

# First record of two marine fish species from the northern Bay of Bengal, Bangladesh

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**Abstract.** The present study reports a new record of two marine fishes *Filimanus similis* (Feltes 1991) and *Naso unicornis* (Forsskål 1775) from Bangladesh waters. The specimens were collected from Saint Martin's Island and Cox's Bazar fish landing canter, Bangladesh. The specimens were diagnosed by analyzing their morphometric characters and DNA barcoding. The study also reports *Naso* as the first species of the genus ever recorded in the marine waters of Bangladesh.

Keywords: Saint Martin's Island, DNA Barcoding, Filimanus similis, Naso unicornis

#### Introduction

Bangladesh is one of the largest deltas in the world and has a coastline of about 710 km and 121,110 sq. km of Exclusive Economic Zone (EEZ). The coastal and marine ecosystem of Bangladesh networks from the Bay of Bengal and constitutes a unique diversity of ecosystem. Over 750 species of marine fish have been recorded from the brackish and marine waters of Bangladesh (Habib *et al.* 2019, Saha *et al.* 2019, Ahmed *et al.* 2020, Habib *et al.* 2020a, 2020b, Habib and Islam 2020, Hanif *et al.* 2020, 2021, Islam and Habib 2020, Sharifuzzaman 2021a, 2021b). Species of fishes are still being added to the existing list of fauna of Bangladesh, several new fish species are added into the countries fish checklist in last few years.

*Filimanus* Myers, 1936 is a genus of marine ray-finned fishes of the family Polynemidae commonly called threadfins. There are ten species found so far under the genus *Filimanus* in the world (Motomura 2004) whereas only one species, *Filimanus heptadactyla* (Cuvier 1829) was recorded in Bangladesh waters (Habib and Islam 2020). The genus *Naso* (Lacepède 1801) generally known as unicornfish belongs to the family Acanthuridae Bonaparte (1832). Although, the genus comprises approximately 20 species in the Indo pacific region (Randall 2002, Froese and Pauly 2021), no species has not been recorded yet of the genus *Naso* from northern Bay of Bengal, Bangladesh. The aim of this article is to confirm the occurrence of two species of marine fishes *Filimanus similis* (Feltes 1991) and *Naso unicornis* (Forsskål 1775) in Bangladeshi waters as well as the northern Bay of Bengal.

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## Materials and Methods

*Sample collection and preservation*: Specimens were collected from local angler of the Saint Martin's Island, Bangladesh (Fig. 1) and Cox's Bazar Fish landing centre. Voucher specimens were preserved in 90% ethyl alcohol and deposited in Aquatic Bioresource Research Lab, Department of Fisheries Biology and Genetics, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh for further analysis. Morphological study was conducted by following Feltes (1991, 2001), Randall (2001) and Motomura (2004).



Fig. 1. Saint Martin's Island and Cox's Bazar of Bangladesh, the sampling location of *F. similis* and *N. unicornis* in the northern Bay of Bengal ( $\mathbf{\nabla}$ ); and previously reported distribution of *F. similis* ( $\mathbf{\bullet}$ ) and *N. unicornis* ( $\mathbf{\star}$ ).

*Genetic analysis:* Pieces of preserved muscle tissues were used for genomic DNA extraction. The DNA extraction procedure was carried out using TIANamp Marine Animals DNA Kit (TIANGEN) following the protocol provided by the manufacturer. The COI gene fragment of mtDNA was amplified following Habib *et al.* (2017). PCR products were visualized on 1% agarose gel (Invitrogen, USA) stained with ethidium bromide in a gel documentation chamber (Model: Syngene InGenius). PCR samples with a single and clear visible band were purified with the PCR Purification Kit (TIANGEN-Universal DNA Purification Kit). The concentration of the purified DNA was assessed using Qubit 3.0 fluorometer. Sequencing was conducted with the same PCR primers by the Sanger standard method with automated sequencing (ABI 3730x1 DNA analyzer) at Macrogen Inc. (Korea).

Nucleotide sequences were edited and aligned using the bioinformatics software MEGA-7 (Kumar *et al.* 2016). For phylogenetic analysis, COI sequences of conspecific and congeneric species retrieved from the GenBank were used with the obtained sequences of the present study. *Carangoides malabaricus* (KU499676, Saudi\_Arabia) *Carangoides coeruleopinnatus* (KF489519, South Africa: Park Rynie) were used as outgroup. Phylogenetic analysis was performed using

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Maximum likelihood (ML) methods through IQ Tree (Nguyen *et al.* 2015, Trifinopoulos et al. 2016) with bootstrap analysis of 10,000 replications. ML tree was visualized using Figtree v1.4.3 and edited by Adobe Illustrator. We used the evolutionary model TPM2u+F+G4 in the phylogenetic analysis obtained as the best-fit model using the program Modelfinder (Kalyaanamoorthy *et al.* 2017). This model was selected by applying the Bayesian information criterion. Kimura-2 parameter (K2P) distance model (Kimura 1980) was used for calculating the genetic distance among the sequences using MEGA-7.

## Results

Two species of order Perciformes were identified in the present study namely *Filimanus similis* (Feltes, 1991) and *Naso unicornis* (Forsskål 1775). Diagnostic characters of these two species are given below:

Family: Polynemidae Rafinesque, 1815 Genus: *Filimanus* Myers, 1936 Species: *Filimanus similis* Feltes, 1991 English name: Indian sevenfinger threadfin (Fig. 2A, Table I, II)



Fig. 2. Lateral view (A) F. similis (SL 102 mm); (B) N. unicornis (SL 420 mm).

*Material examined*: Specimen collected from Cox`s Bazar, Saint Martin's island, coordinate 20°36'39.6" N, 92°19'37.2" E, by Md Jayedul Islam. One specimen; specimen voucher no. F1707SM-46, 102mm SL, GenBank accession number MK340618.

**Diagnostic characters:** Size small, body elongated, moderately compressed; snout pointed; occipital profile almost straight. Seventh pectoral filaments, not reaching midpoint of anal fin. The depth of the posterior margin of the maxilla is greater than the diameter of the eye. Snout pointed; posterior margin of preopercle serrated. The lateral line extends from the upper end of the gill opening to the mid-distal margin of the caudal-fin membrane. Caudal-fin deeply forked; non-filamentous.

	N. unicornis		F. similis		
	Present study	Randall	Present study	Motomura	
	(n=1)	(2001)	(n=1)	(2004)	
1 <sup>st</sup> dorsal fin spines	VI	VI	VIII	VIII	
1st dorsal-fin soft rays	26	27-30			
2 <sup>nd</sup> dorsal-fin spines	-	-	Ι	Ι	
2 <sup>nd</sup> dorsal-fin soft rays	-	-	13	11-13	
Pectoral-fin soft rays	16	_	14	13-16	
Pelvic-fin spines	Ι	Ι	Ι	-	
Pelvic-fin soft rays	3	3	5	-	
Anal-fin spines	II	II	III	III	
Anal-fin soft rays	27	27-30	12	10-15	
Caudal-fin rays	_	_	22	_	
Gill rakers	12	_	45	_	

 Table I. Meristic characters of the two new records of *Filimanus similis* and *Naso unicornis* collected in the present study and compared with reference data.

**Colouration:** Brown tinge at the top of the head and trunk, the undersides turning golden; posterior margins of 1st & 2nd dorsal, anal, and caudal fins blackish, residuals parts yellowish; pectoral fins mostly black; the base of pectoral filaments whitish in colour, turning yellowish white on posterior tips; the base of pelvic fin white, remaining parts yellowish.

*Distribution*: India, including the Laccadive Archipelago and Sri Lanka to west coast of Malay Peninsula of Indian Ocean (Feltes 1991, Motomura 2004), Saint martin's Island of Bangladesh.

Family: Acanthuridae Bonaparte, 1835
Genus: Naso Lacepède, 1801
Species: Naso unicornis (Forsskål 1775)
English name: Bluespine unicornfish (Fig. 2B, Table I, II)

*Material examined*: The specimen collected from Cox`s Bazar, coordinate 21°27'7.26"N 91°58'5.84"E (Fig. 1), by Md Najmul Alom. One specimen; specimen voucher no. F2103SM-12, 420mm SL.

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**Diagnostic characters:** Body deep and compressed, depth 2.3 in standard length; a pointed, bony, projection anterior to the level of eye, horn not extending anterior to mouth; dorsal profile of snout straight and forming angle of about 45°. Mouth small. Caudal peduncle cylindrical with 2 peduncular fixed bony plates on mid-side which have forward-directed, knife-like keels. Caudal fin truncated with filamentous lobes.

	N. unicornis	F. similis				
	(n=1) (mm)	(n=1) (mm)				
Total length	580.00	142.00				
Standard length	420.00	102.00				
Percentage of standard length						
Body Depth	16.67	30.39				
Head length	23.81	30.39				
1st dorsal-fin base length	70.00	15.69				
1st dorsal-fin length	14.29	20.59				
2nd dorsal-fin base length	-	20.59				
2nd dorsal-fin length	-	21.57				
Pectoral fin base length	5.95	3.92				
Pectoral fin length	14.29	26.47				
Pelvic fin base length	1.19	5.88				
Pelvic fin length	10.71	15.69				
Anal fin base length	55.71	20.59				
Anal fin length	11.90	19.61				
Caudal fin base length	6.43	14.71				
Caudal Peduncle length	8.10	36.27				
Caudal Peduncle Depth length	5.48	14.71				
Pre anal length	38.10	-				
1st dorsal-fin spine length	10.71	_				
2nd dorsal-fin spine length	10.71	-				
3rd dorsal-fin spine length	10.95	-				
4th dorsal-fin spine length	10.24	-				
5th dorsal-fin spine length	8.57	_				
6th dorsal-fin spine length	8.57	_				
1st anal-fin spine length	10.24	-				
2nd anal fin spine length	9.52	-				
Upper lobe of caudal fin length	39.29	-				
Lower lobe of caudal fin length	32.14	_				
Percentage of head length						
Inter orbital width	26.00	25.81				
Pre orbital length	82.00	12.90				
Post orbital length	98.00	61.29				
Eve diameter	13.00	25.81				

Table II.	Morphom	etric meas	urements	of two	new r	ecords o	f
F. sim	ilis and N.	unicornis	collected i	in the	present	study	

**Colouration:** Dorsal part of the body yellowish to olivaceous gray, and ventral is pale, peduncular plates and keel spines is blue; lips whitish; dorsal and anal fins yellowish with

narrow blue margins; caudal fin orangish basally, shading to gray, with a broad, pale greenish posterior border and caudal filaments are edged in blue.

**Distribution:** Andaman and Nicobars Island (Rajan *et al.* 2011), Indo-Pacific Red Sea and East Africa to the Hawaiian (Randall 1986, 2001), Marquesas and Tuamoto Islands, north to southern Japan, south to Lord Howe and Rapa islands and Somalia (Sommer *et al.* 1996), Cox's Bazar coast of Bangladesh.

**Genetic description:** A clear 611 bp nucleotide sequences of the COI gene of *F. similis* was obtained and submitted to the GenBank under the accession numbers MK340618. We did not get clear sequence for *N. unicornis*. To verify the result of morphological identification, COI barcode sequences of *F. similis* species with other conspecifics and congeneric species retrieved from the GenBank were compared. In the phylogeny, sequence of *F. similis* of Bangladesh formed a single clade with the two conspecific individuals from India with over 90% bootstrap value (Fig. 3). The genetic distances between Bangladesh and each of two Indian individuals were 0.8% to 1%. The overall mean genetic distance was 4.4%.



**Fig. 3.** Maximum Likelihood tree constructed for COI barcode sequences of *F. similis*. GenBank accession number and country of origin were given in the parenthesis. Bootstrap support over 90% are shown above branches. Scale bar indicates nucleotide substitutions per site.

#### Discussion

As the existing marine fish species of Bangladesh, the number '475' has been mentioned in almost all of the literatures of the country. However, reviewing all of the previous valid primary reports and scientific articles, Habib and Islam (2020) showed that a total of 740 species of marine fishes have been reported in Bangladeshi marine waters within last 50 years from 1970 to 2020 and over 50 marine fish species have been reported as the first records in country's fish

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checklist. In the present study, we have recorded two more marine fish species, *Filimanus similis* (Feltes 1991) and *Naso unicornis* (Forsskål, 1775) from the marine area of Bangladesh.

The early records revealed that the distribution range of the *F. similis* are from Pakistan to southern coasts of India, including the Laccadive Archipelago and Sri Lanka to west coast of Malay Peninsula of Indian Ocean (Feltes 1991, Motomura 2004). Feltes (2001) reported the occurrence of *F. similis* in the Bay of Bengal coast. However, there was no confirmation record of this species from the marine waters of Bangladesh as well as the northern Bay of Bengal. So, the present study has confirmed the occurrence of *F. similis* in Bangladesh coast as well as the northern Bay of Bengal. Similarly, though *Naso unicornis* was known to occur from Andaman and Nicobars Island (Rajan *et al.* 2011), Indo-Pacific Red Sea and East Africa to the Hawaiian (Randall 1986, 2001), Marquesas and Tuamoto Islands, north to southern Japan, south to Lord Howe and Rapa islands and Somalia (Sommer *et al.* 1996), there is no record of any species of the genus *Naso* in Bangladesh, even in the northern Bay of Bengal. So, the present study has confirmed the occurrence of the genus *Naso* in Bangladesh, even in the northern Bay of Bengal. So, the present study has confirmed the occurrence of the genus *Naso* into the northern Bay of Bengal for the first time based on the occurrence of species *N. unicornis* in this study.

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