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Filling missing links in bramids distribution along the Indian coast with first record of big tooth pomfret, *Brama orcini* (Perciformes: Bramidae) from the east coast of India

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Brama orcini has been reported for the first time from the east coast of India extending its distribution to the Gulf of Mannar region. The study also claims the first documentation of the genus from the commercial catches along the Indian coast. The meristic and morphometric characters of the specimens from India are in agreement with the record from other parts of the world. Meristic characters like lateral series scale counts and vertebrae counts have stronger species discriminating power than morphometric variables which showed comparable ranges. The study also reveals a continuous distribution of *B. orcini* along the Neritic-oceanic gradient ranging from < 50 to 1500 m.

[Keywords: Bramids; Gulf of Mannar; Oceanic pomfrets]

Introduction

Fishes belonging to the family Bramidae, popularly known as sea breams or oceanic pomfrets are among the listed groups of highly migratory fishes in Annex I of article 64 of United Nations Convention on Law of Sea. They are oceanodromous in nature and are poorly represented in commercial catches barring *Brama brama*[1]. Food and Agriculture Organisation fishery statistics database includes this group in not elsewhere included (nei) category and hence no separate global catch statistics are available for assessment. Nevertheless, a strong oscillation in landings is reported from Atlantic and Pacific Ocean[2].

Bramids enjoy circumglobal distribution across temperate and tropical waters of all oceans with few species like *B. brama* and *B. japonica* known to undertake inter-latitudinal seasonal migration[3]. Family Bramidae is globally represented by 7 genera and 20 species[4-8]. In India, it has five representative species belonging to three genera. The reported species from India are: *Brama orcini* Cuvier, 1831*; B. dussumieri* Cuvier, 1831*; B. myersi*, Mead, 1972; and *Taractichthys longipinnis*, (Lowe, 1843) from the west coast and *Taractes rubescens* (Jordan and Everman, 1887) from east coast[9-11]. All the earlier reports except the report of Luther[9] from India were part of the exploratory survey and the group failed to make their presence in commercial catches. Globally also, most of the members of the family are occasionally recorded in catches. As being rare or part of bycatch, biological information related to them is sparse and scanty.

The present report of *B. orcini* is the first record of the species from the east coast of India. In addition, both *B. orcini* form the east coast and *B. dussumieri* form the west coast, included in the present study is the first documented presence of the genus in commercial catches in the respective coasts. The current study undertakes the morpho-meristic comparison between specimens and also with reference literature. Based on current observation and past literature, a field identification key for the five recorded species of the family is provided to aid field workers in prompt identification and reporting of the species.

Materials and Methods

Ten specimens of *Brama orcini* and a single specimen of *Brama dussumieri* were collected from Tharuvaikulam landing centre, Tuticorin, Tamil Nadu and Cochin fishing harbour, Cochin, Kerala, respectively. The samples were collected during November, 2016 to February 2017. The samples were collected along with the GPS point of capture or bearing-distance combination of the fishing site from the landing centre to facilitate identification of the location of capture. The specimens were identified

based on the original description and other taxonomic literature and keys[3,5,12,13]. A short description of both the species based on our observation is provided considering the fact that earlier reports of these species from Indian waters were without any morphological details. The morphometric measurements were recorded to the nearest 0.1 mm using Vernier calliper[14]. Meritic counts include fin rays counts, lateral series scales vertebrae counts from radiographs. Morphometric measurements were transformed into a percentage of standard length for comparative study. A GPS-based distribution map with topographic features (GEBCO bathymetric grids, BODC) is generated to visualize the distribution along Indian coast[15]. The specific depth of the site of capture was recorded using online bathymetric data viewer[16] to compare the depth of occurrence of present records with past ones. The gut contents of the species were studied qualitatively to access the preferred prey of the species. A field identification key of the species reported from India is provided to facilitate easy identification and prompt reporting.

Results

Brama orcini, Cuvier, 1831

Dorsal fin rays, 32-35; anal fin rays, 28-30; pectoral fin rays, 19-20; gill rakers, 12-16; horizontal series scales, 52-54; and vertebrae, 37-38 (Table 1).

Body compressed laterally and ovate in shape, snout small, head large and feebly arched in dorsal profile, eyes moderately large, jaw angle oblique, mandible touching along entire length, isthmus not exposed, one row of teeth in upper jaw, 1-2 rows of teeth in lower jaw with few median ones large and curved inwardly, dorsal and anal fin scaly and non-recessible, single dorsal fin originating just posterior to pectoral fin base, anal fin lobe poorly developed, pectoral fin inserted high on body and originating at the edge or operculum or just before it, pelvic small and originating at about mid of pectoral fin base, caudal fin forked with upper lobe longer than lower, and scales on body large and oblong.

Colour: Silvery grey to darkish in colour, darkish on the dorsal side, pelvic translucent, and dorsal and anal fin dark in colour.

Brama dussumieri, Cuvier, 1831

Dorsal fin rays, 33; anal fin rays, 25; pectoral fin rays, 19; gill rakers, 15; horizontal series scales,65; and vertebrae, 39 (Table 1).

Body compressed laterally and ovate in shape, snout small, head large and moderately arched in dorsal profile, eyes moderately large, jaw angle oblique, mandible touching along entire length, isthmus not exposed, one row of teeth in upper jaw, 1-2 rows of teeth in lower jaw with few median ones large and curved inwardly, dorsal and anal fin scaly and non-recessible, single dorsal fin originating just posterior to pectoral fin base, anal fin lobe poorly developed, pectoral fin inserted low on body and originating at the edge or operculum or just before it, pelvic small and originating at about mid of pectoral fin base, caudal fin forked with upper lobe longer than lower, and scales on body medium and oblong.

Colour: Darkish in colour, darker on the dorsal side, pelvic darkish with prominent dark colour patch underneath it, and dorsal and anal fin black in colour.

The meristic counts and morphometric variables in the percentage of SL are presented in Table 1. Most of the variables showed comparable ranges between the species. The current estimates were found to be similar to the earlier works. But ranges in our study were found to be narrower than some of the earlier reports. The body depth and length of upper caudal lobe were found to be the most variable morphometric features. The pectoral-pelvic distance emerged as the most important morphometric variables from a taxonomic point of view. Meristic characters proved to have better discriminating power either alone or in combinations as they are non-overlapping in nature. The most discriminating meristic characters were scales count in lateral series and number of vertebrae (Figures 1, 2 & 3).

The current report of *B. dussumieri* is from a similar geographical area with similar depth profile. But the reports of *B. orcini* not only differ in the geographical region but also the depth profile of the area of capture. All the earlier records of the species were from the area having a depth of more than 1500 m. In the present study, the reports are even from the area having a depth of < 50 m (Table 2 and Figures 4 & 5).

The *B. orcini* is landed at Tharuvaikulam landing centres by two variants of multi-day gill netters, namely, Paru valai and Mural valai. Paru valai having bigger mesh sizes target fishes like yellowfin tuna and swordfishes and are operated relatively in deeper water than Mural valai targeting belonids with smaller mesh size. As per the enquiry made from the fishermen, the incidence of the capture of *B. orcini* is

Table 1 — Morpho-meristic comparison of *Brama orcini*, *B. dussumieri* and *B. myersi*

		B. orcini			*B. dussumieri*			*B. myersi**
		Present Study	Mead (1972)	Lee et al. (2014)	Present Study	Mead (1972)	Lee et al. (2015)	Holotype (Mead,1972)
	Number of specimens	10	20	2	1	24	12	1
	Standard length (mm)	182.3-266.6	30.00-298.0	188.0-267.0	202.9	20.6-158.0	100.1-137.5	
Morphometric measurements in % of SL	Pre-dorsal length	34.63-39.73	36.80-39.90	38.20-40.50	36.60	36.10-50.00	36.70-40.50	35.74
	Pre-anal length	47.02-52.92	44.80-50.00	47.40-55.90	49.70	39.50-47.80	49.20-55.40	46.09
	Pre-pelvic length	36.42-41.75	38.20-50.80	39.80-41.40	35.19	38.00-45.50	32.80-40.30	27.81
	Pre-pectoral length	25.73-29.91	28.20-35.50	28.20-28.50	27.08	28.20-32.50	25.80-28.20	26.75
	Depth at pectoral origin	46.65-50.93			46.75			54.44
	Depth at dorsal origin	49.21-54.15	47.80-68.30	50.10-51.20	48.54	47.70-62.70	45.70-51.30	57.63
	Depth at anal origin	47.72-51.46			48.22			55.92
	Dorsal fin length	55.66-60.58	49.30-58.60	53.80-58.20	59.37	49.60-59.80	55.70-60.10	57.57
	Anal fin length	44.08-49.10			46.49			52.60
	Pectoral to pelvic fin origin	12.69-14.40	13.00-16.30	12.40-12.50	10.77	06.60-11.70	09.40-12.00	17.02
	Head length	26.81-23.82	25.50-33.30	26.20-28.50	28.30	26.60-35.00	24.40-27.60	27.10
	Snout length	05.34-07.24	05.60-08.20	06.90-07.60	07.22	05.60-08.30	05.50-07.30	08.97
	Pre-orbital length	04.15-05.19			05.24			05.91
	Upper caudal lobe	35.40-45.29	32.00-42.80	28.40-36.60	33.78	35.50-65.40	32.40-60.80	
	Lower caudal lobe	30.27-34.70	30.20-36.00	31.40-31.60	28.28	32.20-40.20	25.30-37.20	
	Eye diameter (Horizontal)	06.63-08.58	06.40-12.50	06.00-06.50	07.19	07.10-14.50	06.30-08.50	10.12
Meristic counts	Dorsal fin rays	32-35	33-36	34	33	33-35	32-34	
	Anal fin rays	28-30	28-30	28-29	25	26-29	26-29	
	Pectoral fin rays	19-20	20-22	19-20	19	19-22	19-20	
	Lateral Line scales	52-54	52-54	54	65	57-65	58-64	
	Gill rakers	12-16	12-16	16	15	13-15	13-15	
	Vertebrae	37-38	37-40	36-37	39	40-43	39-42	40

*Note: The morphometric characters of the holotype is retrieved from the radiograph available in online database of Smithsonian NMNH

more in Mural valai especially during October to February, but they are occasionally retained in catch owing to poor or no market value. All the collected specimens of *B. orcini* were dissected to study the feeding behaviour of the species. One stomach was found empty, one having a semi-digested fish (Trichuridae) and remaining all have cephalopods (Fig. 6). The cephalopods was found to be the preferred food items of the species. All the specimens (6 females and 4 males) were found to be spent.

Key to the genus and species of Bramidae occurring in the area

Adapted from Mead, Last and Moteki and Thompson[3, 4, 6], added with the observation made during the current study.

Keys for Genus

1. Dorsal fin scaly, non-recessible, interorbital broad and flat in frontal view……*Taractes*

Dorsal fin scaly, non-recessible, interorbital narrow and flat in frontal view…….. B

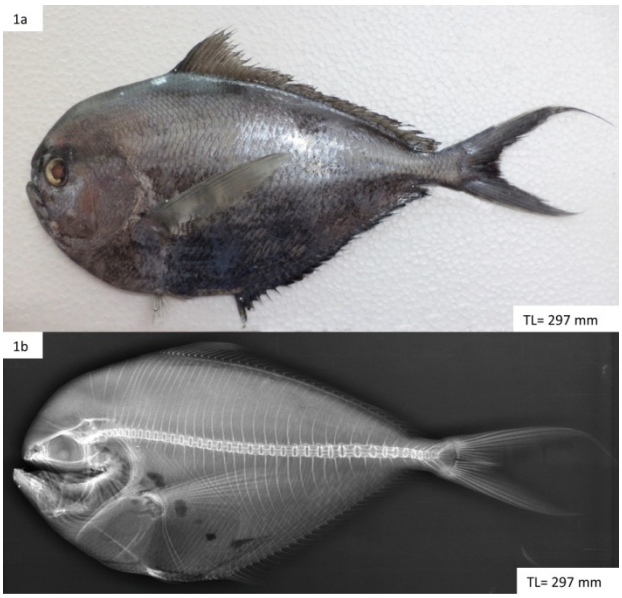

Fig: 1 — Fresh specimen of *Brama Orcini* (1a) and radiograph of *B. orcini* with 37 vertebra (1b) collected from Tharuvaikulam Landing Centre, Tuticorin, Tamil Nadu. [Specimen deposited at Marine Biodiversity Museum, CMFRI, Kochi (GB.31.133.2.8)]

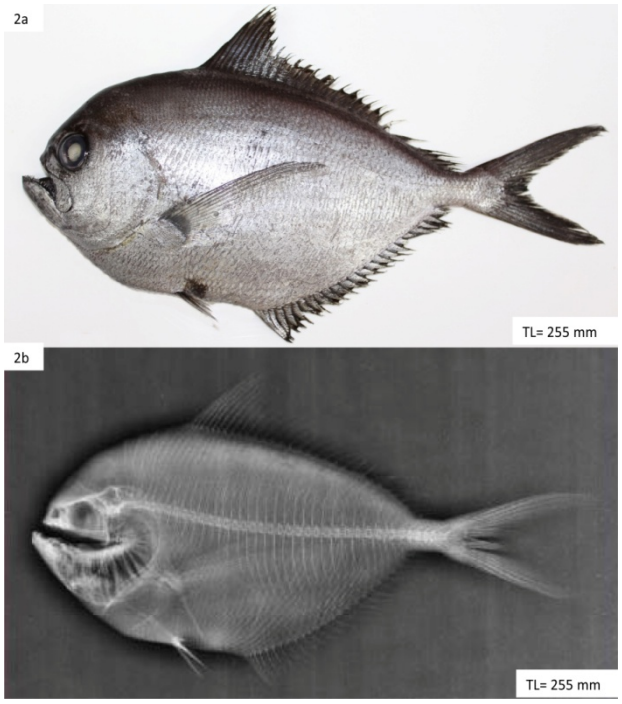

Fig. 2 — Fresh specimen of *Brama dussumieri* (2a) and radiograph of *B. dussumieri* with 39 vertebra (2b) collected from Cochin Fishing Harbour, Kerala.

2. Upper lip not free, connected to snout ……. *Brama* Upper lip free, not connected to snout, belly ridges originating forward of pelvic *Taractichthys*

Fig. 3 — Radiograph of *Bama myersi* holotype (Mead, 1972) with 40 vertebra taken from online database of Smithsonian NMNH (http://collections.nmnh.si.edu/search/fishes/?nb=254386)

Keys for species

1. Anterior part of dorsal and anal fin form strong lobe……. 2

Anterior part of dorsal fin and anal forms poor or no lobe……. 3

2. Prominent caudal keel present …… *Taractes rubescens*

Caudal keel absent…… *Taractichthys longipinnis*

3. Pectoral inserted low on body (Pectoral-pelvic distance <12.5% of SL) …. *Brama dussumieri*

Pectoral inserted high on body (Pectoral-pelvic distance >12.5% of SL)……..…… 4

4. Body deep, vertebrae mostly ≥ 40..... *B. myersi*

Body relatively elongated (sub-adult & adult), vertebrae 37-40 (mostly 38-39)……. *B. orcini*

Discussion

The morphometric variables studied during the present work were found to be in agreement with the previous works[4,17,20]. Ranges for different morphometric variables in our study were found comparable to that of Lee *et al*.[19-20], as the size ranges of the specimens were similar in terms of standard lengths. The results of the present study and works of Lee *et al.* comprised adult ones and hence morphometric variables in a narrow range are obvious. Nevertheless, the variables like body depths, length of upper caudal lobe showed prominent variation within species making them the least suitable for inter-species comparison. Mead[4] morphometric assessments were based on wider size ranges and hence most of the characters showed wider

Table 2 — Details regarding reports of Bramids along Indian Coast

	Date/Year of collection	Site of collection/Catch	Gear	Icon *	Species	Nos	Size range (TL) (cm)	Depth (m)	Latitude	Longitude
Present Study	08-11-2016	Tharuvaikulam LC	(Drift Gill Net)	●	*B. orcini*	1	29.23	≈700	08^0 19' 06''	079^0 05' 12''
	26-11-2016	Tharuvaikulam LC	(Drift Gill Net)	●	*B. orcini*	2	25.23-25.91	<50	08^0 12' 02''	078^0 12' 48''
	16-12-2016	Tharuvaikulam LC	(Drift Gill Net)	●	*B. orcini*	3	26.99-27.80	≈250	08^0 53' 52''	078^0 50' 39''
	14-01-2017	Tharuvaikulam LC	(Drift Gill Net)	●	*B. orcini*	4	28.77-36.45	≈1500	08^0 07' 17''	078^0 51' 33''
	02-02-2017	Cochin FH	Long Line	▲	*B. dussumieri*	1	25.5	≈1600	13^0 07'28''	072^0 35' 39''
	01-03-1962	Andamans (Off Chowra Island)	Long Line	★	*T. rubescens*	1	68.2 (SL)	<50	08^0 27' 00''	093^0 02' 00''
Previous reports	Feb, 1985 to Jun, 1987	Arabian Sea	Pelagic trawl	●	*B. dussumieri*	-	-	1990-3825	14^0 00' 00''	072^0 30' 30''
		Bay of Bengal	Pelagic trawl	□	*B. dussumieri*	-	-		07^0 00' 00''	083^0 00' 00''
									13^0 30' 00''	090^0 00' 00''
		Arabian Sea	Pelagic trawl	▱	*B. orcini*	-	-	1875-2835	05^0 00' 00''	071^0 00' 00''
									11^0 00' 00''	077^0 30' 00''
		Lakshadweep sea	Pelagic trawl	■	*B. myersi*			1097	10^0 47' 00''	073^0 45' 00''
	22-01-1990	N-W coast (Off Porbandar)	Long Line	◆	*T. longipinnis*	1	83	2375	22^0 35' 00''	067^0 14' 00''
	19-12-1991	Andamans (Off sentinal Island)	Long Line	★	*T. rubescens*	1	95	2245	10^0 28' 00''	091^0 44' 00''

*Note: Icons are provided to visualize the site of the capture in maps (Fig 4 & 5)

ranges. Juvenile fishes tend to share similar meristic features with their adult counterparts but can differ substantially in morphometry; and bramids forms ideal group to illustrate this[21]. Juvenile bramids have deeper bodies and longer upper caudal lobe during the juvenile phase than the adult. Even in adult members of genus *Brama*, the morphometric variables are either comparable between species or too variable within species to make them an effective taxonomic character. One of the characters used in the differentiation of species of genus *Brama* is the insertion point of the pectoral fin. Species like *B. orcini* and *B. myersi* have pectoral insertion higher than B. *dussumieri,* reflected in the pectoral-pelvic distance which is < 12.5% of SL in *B. dussumieri* and >12.5% in other two species reported from Indian waters. In the present study, we also found this reliable character after comparing the specimens of *B. orcini* (12.69-14.4%), *B dussumieri* (10.77%) and radiograph of *B. myersi* (17.02%) holotype USNM 254386[22]. Carvalho-Filho *et al.*[7] considered this character unreliable as he found a higher pectoral insertion in *B. dussumieri* referring to the support of image presented by Omori *et al.*[18]. But after our examination of the image given by them, we found that pectoral-pelvic distance is below 12.5% of SL which is even reflected in the range (9.6-12.3 % of SL) given by them. Although we have not examined the entire size range of the specimens, but in our opinion, pectoral fin insertion is a reliable character at least in case of adult and sub-adult specimens which is also reflected in earlier works of Omori *et al*. and Lee *et al.*[18-20], where larger specimens were studied. The most reliable and widely used characters for species differentiation among genus *Brama* are meristic characters like gill rakers, scales in horizontal series and vertebrae count. The above-mentioned meristic characters in the present study confirm the

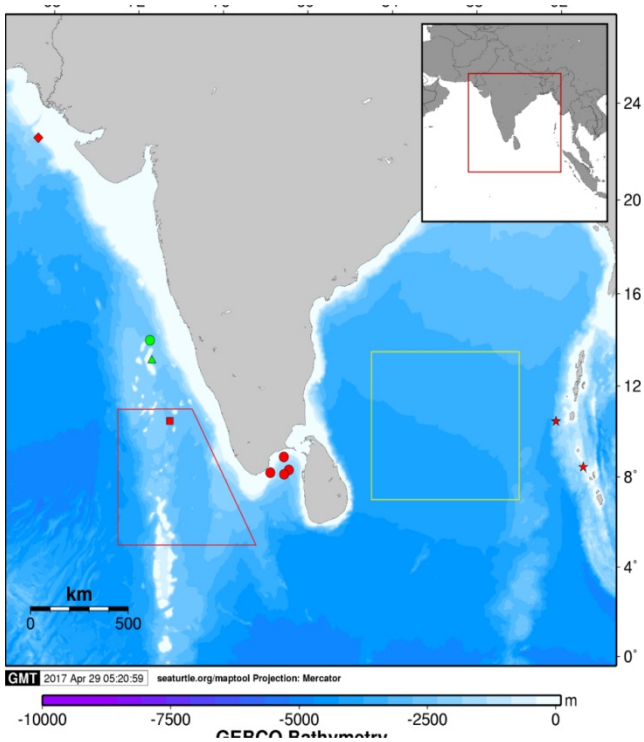

Fig. 4 — Capture sites of recorded Bramids from Indian waters including present study (modified from Seaturtle/maptool)

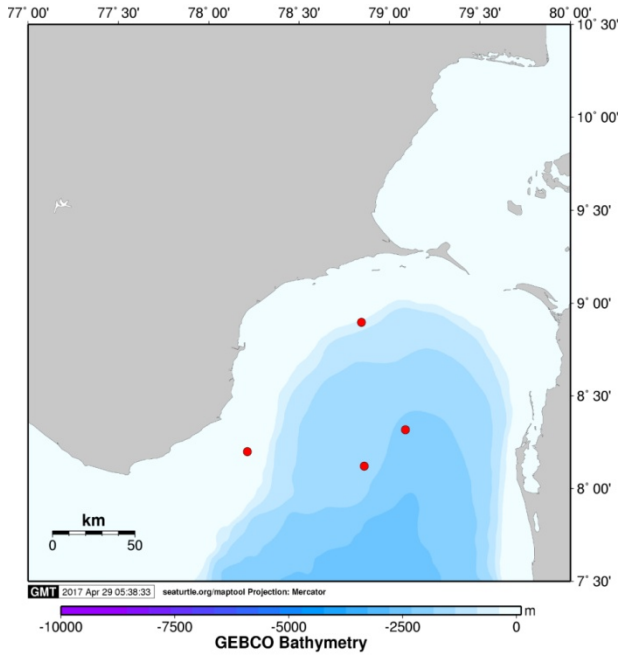

Fig. 5 — Present records of *Brama orcini* from Gulf of Mannar, India.

earlier observations. The above-mentioned meristic characters along with the insertion of pectoral were found enough in successful discrimination of the three species of *Brama* reported so far from Indian waters.

Fig. 6 — Gut contents of *Brama orcini*: Cephalopods (6a & 6b) and Trichurids (6c).

The current record of *B. orcini* is the first report of the species from the eastern coast of India. Joshi *et al.*[23] claim the presence of *B. raii* from the Gulf of Mannar, the same area from where *B. orcini* is recorded in the current study in a checklist of fishes for the mentioned geographical area. As of now, *B. raii* is not a valid species, earlier it has been used to refer *B. brama* (synonym), *B. dussumieri* and *B. japonica* (misapplied)[8]. As the literature do not have description or images for the specimens, it was not possible to infer that for which species the name has been referred. Nevertheless, *B. raii* is never referred for *B. orcini*, making the current study a valid claim as the first report of the species from this area. The family Bramidae in India has been represented by five species belonging to the three genera. The earlier reports included: *T. longipinnis* from the Arabian Sea (Off Porbandar), *B. dussumieri*, *B. orcini* and *B. myersi* from Lakshadweep Sea, *B. dussumieri* from the Bay of Bengal and *T. rubescens* from the Andaman Sea (Off Sentinal Island and Chowra Island)[9-11]. The bramids are highly migratory oceanodromous fish. All the earlier Indian record for the group has been from oceanic waters with an underlying depth range of 1000 to 4000 m, except a specimen of *T. rubescens* caught off Chowra Island, Andamans[9]. A majority of the fishes of these groups is epipelagic in nature occupying 1 to 200 m of upper water column[3] making their presence in shallower waters highly probable. The current study unlike most of the previous reports recorded the specimens from depth even lower than 50 m. In the present study, *B. orcini* has been reported over the depth range of

less than 50 m to 1500 m from Gulf of Mannar, whereas *B. dussumieri* from the west coast has been recorded from waters from the same area (earlier reports) with a comparable depth of water column. Hence, the current study proposes an extended distribution of the group not only along the Indian coast but also along the oceanic-neritic gradient. A general trend was observed between specimen size and depth. Larger specimens were collected towards the oceanic realm whereas the smaller ones towards the neritic realm. This trend is a preliminary observation which needs to be verified with larger sample sizes over longer duration for making conclusive remarks.

The feeding ecology of *B. orcini* revealed cephalopods as the preferred food item. The gut analysis of *Eumegistus brevoti,* a bramid species occurring along Brazilian coast revealed fishes (including Trichuridae), cephalopods and crustaceans among the food items of the group[7]. Though we failed to record any crustacean remains from the gut of our specimens, the remaining food items are in congruence with the earlier observation for the group. The variation in gut contents could be attributed to the area and species differences. Higher abundance in shallower water along with the higher proportion of spent specimens during study period indicates possible post-spawning feeding migration in food abundant shallower water, but it needs to be tested with larger sample size and thorough gut content studies in relation to the depth-wise prey abundance.

Realizing the fact that Indian marine fisheries are slowly but definitely moving into deeper waters, the probability of occurrence of the members of oceanic bramids in commercial catches is certainly higher than earlier. This is evident from the current reports which were all from commercial catches unlike most of the earlier ones which were part of one or other exploratory survey. Keeping the changed fishing scenario in mind, the given key in the article will facilitate the field observers in easy identification and reporting of the species.

Conclusion

The study has revealed that the distribution of bramids in Indian EEZ is incomplete. Though the study filled some of the links, possibly there are many such links to be filled. The likely presence of the species in even shallower water as revealed in the study needs to be supported by regular field visits and prompt reporting and collection from different areas. Analysis of more samples across different species will help us to understand the ecology and biology of these fishes in a better way.

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References

1 Paulin, C.D., Fishes of the family Bramidae recorded from New Zealand. *N. Z. J. Zool.*, 8(1) (1981) 25-31.

2 Maguire J., Sissenwine M., Csirke J., Grainger R. and Garcia S., *The State of World Highly Migratory, Straddling and other high seas fishery resources and associated species*. FAO Fisheries Technical Paper, (FAO, Rome) 2006, pp. 67.

3 Last P.R., Moteki M., Bramidae, Pomfrets. *In*: Carpenter K. E. and Niem V. (eds), *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 5. Bony fishes part II (Menidae to Pomacentridae)*, (FAO, Rome) 2001, pp. 2824-2836.

4 Mead, G.W., Bramidae. *The Carlsberg Foundation's oceanographical expedition round the World 1928-30 and previous Dana-expeditions*, (Dana-Report) 1972, pp. 166.

5 Mundy, B.C., *Checklist of the fishes of the Hawaiian Archipelago (Vol. 6),* (Bishop Museum Press) 2005, pp. 704.

6 Thompson, B. A., Bramidae. *In*: Carpenter, K. E. (Ed) *The living marine sources of the western central Atlantic, FAO, Rome, 2127 p., Vol 3, Bony Fishes Part 2. (Opistognathidae to Molidae), Sea turtles and Marine mammals*, (FAO, Rome) 2003, pp. 1469-1472.

7 Carvalho-Filho, A., Marcovaldi, G., Sampaio, C. L., Paiva, M. I. G. and Duarte, L. A., First report of rare pomfrets (Teleostei: Bramidae) from Brazilian waters, with a key to Western Atlantic species, *Zootaxa*, 2290 (2009) 1-26.

8 Froese, R. and Pauly D., Family Bramidae. Retrieved from http://www.fishbase.org/summary/FamilySummary.php?ID=319 (2017, February 4).

9 Luther, G., On the occurrence of *Steinegeria rubescens* Jordan and Evermann (Brammae: Pisces) in the Indian Ocean, *J. mar. biol. Ass. of India*,, 8(2) (1966) 354-356.

10 Balachandran, K. and Abdul Nizar, M., A check list of fishes of the Exclusive Economic Zone of India collected during the research cruises of FORV Sagar Sampada, in: *Proc. First workshop scient. Resul. FORV Sagar sampada*, 1990, pp. 305-324.

11 Nair, K. N. V., Sivaji, V. and Somvanshi, V. S., Two new record of Bramid deep water oceanic pomfret, *Tarachicthys longipinnis* (Lowe, 1843) and *Taractes rubescens* (Jordan and Evermann, 1887) from Arabian Sea and Bay of Bengal, *Occ. Pub. FSI*, 8(2) (1995) 01-08.

12 Cuvier, G. and Valenciennes, A., (1831). Histoire naturelle des poissons. Tome septieme. Livre septieme. Des Squamipennes. Livre huitieme. Des poissons apharyngiens labyrinthiformes. *Histoire naturelle des poissons*, (1831) 441-531.

13 Smith, M. M., Bramidae. *In*: Smith, M. M. and Heemstra, P. C., *Smiths' sea fishes*, (Southern Book Publisher, Johannesberg) 1986, pp. 633-636.

14 Hubbs, C. L. and Lagler, K. F., *Fishes of the Great Lakes Region (Revised ed.),* (University of Michigan Press, USA) 2004, pp. 332.

15 Maptools, Bathymetric map, Retrieved from http://seaturtle.org/maptool/ (2017, February 25).

16 NOAA, Bathymetry Data Viewer, Retrieved from https://maps.ngdc.noaa.gov/viewers/bathymetry/, (2017, March 8).

17 Moteki, M., Fujita, K., & Last, P., *Brama pauciradiata*, a New Bramid Fish from the Seas of Tropical Australia and the Central Pacific Ocean. *Jpn. J. Ichthyol.*, 41(4) (1995) 421-427.

18 Omori, M., Takechi, H., and Nakabo, T., Some notes on the maturation and spawning of the bramid fish, *Brama dussumieri*, in the south eastern waters of Japan. *Ichthyol. Res.*, 44(1) (1997) 73-76.

19 Lee, W. J., Kim, J. K. and Kai, Y., New Record of the Bigtooth Pomfret *Brama orcini* (Pisces: Bramidae) from Korea, *Fish. Aquat. Sci.*, 17(4) (2014) 497-501.

20 Lee, W. J., and Kim, J. K., New Record of *Brama dussumieri* (Pisces: Bramidae) from Korea, as Revealed by Morphological and Molecular Analyses, *Fish. Aquat. Sci.*, 18(3) (2015) 311-316.

21 Okiyama, M., *An Atlas of the Early Stage Fishes in Japan*, (Tokai University press, Tokyo) 1989, pp. 1154.

22 NMNH, *Brama myersi*. Retrieved from http://collections. nmnh.si.edu/search/fishes/?nb=254386, (2017, February10).

23 Joshi, K. K., Sreeram, M. P., Zacharia, P. U., Abdussamad, E. M., Varghese, M., Habeeb Mohammed, O. M. M. J., Jayabalan, K., Kanthan, K. P., Kannan, K., Sreekumar, K. M., George, G. and Varsha, M. S., Check list of fishes of the Gulf of Mannar ecosystem, Tamil Nadu, India, *J. mar. biol. Ass. of India,* 58(1) (2016) 34-54.