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Note

Analysis of meristic characters of the Japanese threadfin bream, *Nemipterus japonicus* (Bloch, 1791) along Indian coast

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ABSTRACT

The Japanese threadfin bream, *Nemipterus japonicus* (Bloch, 1791) is a commercially important demersal fish species along the Indian coast especially in the maritime states of Kerala, Tamil Nadu, Maharashtra and Andhra Pradesh. In the present study, 389 samples were collected from four locations *i.e.,* Cochin, Mumbai, Kakinada and Chennai and 15 meristic characters were recorded and analysed. Wald's chi-square statistics was used to analyse the meristic characters. Most of the meristic characters showed no significant difference between locations which depicted the similarity of stock collected from different locations. However, the counts of gill rakers were found significant and important for differentiating the populations from these locations.

Keywords: Gill raker count, Japanese threadfin bream**,** Meristic traits, *Nemipterus japonicus*,

Nemipterus japonicus is the most dominant fish species among the threadfin bream resources (Nemipteridae) along the coastal stretches of India. The threadfin breams contribute about 4% (CMFRI, 2012) of total marine landings of India, out of which *N. japonicus* contribute to about 55%. This tropical species live in schools, generally close to bottom normally around depth zones of 50-100m with high concentration in 80-100 m. The geographical distribution is within a range of 34 °N - 12°S, 31°E - 133°E (Russell, 1990).

Meristics is an area of ichthyology, which relates to counting quantitative features of fish, such as the number of fins or scales, generally undertaken for identifying different stocks within a species. So far no concrete attempts have been made for meristic analysis of the species from Indian waters. However, meristic comparison of the samples of *N. japonicus* using analysis of covariance method from four different localities on the east coast of India was the first attempt made by Rao and Rao (1983). This study mainly aimed to see whether there exist separate stocks along east and west coast of India based on meristics and also to investigate location specific meristic variations. Identification of variations in the stocks will be useful in the fishery management programmes.

Sampling locations were selected in four maritime states, two each from the west and east coasts of India *viz*., Maharashtra (Mumbai-New Ferry Wharf), Kerala (Cochin Fisheries Harbour), Tamil Nadu (Chennai Fisheries Harbour) and Andhra Pradesh (Kakinada Fishing Harbour) (Fig.1). Samples were collected randomly from these landing centres from August 2010 to April 2011.

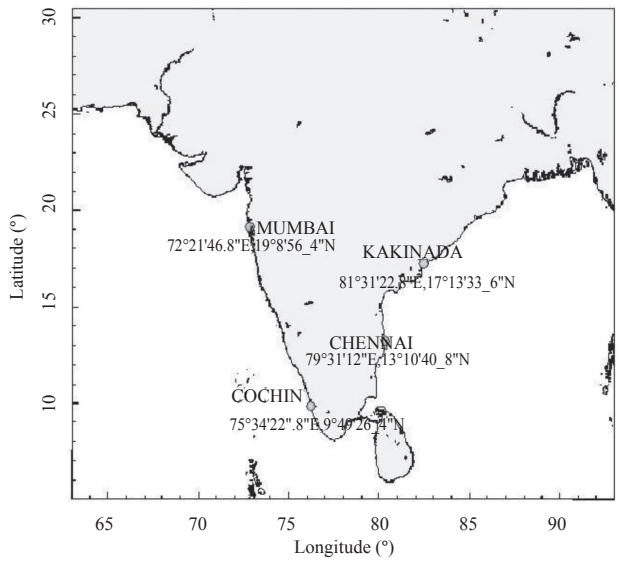

Fig. 1. Locations selected for sampling of *N. japonicus*

A total of fifteen meristic characters were selected for the present study (Table 1) following the widely accepted method provided by Hubbs and Lagler (1958). All counts and measurements were taken from the left lateral aspect of the fish.

Table 1. Meristic traits studied in *Nemipterus japonicus*

Acronyms	Description
DOS	Number of spines on the dorsal fin
DOR	Number of rays on the dorsal fin
PES	Number of spines on the pelvic fin
PER	Number of rays on the pelvic fin
PTR	Number of rays on the pectoral fin
ASP	Number of spines on the anal fin
ANR	Number of rays on the anal fin
BRS	Number of branchiostegal rays
GRU	Gill rakers on the upper limb of first gill arch
GRL	Gill rakers on the lower limb of first gill arch
SBD	Scales before dorsal fin
SAL	Number of scale rows above lateral line
SBL	Number of scale rows below lateral line
LAR	Number of scales with lateral grooves on the lateral line
SCP	Number of scale rows on the caudal peduncle

Out of 15 meristic traits studied, only 7 showed variability. These are the counts of pectoral fin rays, scale rows on the caudal peduncle, scales before dorsal fin origin, scale rows below lateral line, scales on lateral line and gill rakers on upper and lower limbs of first gill arch.

The number of gill rakers on upper limb of the first gill arch ranged from 5 to 8 while on the lower limb ranged from 7 to 12. This may be attributed to the environmental influences like temperature and salinity (Ikusemiju, 1975). Counts for gill rakers on upper limb of first gill arch showed variation in samples from west coast (5-8) and the east coast (6-8). But the counts for gill rakers on lower limb of first gill arch ranged from 7 to12 for both the coasts (Table 2).

The pectoral fin rays ranged from 15-18 in number and the scale rows on the caudal peduncle ranged from 6 to 7.5. The number of scales before dorsal origin, the number of scale rows below lateral line and lateral line scales ranged between 13-15, 9-11 and 45-52 respectively. Pectoral fin rays ranged from 15-18 for both males and females and males have shown variation in traits like scale rows below lateral line, scales on lateral line and gill rakers on the upper limb of first gill arch (Table 3). In contrast, counts of gill rakers on the lower limb showed variation in males and females.

Table 2. Overall and coast-wise descriptive statistics in meristic characters of *N. japonicus*

Meristic traits	Overall (n=389)			East (n=214)			West (n=175)		
	Min.	Max.	Mode (Frequency)	Min.	Max.	Mode (Frequency)	Min.	Max.	Mode (Frequency)
DOS	10	10	10 (389)	10	10	10 (214)	10	10	10 (175)
DOR	9	9	9 (389)	9	9	9 (214)	9	9	9 (175)
PES	1	2	1 (384)	1	2	1 (212)	1	2	1 (172)
PER	3	5	5 (383)	4	5	5 (210)	4	5	5 (172)
PTR	15	18	17 (221)	16	18	17 (132)	16	18	17 (89)
ASP	3	4	3 (385)	3	4	3 (211)	3	4	3 (174)
ANR	4	7	7 (387)	7	7	7 (212)	7	7	7 (175)
SCP	6	7	6.5 (267)	6	7.5	6.5 (167)	6	7.5	6.5 (100)
SBD	13	14	14 (295)	13	15	14 (160)	13	15	14 (135)
SAL	3	4	3.5 (345)	3	4	3.5 (188)	3	4	3.5 (167)
SBL	9	11	9.5 (241)	9	11	9.5 (152)	9	11	9.5 (89)
LAR	45	51	49 (134)	45	52	49 (79)	45	52	49 (55)
GRU	5	8	7 (185)	5	8	7 (109)	5	8	6 (76)
GRL	7	12	9 (210)	7	12	9 (131)	7	12	9 (79)
BRS	6	6	6 (389)	6	6	6 (214)	6	6	6 (175)

PROC UNIVARIATE procedure was used to estimate the variability *viz*., minimum value, maximum value and mode of the meristic traits. The significant sources of meristic variation was analysed by Wald's Chi-square test which is specific for count data using the PROC GENMOD procedure of SAS (SAS Institute, 2010) and tested the meristic variation for the effect of coast, location and sex.

Wald's chi-square statistics showed significant ($p \leq 0.05$) difference between coasts and locations within coast, only in case of counts of gill rakers in lower limb and upper limb of the first gill arch. Coast-wise and

Table 3. Sex-wise descriptive statistics in meristic characters of *N. japonicus*

	Males (n=184)			Females (n=205)		
Meristic traits	Min.	Max.	Mode (Frequency)	Min.	Max.	Mode (Frequency)
DOS	10	10	10 (184)	10	10	10 (205)
DOR	9	9	9 (184)	9	9	9 (205)
PES	1	2	1(183)	1	2	1(201)
PER	4	5	5(182)	3	5	5(200)
PTR	15	18	17(105)	15	18	17(116)
ASP	3	4	3(180)	3	3	3(205)
ANR	4	7	7(183)	4	7	7(204)
SCP	6	7.5	6.5 (129)	6	7.5	6.5(138)
SBD	13	15	14(138)	13	15	14(157)
SAL	3	4	3.5(164)	3	4	3.5(181)
SBL	9	11	9.5(110)	9	11	9.5(131)
LAR	46	52	49(69)	45	51	48(66)
GRU	5	8	7(92)	5	8	7(93)
GRL	7	12	9(102)	7	12	9(108)
BRS	6	6	6(184)	6	6	6(205)

location-wise variations were analysed for all the traits and observed that the overall variation due to other meristic characters is insignificant. No significant variation was observed in the case of the sex-wise variation in any of the meristic traits.

The counts of all major traits observed were similar to the reports of Acharya (1980) and Russell (1990). Acharya (1980) reported a variation in meristic traits of *N. japonicus* off Bombay coast. He pointed out that there were 2.75% of females with 11 dorsal fin spines while 97.25% of females and 100% of males were with 10 dorsal fin spines. The pectoral fin rays ranged from 16-19 in males and 11-19 in females. Lateral line scales ranged from 39-48 and 41-49 for males and females respectively.

The overall data failed to explain any variation among the populations from different coasts, locations and sexes. However, the gill raker counts showed minor variation among coasts and locations. Since none of the other characters showed any significant variation, it is difficult to conclude the existence of different stocks in both the coasts.

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