



Range extension of *Acanthocephola indica* (Perciformes: Cepolidae) in the north-eastern Indian Ocean with taxonomic description

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Short communication

Abstract

Band fishes are relatively rare, have no economic value and are often caught in by-catch. *Acanthocephola indica* has been reported herein for the first time from the coast of Andaman and Nicobar Islands, Andaman Sea, India based on five specimens, adding to the cepolid diversity of the region. The species is described with detailed meristic and morphometric characters and compared with its known congeners. Molecular confirmation of the species was carried out using the partial mitochondrial cytochrome oxidase subunit I gene. This report updates the geographical distribution of this species, filling the missing link in the distributional range of the species along the Indo-Pacific region.

Keywords: Band fish, *Acanthocephola indica*, cepolidae, north-eastern Indian Ocean

Introduction

Fishes of the family Cepolidae, commonly called bandfishes, are benthic or suprabenthic fishes, distributed throughout tropical, subtropical and temperate waters with muddy or sandy substrates (Smith-Vaniz, 2001). Cepolidae comprises two subfamilies, Cepolinae and Owstoniinae consisting of five genera and 45 valid species (Fricke *et al.*, 2020). The subfamily Cepolinae encompasses two genera, *Acanthocephola* Bleeker, 1874 and *Cepola* Linnaeus, 1764, based on the presence or absence of preopercular spines (Smith-Vaniz, 2001). The genus *Acanthocephola* is represented by four valid species *viz.* *Acanthocephola krusensternii* (Temminck and Schlegel, 1845),

A. abbreviata (Valenciennes, 1835), *A. limbata* (Valenciennes, 1835) and *A. indica* (Day, 1888) with vast distribution along the Indo-west Pacific Ocean. *A. abbreviata*, *A. limbata* and *A. indica* have been reported from the peninsular Indian coasts (Day, 1888; Venkataraman *et al.*, 2002). Andaman and Nicobar archipelago is rich in ichthyofaunal diversity with 1434 species belonging to 165 families (Rajan *et al.*, 2013). The present study forms the first record of the species, *A. indica* and the second report of the species from the family Cepolidae from the coast of Andaman and Nicobar Islands, India adding to the cepolid diversity of the region with detailed morpho-meristic characters and phylogenetic analysis.

Material and methods

Five specimens of *A. indica* measuring 388.2 to 477.7 mm in total length (TL) were collected from Junglighat fish landing centre, Port Blair, South Andaman (11° 57' 64" N; 92° 88' 92" E) (Fig. 1). The specimens were identified based on the morphological and meristic characteristics described by Day (1888) and Smith-Vaniz (1986). Measurements were taken with a digital Vernier calliper with an accuracy of 0.1 mm. The meristic counts and morphometric measurements were compared with previously published records of *A. indica*. Vertebral counts were made from radiographs. The specimens are deposited in the national repository of the ICAR-National Bureau of Fish Genetic Resources (NBFGR), Lucknow, India for future reference.

Molecular analysis was carried out, using partial mtDNA cytochrome oxidase subunit I gene (COI). Tissue samples collected from the specimens were preserved in 95% ethanol.

The total genomic DNA was extracted from the muscle tissue samples with Qiagen Kit, as per the manufacturer’s protocol. Further, the quality and quantity of DNA were estimated with Nanodrop Bio Spectrometer (Eppendorf Pvt. Ltd). The partial COI gene was amplified using universal primers COI F (5 -TCA ACC AAC CAC AAA GAC ATT GGC AC-3) and COI R (5 -TAG ACT TCTGGG TGG CCA AAG AAT CA-3) (Ward *et al.*, 2005). The amplifications were performed in 25 µl reactions containing 10x assay buffer (100 mMTris, 500 mMKCl, pH 9.0) with 20 mM MgCl₂, 10pmoles of primers, 200 µM of each dNTP, 0.25 U Taq DNA polymerase and 25 ng of template DNA. PCR conditions consisted of initial denaturation at 95 °C for 5.0 minutes, denaturation at 94 °C for 30 sec., annealing 54 °C for 45 sec., an extension of 72 °C for 1.0 minute (30 cycles) followed by a final extension for 10 minute at 72 °C. PCR products were sequenced bidirectionally. Approximately 552 bp of COI gene region was amplified for three individual specimens of *A. indica*. The COI

sequences of three specimens were aligned with the sequences of other valid species of the genus *Acanthocephala* retrieved from NCBI (Table 1) and edited using BioEdit sequence alignment editor version 7.0.5.2 (Hall, 1999). The phylogenetic tree was constructed by adopting the method of maximum likelihood with gamma distribution and 1000 bootstrap replicates. The genetic divergences were calculated by the Kimura 2-parameter method using MEGA version 7.0 (Kimura, 1980; Kumar *et al.*, 2016). The sequence of *Cepola macrophthalma* was used as an outgroup for the phylogenetic analysis.

Results

Systematics

Order : Perciformes
 Family : Cepolidae
 Genus : *Acanthocephala* Bleeker, 1874
Acanthocephala indica (Day, 1888) (Fig. 2; Table 2, 3 and 4)

Materials examined: NBFG-AC 1-5, 5 specimens 346.9-411.7 mm SL, Junglighat fish landing centre, Port Blair, South Andaman, Andaman Sea (11°57'64"N; 92°88'92"E), October 2019.

Description: Body elongated and greatly compressed laterally, gradually tapering to caudal fin; Head small, 6.9-8.6 times in SL (in ratio) with the blunt snout; Eyes large 7.8-9.6 in HL, located dorsally, eye diameter more than snout length, 31.9-35.4 in TL; interorbital space flatten. Mouth large and strongly oblique with a single row of recurved canine teeth on both jaws, upper jaw with broad end reaches mid-eye; maxilla extending near posterior margin of eye; supramaxilla absent. Preopercular margin with five blunt and one serrated spine; two nostrils, posterior nostril larger located at the anterior edge of the eye as a simple pore. Wide gill opening, semi-circular in shape; long and slender gill rakers (8-13 + 25-32) with 100-131 filaments. Pseudobranchiae present, minute cycloid scales on the cheek and body and opercle scaleless. The lateral line originates near the margin of the opercle, and runs parallel to the dorsal-fin base, which concludes at the posterior fin end. Body depth at pectoral fin base 9.2-12.6 in SL. Dorsal-fin rays 80-89; caudal fin with 7-10 rays; anal-fin rays 94-103; pectoral fin with 17 rays and pelvic fin with six rays. Continuous dorsal and anal fins confluent with caudal fin. Posterior margin of pectoral fin rounded with branched rays; pelvic-fin origin anterior to pectoral fin, the outermost ray of pelvic fin longest, the commencement of anal fin just after the anus. Caudal fin lanceolate. Morphometric measurements are provided in Table 2.

Colouration: Freshly collected specimen (Fig. 2). Body pale pinkish-orange with several faint yellow narrow vertical bands; dorsal fin pale yellow with faint orange margin, a moderate

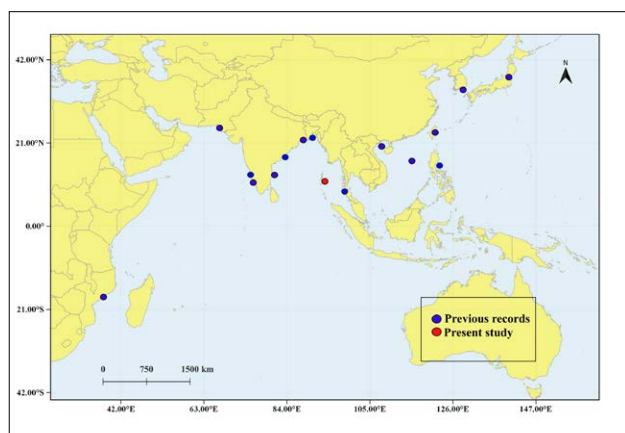


Fig. 1. Distribution of *A. indica* in the Indo-West Pacific. The red circle denotes, the present record in Andaman and Nicobar Islands, Andaman Sea and the blue circles indicate previous records.

Table 1. Sampling locations and GenBank accession numbers of *Acanthocephala* spp.

Species name	NCBI Accession number	Location
<i>Acanthocephala indica</i>	MT 758602	Andaman, India
<i>Acanthocephala indica</i>	MT758603	Andaman, India
<i>Acanthocephala indica</i>	MT758604	Andaman, India
<i>Acanthocephala indica</i>	KP244477	India
<i>Acanthocephala indica</i>	KP244476	India
<i>Acanthocephala indica</i>	KP244478	India
<i>Acanthocephala indica</i>	MG886841	Calicut, India
<i>Acanthocephala limbata</i>	KU893034	Taiwan
<i>Acanthocephala limbata</i>	KU944310	Taiwan
<i>Acanthocephala limbata</i>	KU944311	Taiwan
<i>Acanthocephala limbata</i>	KU944309	Taiwan
<i>Acanthocephala krusensternii</i>	MK777680	Vietnam
<i>Acanthocephala krusensternii</i>	NC034333	Japan

Table 2. Morphometric characters of *A. indica* from Andaman and Nicobar Islands, Andaman Sea

Morphometric characters	Range (n=5)	Mean±SD
Total length (mm)	388.2-477.7	
Standard length (mm)	346.9-411.7	
Percentage of standard length		
Head length	12.1-14.4	13.1±1.0
Snout length	1.7-2.2	1.9±0.2
Eye diameter (Same along both axes)	3.3-3.5	3.4±0.1
Eye (middle dark portion)	1.4-1.6	1.5±0.1
Inter-orbital distance	2.3-2.5	2.4±0.1
Distance between eyes	3.2-3.5	3.4±0.1
Maxillary length	3.4-4.1	3.9±0.3
Mandibular length	3.2-4.0	3.7±0.3
Width of gill opening	8.7-9.7	9.2±0.4
Snout to insertion of dorsal fin	9.2-10.8	9.9±0.7
Length of dorsal fin base	89.6-91.8	90.9±1.0
Snout to insertion of pectoral fin	12.7-14.7	13.7±0.7
Length of pectoral fin	6.7-8.3	7.5±0.8
Snout to insertion of pelvic fin	11.2-13.6	12.4±1.0
Length of pelvic fin	7.1-8.0	7.7±0.4
Snout to insertion of anal fin base	15.0-17.9	16.8±1.3
Length of anal fin	85.5-95.7	89.4±4.8
Length of caudal fin	10.2- 11.9	11.1±0.8
Snout to vent	14.2-16.8	15.3±1.1
Depth of body in line with eye	7.7- 8.7	8.2±0.4
Depth of body at dorsal fin insertion	9.7-10.0	10.5±0.5
Depth of body at pectoral fin insertion	10.0-10.8	10.5±0.4
Depth of body at pelvic fin insertion	10.2-11.1	10.8±0.4
Depth of body at anal fin insertion	10.6-11.7	11.0±0.5
Depth of body at mid-length	6.0-6.7	6.3±0.3
Depth of body at caudal fin insertion	0.9-1.0	1.0±0.1
Breadth of body at dorsal fin insertion	4.6-5.4	5.1±0.4
Breadth of body at mid-length	1.3-1.4	1.3±0.1

Fig. 2. *A. indica* Day (1888), 415.9 mm TL, Andaman and Nicobar Island, Andaman Sea

red to blackish oval blotch present in between 9th and 14th dorsal rays and iris red. Anal fin dismal yellowish to pink with dark reddish-black margin followed by a creamy whitish band

which runs throughout the fin. Pectoral fins are translucent. Pelvic fins pale, whitish-pink. Distal margin of caudal-fin dark black. In preservation (formalin), the body faded pink in colour and the fin membrane completely faded to beige with a dark dorsal and anal-fin base.

Distribution

A. indica is commonly distributed in Indo-West Pacific; India, Chennai (Day, 1888), Mangalore (Mahesh *et al.*, 2014); Calicut (Mahesh *et al.*, 2019), West Bengal (Pradhan and Mahapatra, 2018), Vishakapatnam (Silambarasan *et al.*, 2022); South Africa (Smith-Vaniz, 1986); Pakistan (Psomadakis *et al.*, 2015); Bangladesh (Saha *et al.*, 2017; Habib and Islam, 2020); Myanmar

Table 3. Comparison of morpho-meristic characters of *A. indica* from Andaman and Nicobar Islands with previous records

Parameters	Current study (n=5)	Day (1888) (n=1)	Smith-Vaniz (1986)	Park <i>et al.</i> (2008) (n=1)	Mahesh <i>et al.</i> (2019) (n=1)
Location	Andaman and Nicobar Island	Madras, India	South Africa	Korea	Calicut, India
Total length (mm)	388.2-477.7	200.3	-	245.0	556
Standard length (mm)	346.9-411.7	-	-	220.4	508
Head length	12.1-14.4	-	-	14.4	12.40
Snout length	1.7-2.2	-	-	3.3	1.77
Eye diameter	3.3-3.5	-	-	4.4	2.75
Body depth	9.7-10.0	-	-	13.7	11.02
Dorsal fin rays	80-89	ca.90	82-89	88	83
Anal fin rays	94-103	ca.90	91-102	101	93
Pectoral fin rays	17	17	-	17	19
Pelvic fin rays	1, 5	-	-	1,5	1, 5
Caudal fin rays	10	-	-	-	10
Gill rakers	8-13+25-32	-	-	16+33	13+32
Gill filaments	100-131	-	-	-	100
Vertebrae	12+63-66	-	12+60-66	12+66	-
Pre opercular spine	1+5	1+5	-	-	1+5

Table 4. Comparison of meristic characters of different species of the genus *Acanthocephala*

Parameters	<i>A. indica</i> Present study	<i>A. abbreviata</i> Yoshida <i>et al.</i> (2013)	<i>A. krusensternii</i> Park <i>et al.</i> (2008)	<i>A. limbata</i> Joshi <i>et al.</i> (2014)
Dorsal-fin rays	80-89	64-75	78~82	81-83
Anal-fin rays	94-103	63-76	76~82	91-93
Pectoral-fin rays	17	16	19	19
Pelvic-fin rays	1, 5	1, 5	-	6
Gill rakers	33-45	-	-	52-55
Caudal-fin rays	10	13	10-12*	10
Vertebrae	12+63-66	12+44-48	12+49-52*	12+60-67*

*Data from Smith-Vaniz (2001)

(Psomadakis *et al.*, 2020); Thailand (Satapoomin, 2011); Ha Long Bay, Northern Vietnam (Kimura *et al.*, 2018); Panay Island, Philippines (Motomura *et al.*, 2017); South China Sea (Chen *et al.*, 1997; Randall *et al.*, 2000); Taiwan (Shen *et al.*, 1993); Maemul Island, off east-southern Korea (Park *et al.*, 2008; Kim *et al.*, 2020) and Japan (Masuda *et al.*, 1984; Shinohara *et al.*, 2001, Nakabo, 2002)

Molecular analysis

The molecular analysis employing the mtDNA COI gene resulted in 552 bp length sequences which exhibited an identity of 100% to *A. indica* sequences available in the GenBank. After editing and aligning, the sequences were submitted to the NCBI gene bank and the accession numbers MT758602, MT758603 and MT758604 were obtained. Comparison of the present specimens with the sequences available in GenBank (KP244476, KP244477, KP244478 and MG886841) revealed a monophyletic

clade with 0% of intraspecific divergences (Table 5). *A. indica* showed 7.1 and 20.1% genetic divergences with *A. limbata* (Taiwan) and *A. krusensternii* (Taiwan) respectively. Overall, the phylogenetic tree using maximum likelihood algorithms and

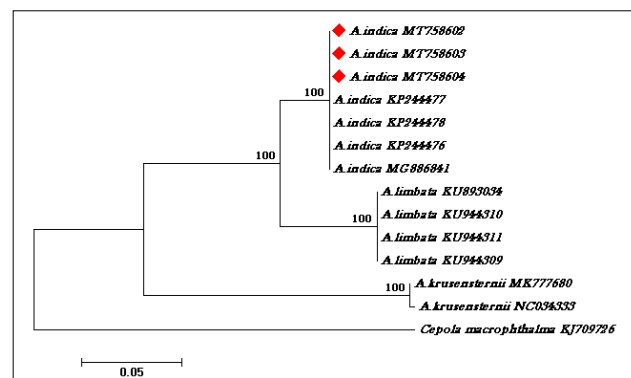


Fig. 3. Maximum Likelihood tree depicting collected specimen as *A. indica* using mitochondrial COI gene

Table 5. Kimura 2 parameter (K2P) distance values based on COI sequence between different species of the genus *Acanthocephala*

<i>A.indica</i> MT758602	<i>A.indica</i> MT758603	<i>A.indica</i> MT758604	<i>A.indica</i> KP244477	<i>A.indica</i> KP244478	<i>A.indica</i> KP244476	MG886841	<i>A.limbata</i> KU893034	<i>A.limbata</i> KU944310	<i>A.limbata</i> KU944311	<i>A.limbata</i> KU944309	<i>A.krusen</i> MK777680	<i>A.krusen</i> sternii NC034333	<i>Cepola</i> <i>macrophthalma</i> KJ709726
<i>A.indica</i> MT758603	0.000												
<i>A.indica</i> MT758604	0.000	0.000											
<i>A.indica</i> KP244477	0.000	0.000	0.000										
<i>A.indica</i> KP244478	0.000	0.000	0.000	0.000									
<i>A.indica</i> KP244476	0.000	0.000	0.000	0.000	0.000								
<i>A.indica</i> MG886841	0.000	0.000	0.000	0.000	0.000	0.000							
<i>A.limbata</i> KU893034	0.071	0.071	0.071	0.071	0.071	0.071	0.071						
<i>A.limbata</i> KU944310	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.000					
<i>A.limbata</i> KU944311	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.000	0.000				
<i>A.limbata</i> KU944309	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.000	0.000	0.000			
<i>A.krusensternii</i> MK777680	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.206	0.206	0.206	0.206		
<i>A.krusensternii</i> NC034333	0.203	0.203	0.203	0.203	0.203	0.203	0.203	0.208	0.208	0.208	0.208	0.002	
<i>Cepola</i> <i>macrophthalma</i> KJ709726	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.300	0.300	0.300	0.300	0.302	0.305

genetic divergences revealed that *A. indica* formed a distinct clade from the other species of the genus and thus confirmed the identity of *A. indica* from the Andaman Sea (Fig. 3).

Discussion

Among the four species of *Acanthocephala* genus, *A. indica* closely resembles *A. limbata* by possessing distinct reddish to black blotch on the anterior part of the dorsal-fin but can be readily distinguished from *A. limbata* by the presence of more dorsal-fin rays (80-89 vs 81-83 in *A. limbata*) and anal-fin rays (94-103 vs 91-93 in *A. limbata*) (Joshi *et al.*, 2014; Mahesh *et al.*, 2019). *A. abbreviata* differs from *A. indica* by having fewer dorsal-fin rays (64-75 vs 80-89 in *A. indica*) and anal-fin rays (63-76 vs 81-83 in *A. indica*). Further, *A. indica* differ from *A. krusensternii* by the presence of blotch on the dorsal fin membrane (absent in *A. krusensternii*) and also in having more dorsal-fin rays (80-89 vs 78-82 in *A. krusensternii*); anal-fin rays (94-103 vs 76-82 in *A. krusensternii*) and fewer pectoral fin rays (17 vs 19 in *A. krusensternii*) (Park *et al.*, 2008). The meristic characters of the present specimens are in agreement with the range of previous records made around the world (Table 2). Moreover, the dorsal and anal-fin counts of the present specimen match well with the South African specimens described by Smith-Vaniz (1986). The mitochondrial marker cytochrome oxidase subunit 1 (mt-co1) is widely used for molecular differentiation of closely related

species and phylogenetic analysis (Timm *et al.*, 2008) because its mutation rate is fast and also its sequence is conserved among congeners (Hebert *et al.*, 2003). Molecular analysis of the specimen confirmed the identification of the species.

Day (1888) described *A. indica* based on a single specimen collected from Chennai coast (Madras), India. Further, Venkataraman *et al.* (2002) documented *A. limbata* and *A. abbreviata* from the Gulf of Mannar, Bay of Bengal. Recent studies have reported *A. indica* from the Bay of Bengal (Pradhan and Mahapatra, 2018; Silambarasan *et al.*, 2022) and Beypore Fisheries Harbour, Calicut, west coast of India (Mahesh *et al.*, 2019). Andaman and Nicobar Islands are close to the southeast Asian countries and possess an ichthyofaunal assemblage of both Eastern Indian Ocean and Western Pacific Ocean fishes (Rajan *et al.*, 2013). The coastal waters surrounding the archipelago of the Andaman and Nicobar Islands that lie on the zone of tectonic contact between the Indian and eastern Asian plates, are highly productive, harbour high species diversities and form a suitable habitat for cephalopods. The checklist of Ichthyofauna of Andaman and Nicobar Islands and further studies ensued the addition of ichthyofaunal diversity in Andaman waters (Rajan *et al.*, 2013., Kumar *et al.*, 2016; Shirke *et al.*, 2017; Goutham *et al.*, 2017; Kumar *et al.*, 2018; Pradeep *et al.*, 2018; Tyabji *et al.*, 2018; Jayakumar *et al.*, 2020). Further, the documentation of *Owstonia kamoharai* from the Andaman and Nicobar Islands

by Oxona *et al.* (2020), added to the diversity of cepolid fishes in the region. However, the region seems unexplored and under-documented as far as cepolid diversity is concerned. Owing to the bio-geographical location of the Andaman and Nicobar Islands, species diversity around the region is unique and seems to overlap with that of Southeast Asia.

The present study forms the first documentation of this species in Andaman waters, thus affirming the wider distribution of the species in the Eastern Indian Ocean and filling the missing link in the cepolid distributions in the Indo-Pacific Ocean. More dedicated exploratory surveys will help in understanding the distributional patterns of ichthyofauna along the coast of the Andaman and Nicobar Islands as well as the probable establishment of new populations of species.

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References

Chen, Q. C., Y. Z. Cai and X. M. Ma. 1997. Fishes from Nansha Islands to South China Coastal Waters. Science Press, Beijing, 202 pp.

Day, F. 1888. The fishes of India; being a natural history of the fishes known to inhabit the seas and fresh waters of India, Burma, and Ceylon. Fishes of India, William Davison & Sons Ltd, London, 816 pp.

Fricke, R., W. N. Eschmeyer and J. D. Fong. 2020. Species by Family/Subfamily. Eschmeyer's Catalog of Fishes (<http://researcharchive.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp>). Electronic version accessed 06/07/2020.

Goutham, B. M. P., S. Rajendra and C. Raghunathan. 2017. Notes on yellow-spotted moray eel, *Echidna xanthospilos* (Actinopterygii: Anguilliformes: Muraenidae), from Great Nicobar Island, India. *Acta. Ichthyol. Piscat.*, 47(2): 209-212.

Habib, K. A. and M. J. Islam. 2020. An updated checklist of Marine Fishes of Bangladesh. *Bangladesh J. Fish. Res.*, 32(2): 357-367.

Hall, T. A. 1999. BioEdit: a user friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucleic. Acids. Symp. Ser.*, 41: 95-98.

Hebert, P. D., A. Cywinski and S. L. Ball. 2003. Biological identifications through DNA barcodes. *Proc. R. Soc. Lond. B. Biol. Sci.*, 270: 313-321.

Jayakumar, T. T., A. Kathirvelpandian, T. T. A. Kumar and K. K. Lal. 2020. First record of *Leptojulius lambdastigma* Randall and Ferraris, 1981 (Perciformes: Labridae) from the Andaman Islands, India. *J. Mar. Biol. Ass. India*, 62(1): 90-94.

Joshi V. P., S. A. Mohite and S. B. Satam. 2014. On the occurrence of the deepsea snake fish, *Acanthocephala limbata* (Cuvier) (Pisces: Cepolidae) along Ratnagiri coast, Maharashtra, India. *Species*, 7(17): 17-19.

Kim, J. K., H. J. Kwun, H. S. Ji, J. H. Park, S. H. Myoung, Y. S. Song, S. E. Bae and W. J. Lee. 2020. A guide book to marine fishes in Korea. Ministry of Oceans and Fisheries, Korea Institute of Marine Science and Technology Promotion, and Pukyong National University, Busan, Korea, 223 pp.

Kimura, M. 1980. A simple method for estimating evolutionary rates of base substitutions through comparative studies of nucleotide sequences. *J. Mol. Evol.*, 16(2): 111-120.

Kimura, S., H. Imamura, V. Q. Nguyen and T. D. Pham. 2018. Fishes of Ha Long Bay, the World Natural Heritage Site in northern Vietnam. Fisheries Research Laboratory, Mie University, Shima, 314 pp.

Kumar, A. M., S. Venu and G. Padmavati. 2016. First record of the pink lipped moray eel, *Echidna rhodochilus* (Bleeker 1863) (Family: Muraenidae), from Andaman and Nicobar Islands, India. *Int. J. Oceanogr.*, 2016: accessed 4.11.2020.

Kumar, R. R., S. Venu, K. V. Akhilesh, K. K. Bineesh and P. T. Rajan. 2018. First report of four deep-sea chondrichthyans (Elasmobranchii and Holocephali) from Andaman waters, India with an updated checklist from the region. *Acta. Ichthyol. Piscat.*, 48(3): 289-301.

Kumar, S., G. Stecher and K. Tamura. 2016. MEGA7: molecular evolutionary genetics analysis version 7.0 for bigger datasets. *Mol. Biol. Evol.*, 33(7): 1870-1874.

Mahesh, V., S. Benakappa, A. P. Dineshbabu, H. N. Anjanayappa, N. A. S. Kumar, M. E. Vijaykumar, S. R. Somasekara and J. Kumar. 2014. Finfish constituents of trawl low value by-catch off Mangalore. *J. Exp. Zool. India*, 17(2): 479-485.

Mahesh, V., P. K. Asokan, N. S. Jeena, K. K. Vinod, K. S. Koya and P. U. Zacharia. 2019. New Distributional Record of Deep Sea Snake Fish *Acanthocephala indica* (Day, 1888) from the southwest coast of India. *Thalassas*, 35(2): 561-565.

Masuda, H., K. Amaoka, C. Araga, T. Uyeno and T. Yoshino. 1984. The fishes of the Japanese archipelago, vol 1. Tokai University Press, Tokyo, 437 pp.

Motomura, H., U. B. Alama, N. Muto, R. P. Babaran and S. Ishikawa. 2017. Commercial and bycatch market fishes of Panay Island, Republic of the Philippines. The Kagoshima University Museum, Kagoshima, University of the Philippines Visayas, Iloilo, and Research Institute for Humanity and Nature, Kyoto, Japan, 246 pp.

Nakabo, T. 2002. Introduction of ichthyology. In: Nakabo T (Ed.) Fishes of Japan with pictorial keys to the species, Tokai University Press, Tokyo, p. 111-112.

Oxona, K., K. A. Kuma, M. Sileesh, R. Nikki, M. R. Kumar, M. Hashim and M. Sudhakar. 2020. New record of *Owstonia kamoharai* Endo, Liao and Matsuura, 2015 (Perciformes: Cepolidae) from the northeastern Indian Ocean. *Reg. Stud. Mar. Sci.*, 33: 100946.

Park, J. H., J. Hwa Ryu, J. M. Lee and J. K. Kim. 2008. First record of a Bandfish, *Acanthocephala indica* (Cepolidae:Perciformes) from Korea. *Korean. J. Ichthyol.* 20(3): 220-223.

Pradeep, H. D., S. S. Swapnil, M. Nashad, S. Venu, R. R. Kumar, G. Sumitha, D. S. Monalisha and M. K. Farejiya. 2018. First record and DNA barcoding of Oman cownose ray, *Rhinoptera jayakari* Boulenger, 1895 from Andaman Sea, India. *Zoosystema*, 40(4): 67-74.

Pradhan, A. and B. K. Mahapatra. 2018. The band fish *Acanthocephala indica* (Perciformes: Cepolidae) in the Northern Bay of Bengal, India. *Cuad. Inv. UNED*, 10(1): 127-130.

Psomadakis, P. N., H. B. Osmany and M. Moazzam. 2015. Field identification guide to the living marine resources of Pakistan. FAO species identification guide for fishery purposes. FAO, Rome, 386 pp.

Psomadakis, P. N., H. Thein, B. C. Russell and M. T. Tun. 2020. Field identification guide to the living marine resources of Myanmar. FAO species identification guide for fishery purposes. FAO, Rome, 694 pp.

Rajan, P. T., C. R. Sreeraj and T. Immanuel. 2013. Fishes of Andaman, Andaman and Nicobar Islands: a checklist. *J. Andaman. Sci. Assoc.*, 18(1): 47-87.

Randall, J. E. and K. K. P. Lim. 2000. A Checklist of the Fishes of the South China Sea. *Raffles Bull. Zool. Suppl.*, 8: 569-667.

Saha, T., S. K. Datta, A. A. Zhilik, N. Z. Chowdhury, S. Ahmed and M. S. Ahmed. 2017. First record of the band fish *Acanthocephala indica* (Perciformes: Cepolidae) from the Bay of Bengal, Bangladesh. *Univ. J. Zool. Rajshahi Univ.*, 36: 57-59.

Satapoomin, U. 2011. The fishes of southwestern Thailand, the Andaman Sea-a review of research and a provisional checklist of species. *Res. Bull. (Sun Chiwawitthaya thang Thale Phuket)*, 70: 29-77.

Shen, S. C., K. T. Shao, C. T. Chen, C. H. Chen, S. C. Lee and H. K. Mok. 1993. Fishes of Taiwan. Department of Zoology, National Taiwan University Press, Taipei, 960 pp.

Shirke, S. S., M. Nashad, M. D. Sukham and H. D. Pradeep. 2017. A first record of the bentfin devil ray *Mobula thurstoni* (Lloyd, 1908) (Myliobatiformes: Mobulidae) from the Indian EEZ of the Andaman Sea. *J. Threat. Taxa.*, 9(12): 11074-11080.

Shinohara, G., H. Endo, K. Matsuura, Y. Machida and H. Honda. 2001. Annotated checklist of the deepwater fishes from Tosa Bay, Japan. *Nat. Sci. Mus. Monogr.*, 20: 283-343.

Silambarasan, K., A. B. Kar, G. V. A. Prasad, S. K. Pattnayak and L. Ramalingam. 2022. New Records of Six Fish Species from Reef Off Visakhapatnam Coastal Waters, Northeast Coast of India. *Thalassas*, 38(1): 401-409.

Smith-Vaniz, W. F. 1986. Family Cepolidae. In: Smith M. M., Heemstra PC (Eds.) Smith's sea fishes. Springer Verlag, Grahamstown, p. 727-728.

Smith-Vaniz, W. F. 2001. Cepolidae, Bandfishes. In K. E. Carpenter & V. Niem (Eds.). FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Bony fishes part 3 (Menidae to Pomacentridae). Rome, Italy, FAO, p. 3331-3332.

Timm, J., M. Figiel and M. Kochzius. 2008. Contrasting patterns in species boundaries and evolution of anemone fishes (Amphiprioninae, Pomacentridae) in the Centre of marine biodiversity. *Mol. Phylogenet. Evol.*, 49: 268-276.

Tyabji, Z., R. W. Jabado and D. Sutaria. 2018. New records of sharks (Elasmobranchii) from the Andaman and Nicobar Archipelago in India with notes on current checklists. *Biodiv. Data J.*, 6: e28593.

Venkataraman, K., M. Srinivasan, C. H. Satyanarayana and D. Prabakar. 2002. Faunal diversity of Gulf of Mannar Biosphere Reserve, Conservation Area Series. 15: 1-77.

Ward, R. D., T. S. Zemlak, B. H. Innes, P. R. Last and P. D. N. Hebert. 2005. DNA barcoding Australia's fish species. *Philos. Trans. R. Soc. Lond. B. Biol. Sci.*, 360: 1847-1857.