.
12. Norman JR. The flatfishes (aeterosomata) of India, with a list of the specimens in the Indian Musellm. Part 2. Rec. Indian Mus. 1928; 30:173-193.
13. Nair RJ. A Review on the Fisheries, Taxonomy and Status of the Flatfishes in Tropical Waters. Ph.D Thesis, 2010, 529.
14. Swain DP, Ridell BE, Murray CB. Morphological differences between hatchery and wild populations of Coho salmon (*Oncorhynchus kisutch*): environmental versus genetic origin. Can J Fish Aquat Sci. 1991; 48:1783-1791.
15. Talwar PK, Kacker RK. Commercial Sea Fishes of India. Zoological Survey of India, Calcutta, 1984, 997.
16. Tandon KK, Johal MS, Bala S. Morphometry of *Cirrhinus rebar* (Hamilton) from Kanjli Wetland, Punjab, India. Res Bull Panjab Univ. 1992; 43:73-79.
17. Wimberger PH. Plasticity of fish body shape the effects of diet, development, family and age in two species of *Geophagus* (Pisces, Cichlidae). Biol J Limnol Soc. 1992; 45:197-218.
18. www.fishbase.org, 1st June, 2015.