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A PRELIMINARY NOTE ON THE BLACK SNOEK, *Thyrsitoides marleyi* Fowler, 1929 (PISCES: GEMPYLIDAE) FROM INDIAN WATERS

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ABSTRACT

Thyrsitoides marleyi Fowler, 1929 (Black snoek, Black sail snake mackerel), a monotypic species of the genus *Thyrsitoides* under the family Gempylidae was collected from the hook and line fishers of the south west coast of India to study the morphometrics, meristics and molecular credentials of the fish. The morphometrics, meritics and the DNA barcode of the fish emphasises the monotypic nature of the fish family. The DNA barcode (Accession no.: MG886840), upon comparison with NCBI database, confirmed that the species was *Thyrsitoides marleyi*, which exhibited an identity of 99% to *T.marleyi* from Japanese waters (Accession: AP012505.1). The X-ray photograph of the fish depicted the presence of two rows of intramuscular bones stretching from the dorsal and ventral side of the vertebral column on both sides forms one of the major distinguishing characteristics of the fish. The study pertinent to different facet cleared the taxonomic ambiguity of *T.marleyi* with *T.jordanus*, another species yet to be described.

INTRODUCTION

Snake mackerels, Escolars or Snoeks, of the family Gempylidae comprised of 24 species fewer than 16 genera, a most diverse group of fishes, distributed worldwide along the tropical and subtropical oceans (Kim *et al.,* 2012). Generally Gempilids are characterised by a fusiform to very long, oblong and compressed body, two separate dorsal fins, the second with a shorter base than the first followed by isolated finlets present behind the dorsal and anal fins in some species; pelvic fins small in some species or getting reduced to spines in others or absent. Mouth large with protruding lower jaw and sharp robust teeth (Nakamura and Parin, 1993). Snake mackerels are oceanic predators which swim fast, usually found in deep waters during day time and migrate to surface during night. Studies pertaining to the taxonomical and biological aspects of the family gempilidae were very less. The genus *Thyrsitoides* comprised of only one species, *Thyrsitoides marleyi* Fowler, 1929 worldwide. *T. jordanus,* a new species under the same genera was reported from the Gulf of Aqaba (Red sea) (Ajiad *et al.,*1982), but little is known about the distribution of the same species from anywhere in the world rather than the above said study. Especially from Indian waters, the detailed studies on snake mackerels were not recorded owing to its low contribution to the commercial fishery. Usually the species was noticed as a bycatch along with ribbon fishes, seer fishes and tunas.

The Gempilids were distributed widely from Indo-West Pacific Ocean, Korea, Japan, Taiwan, New Caledonia, New Hebrides, Malacca Straits, Andaman Sea, Western Australia, around Madagascar, La Reunion, East coast of South Africa and Red sea (Kim et al 2012). Gempilids reports from the Indian ocean were also very less. A study attributing to the Mean trophic index of fish fauna associated with trawl bycatch of Kerala, southwest coast of India (Bijukumar and Deepthi, 2009) has reported a fish under gempilidae family as *T. marleyi* specifying its habitat as benthopelagic, trophic index as 4.19 with a very low resilience.

The standard length reported in the above study ranged from 48.6 cm to 50.1 cm. The maximum size reported for the species was 200 cm (Fish base). Eventhough the fish was reported from Indian coast as a bycatch, a complete study were not done yet to describe its morphometrics, meristics and allied aspects. The fishes collected were shown some morphological similarities to *T.jordanus* a new species from the Gulf of Aqaba (Red sea), which was not mentioned anywhere rather than the study. So the present study was designed to make a supplementary note on *T. marleyi* pertinent to its morphology, meristics and molecular characters from Indian waters.

MATERIALS AND METHODS

The study is based on the samples collected from the hook and line fishers of Vizhinjam Coast, Thiruvananthapuram (8°22'38.43"N, 76°59'31.67" E). The photograph of the fish

in fresh condition and collection site is shown in Figure 1 and 2 respectively. Since the landings of Gempilids along the Indian coast is very rare attributing to its low occurrences in the fish samples. We were actually fortunate to collect a few samples of *T.marleyi* along the Vizhinjam coast during the landing centre days of September 2017 and waited for few months to collect more samples but fishers together had intimated that, the landings of such a fish was a rare occurrence and it occurred once or rarely twice in a year. The collected samples were brought to the laboratory and get it identified by Nakamura (1979) Ajiad *et al*, (1982) and Kim *et al,* (2012). The examined specimens were preserved in 10% formalin. The taxonomic ambiguity of the species was clarified by molecular identification of the species. The morphometrics and meristics of the collected samples were studied properly; to get a detailed report of the fish from Indian waters followed the method of Hubbs and Lagler (2004). The X-ray analyses of the samples were also done to clarify the skeletal structure of the fish. The examined specimen is deposited at the National Biodiversity Museum, a designated national repository of CMFRI, Kochi. DNA barcoding, a species identification technique which involves use of a marker region of approximately 650 base-pairs in the 5'-end of the mitochondrial cytochrome c oxidase subunit I gene (COI) was carried out to confirm the correctness of species identification of the specimens. Genomic DNA was isolated from the tissue stored in 90% ethanol using phenol-chloroform method(Sambrook& Russell, 2001). Amplification of partial sequences of COI gene was carried out using the primer set LCO1490/ HCO2198(Folmer *et al.*, 1994). PCR reactions were carried out in BIORAD T100 TM thermal cycler (Biorad, USA). The reactions were performed in 25μl containing 2.5 μl 10x assay buffer, 1.5μl $MgCl_2$ (1.5μM), 0.5 il of 10 μM of each primer, 0.5μl of 10μM dNTPs, 1 U Taq DNA polymerase (Sigma Aldrich, USA) and 1μl of 50-100 ng template DNA. The PCR cycling profiles were as follows: An initial denaturation of 4 minutes at 94 ° C, 30 cycles of denaturation for 30 seconds at 94°C, 30 seconds of annealing at 42°C, 45 seconds of extension at 72°C, and a final extension of 7 minutes at 72°C. The PCR products were checked on 1.5% agarose gels, bi-directionally sequenced and aligned in MEGA 7 (Kumar *et al*., 2016). Molecular identification of the specimens was conduct-ed by using the DNA sequences (650) of COI gene. The DNA sequence (Accession no.: MG886840) of the COI gene obtained from the present specimens were compared with those of *Thyrsitoides marleyi*(Accession No. : AP012505.1, Japan) deposited at the National Center for Biological Information (NCBI) database.

RESULTS AND DISCUSSION

The fish is described based on the samples collected from the hook and line fishery along the Vizhinjam coast, caught by a local fisherman from a depth of over 80m. Initially the genera *Thyrsitoides* were diagnosed by the following characters of bifurcated lateral line; separate two dorsal fins; well developed ventral fin, finlets behind dorsal and anal fins, almost similar second dorsal fin and anal fin counts; forked caudal fin, definite scale pattern on the different patches of the body; colour copper blue and brown dorsally and whitish to silver ventrally. The total length and weight of fishes varied from 56 - 85 cm

Table 1: Comparison of measurements of T. marleyi

Morphometrics	Present study	Maeng (2012)Korea	Machidae (1985)	Nakamura (1980)
Total length	887	976	-	794.8
Fork length	802	873	-	717.7
Standard length	785	818	471	688
Measurements (%SL)				
Body depth	11.25	10.7	1.7	11.0
Body width	8.40	5.6	4.7	5.4
Head length	25.47	26.6	25.7	24.8
Pre-dorsal length	25.60	24.3	23.9	23.1
Pre-pelvic length	31.21	29.6	30.1	29.5
Pre-pectoral length	24.56	26.5	-	25.2
Pre-anal length	75.79	78.0	78.1	76.6
Upper jaw length	11.71	11.3	-	11.3
Lower jaw length	13.75	12.3	-	-
Snout length	9.89	10.6	-	11.1
Interorbital length	4.01	4.1	-	3.9
Eye diameter	3.98	3.7	-	3.8
Caudal peduncle length	5.4	3.9	-	6.1
Caudal peduncle depth	2.92	3.1	-	3.1
Pectoral fin length	11.2	10.2	-	10.5
Pelvic fin length	5.29	6.0	-	6.4
Spiny dorsal length	47.77	-	-	-
Soft dorsal length	9.55	-	-	-
Anal fin length	6.5	7.7	-	-
Meristics				
Dorsal fins	XVIII, i+11+6	XVIII, i+11+6	XVIII, i+11+6	XVIII, i+17
Pectoral fin rays	I,14	I, 13	I, 13	I, 14
Ventral fin rays	I, 5	II, 4	II, 4	I, 5
Anal fin rays	ii, 16	ii, 17	ii,17	ii, 16
Vertebrae	34	34	-	-
Branchiostegals	7	-	-	-

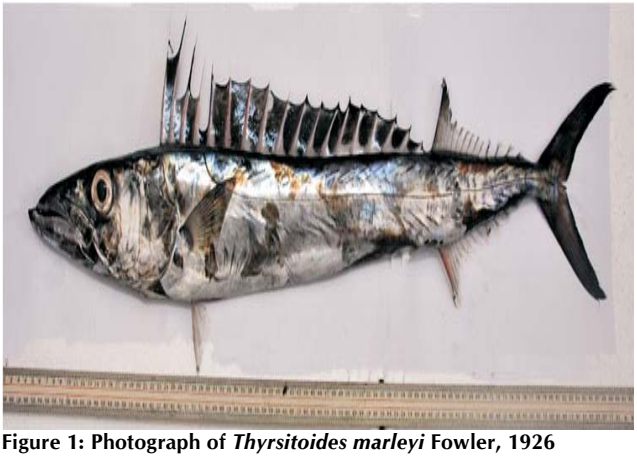

Figure 1: Photograph of *Thyrsitoides marleyi* Fowler, 1926

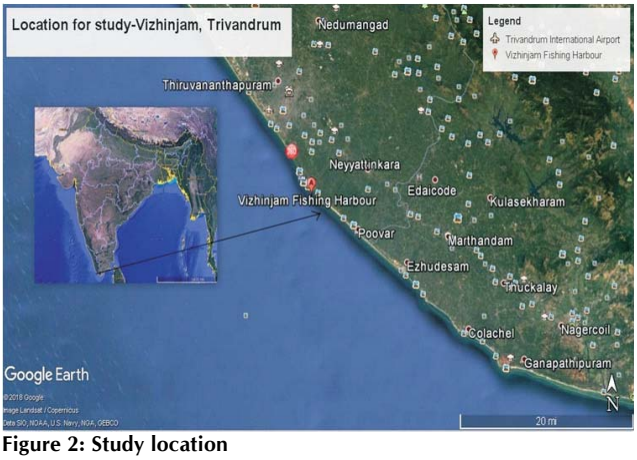

Figure 2: Study location

and 0.85 - 1.925kg respectively. The body is elongated and slightly compressed with tiny cycloid scales at different patches of the body. Head is large and the dorsal profile of head sloping gently with an interorbital groove on the dorsal surface. Two pairs of nostrils present; pore like on anterior and large slit like on posterior. Mouth cleft of the fish is quite wide with lower jaw protrudes in front of the upper jaw. Both jaws bears sharp irregular canine like teeth, of which 29 and 18 on upper and lower jaw respectively on each side. Tip of the each jaw with a small cartilaginous process and 3 pairs of well developed fangs like teeth on each side which are irregular in form. Operculum smooth and without spines and scales. There is long gill arch without apparent gill rakers, but numerous sharp tiny spines along the gill arch. The morphometric and meristic counts of the examined specimen and its comparison to earlier workers were given in Table 1.

Well distinguished spiny and soft dorsal fins present, spiny dorsal with black and white patches on the membrane and the soft with only a black patch on the anterior tip. Pectoral fin well developed with the upper ray reach up to the middle of 6th and 7th dorsal spine. Pelvic fin starts below the third dorsal spine, behind the pectoral fin and anal fin under the 2nd dorsal fin, followed by finlets. Finlets along the dorsal and ventral side are membraneous attachments with a longer finlet at the end on both sides. Lateral line originates from operculum and bifurcates between 4th and 5th dorsal spine, where the lower branch curves downward to pectoral fin and moves straight through the middle of the body to the caudal peduncle with a slight tilt between the 11th and 12th spine. The upper branch runs along the dorsal profile of the body and ends near the soft dorsal fin asymmetrically on both sides. Caudal fin very well forked with a little long ventral lobe which is blackish in colour. Body is blackish brown dorsally and silver ventrally with silver and brown crescent shaped patches along the body in fresh condition. The X-ray photograph of the fish showed that, two rows of intramuscular bones stretching from the dorsal and ventral side of the vertebral column on both sides and it is clearly depicted in Fig. 3. A total of 32 ribbings from the dorsal and ventral sides of the body were counted from the photograph and the vertebral count was 34. The fishes described upon showed some characters similar to *T.jordanus* as well as *T.marleyi*. The DNA barcode from this study

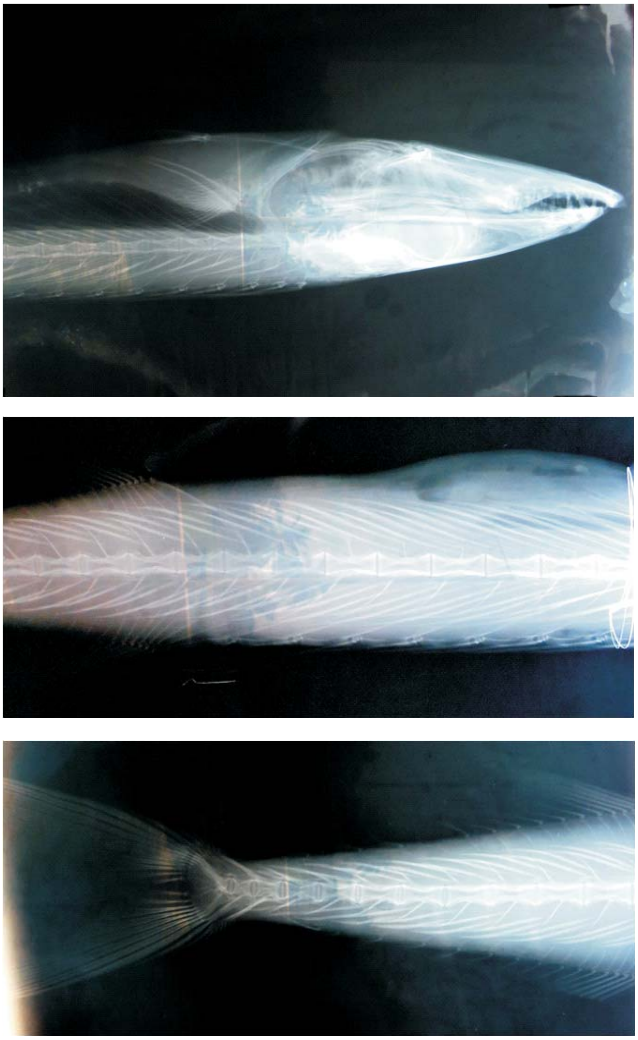

Figure 3: X-ray photograph of *T.marleyi* Fowler, 1926 showing the vertebrae and internal ribbings

(Accession no.: MG886840), upon comparison with NCBI database, confirmed that the species was *T. marleyi*, which exhibited an identity of 99% to *T. marleyi* from Japanese waters (Accession: AP012505.1). The examined specimens used for

the present study were submitted to the National Marine Biodiversity Museum, a national repository of CMFRI, Kochi (Details: EB 3162205, 887.0 mm, standard length(SL), Hook and line, National Marine Biodiversity museum, Kochi, Kerala, India).

The present study is an appurtenant to the marine fin fish biodiversity along the Indian coast, which in turn articulates the rare landings of the Indian fishery. The above details of the specified fish was not reported anywhere from India except a mention of the same as a bycatch or sporadic occurrence. *DNA barcoding* which is a validated tool for species identification (Henriques *et al*., 2015) was also employed as a supplemental identification method in addition to morphological characters in this study. The result indicated that COI sequences of present specimens were 99% identical to *T. marleyi* from Japanese waters(Accession: AP012505.1). The study cleared the taxonomic ambiguity of *T. marleyi* from Indian waters. All the samples collected were in spent and spent recovering phase and the stomachs were emptied or in fully digested condition.

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