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Notes on the distribution and range extension of the black-lined sleeper Goby, *Valenciennea helsdingenii* (Bleeker, 1858) (Gobiiformes: Gobiidae) in Gulf of Mannar and Palk Bay, India

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ABSTRACT: The present paper documents the occurrence of the black-lined sleeper Goby, Valenciennea helsdingenii (Bleeker, 1858) from northern Gulf of Mannar and south Palk Bay, southeast coast of India. This species is characterized by a body with two dark stripes that connect the head and caudal fin and a large dark spot between the third and sixth dorsal fin spines. A total of 6 specimens were collected during the study period from Gulf of Mannar and Palk Bay waters. The present report extends the range of distribution of this species, which was reported earlier from Punnakayal (southern Gulf of Mannar region). This study recommends the need for more taxonomical studies on the cryptic fish species of shallow coastal waters to better understand its diversity and distribution pattern.

Keywords: The black-lined sleeper Goby, Range extension, Gulf of Mannar and Palk Bay.

INTRODUCTION

The perciform suborder Gobioidei includes fishes colloquially known as 'Gobies'. The suborder includes 10 families, about 270 genera and about 2300 species, with more species being described regularly (Larson and Murugan, 2018). The gobiid genus *Valenciennea* consist of 15 recognized species, which includes *V. helsdingenii*, one of the larger sized species with maximal total length of 25 cm (Kuiter 1993; Hoese and Larson 1994). Gobies of the genus *Valenciennea* are common crypto-benthic reef fishes and are poorly known in terms of taxonomically and ecologically (Hoese and Larson 1994). These fishes exhibit cryptic behavior in the reef to hide, or they can be visually cryptic, having coloration that matches the substrate where they live (Depczynski and Bellwood, 2003; Goatley and Brandl 2017). Fast-growing and with naturally short lifespans, these fishes are an important functional group on coral reefs because of its biological characterization (Depczynski and Bellwood 2006). Fishes of this genus are difficult to sample due to their complex cryptic nature and, therefore, relatively understudied worldwide (Ackerman and Bellwood, 2000; Robertson and Smith-Vaniz 2008).

In India, about 150 species of gobiids have been reported (Day 1876, Jones and Kumaran 1980, Murty 2002), which suggest that the greatest diverse fish family is poorly studied in the Indian context. Recent studies have been undertaken on the highly cryptic fish species on molecular front to provide the diversity of these under studies fish family. Black-lined sleeper goby, *V. helsdingenii* have a wide distribution range and are found in the temperate and tropical waters of the Indian Ocean and the western Pacific Ocean from the coast of East Africa, the southern Red Sea, the Maldives, south-east India and Sri Lanka, Southeast Asia, Australia, western Oceania and Japan (Hoese and Larson 1994, Lieske and Myers 1994, Clark *et al.*, 2000, Randall *et al*., 1990, Randall *et al.*, 1997; Kannan *et al.*, 2013). Generally, from conservation point of view, this species is listed as 'Least Concern' (LC) as per the IUCN Red List of Threatened Species and the international trade is 'Not Evaluated' by CITES. Despite their great abundance and ecological importance in coral ecosystem a very few studies has been done on these species (Hoese and Larson 1994; Myoung *et al.*, 2014), which suggest the research gap for the study species and hence more studies are needed to know its distribution and ecological role in the reef ecosystem.

During this study, a total of 6 specimens of *V. helsdingenii* collected, among them, 3 specimens were

collected from the by catch of bottom trawlers operated in Keelakarai (Gulf of Mannar) and Mandapam North (Palk Bay) and the rest of the 3 specimen were caught at Sadamuniyanvalasai reef patch outside the Gulf of Mannar National Park area near Ervadi by undertaking gillnet operation coupled with skin diving, a common practice undertaken by traditional fishermen for targeting reef associated ornamental fishes for ornamental fish trade (Murugan and Durgekar, 2008). *V. helsdingenii* is one among the top variety of reef fishes which are collected from Gulf of Mannar region for domestic aquarium trade by disturbing the reef ecosystem (Prakash *et al.,* 2017). This fish has gained high economic value in aquarium trade due to its colourful appearance, white body colour with two distinct black and orange horizontal lines extending the length of the body and dorsal fin with black-edge, gives it a dramatic look. It is a very timid fish, which makes it a great addition to a reef aquarium and aid in maintaining the sand bed (https://reefs.com/fish/railway-gobies and http://reefkeeping.com/issues/2003-09/hcs3/index.php). However, *V. helsdingenii* (Bleeker, 1858) was previously reported to be caught using drift gill net operated at Punnakayal, Tuticorin, India, which suggest that the study species was caught in the pelagic waters (Kannan *et al.* 2013). Nevertheless, the present study clearly indicates that the study species was caught from demersal fishing practices in the northern Gulf of Mannar waters and Palk Bay region.

MATERIALS AND METHODS

Field surveys were conducted on a monthly basis along southern Tamil Nadu, coast of India (Fig. 1) from August-September 2019. Six specimens of *V. helsdingenii* (93.74-117.45 mm SL) were collected during this study and three among them were recorded from the bottom trawl by-catch (code end mesh size range, 18-25 mm) at Keelakarai (09°04’36”N, 78°22’01”E) and North Mandapam (09°17’09”N, 79°07’43”E), whereas another 3 species where recorded from gill net (mesh size – 08mm, locally called as Koosu valai) operation coupled with skin diving in the reef ecosystem at Sadamuniyanvalasai near Ervadi (09°12’07”N, 78°43’16”E). After collection of specimens from the landing centers, fresh photographs were taken, and the specimens were then preserved in 10% formaldehyde solution. Sspecimens were deposited in the Centre of Advanced Studies in Marine Biology, Annamalai University, Reference Museum (CASMBAURM), Parangipettai, India. Morphometric measurements were carried out using a digital Vernier caliper of 0.01 mm accuracy. Specimens were identified to species level by following previously published key (Hoese and Larson 1994; Kannan *et al.*, 2013; Myoung *et al.,* 2014). Measuring methods follows Hoese and Larson (1994) and Kannan *et al.,* (2013). The results are expressed in % of standard length (SL).

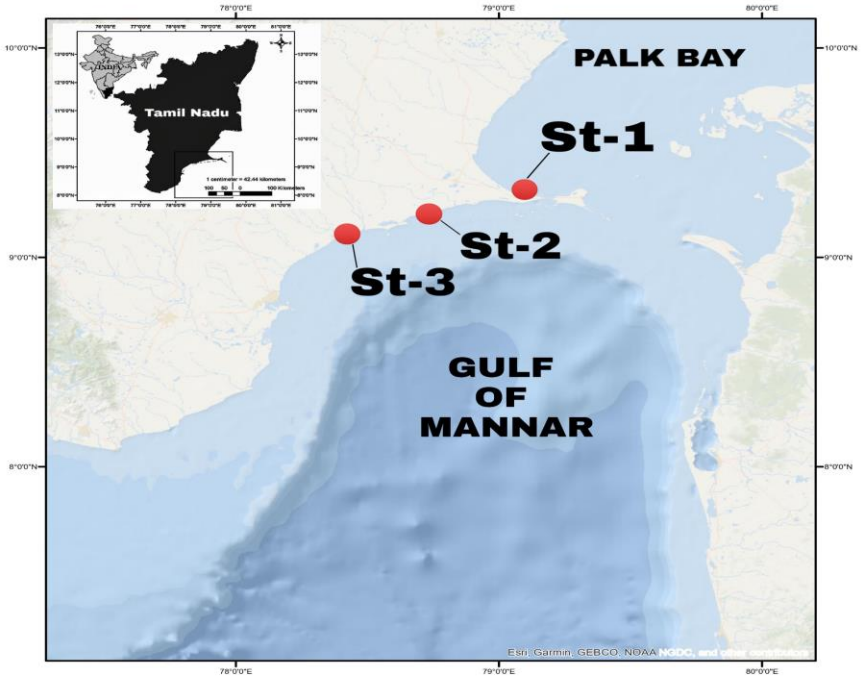

Fig. 1. Sampling stations in Tamil Nadu coastal waters {St-1 North Mandapam, St-2 Sadamuniyanvakasai (near Ervadi) and St-3 Keelakarai}, where *V. helsdingenii* was recorded**.**

A. Materials examined

Materials from India: CASMBAURM/232116481-82, 2 specimens (93.74-113.12 mm SL), Mandapam, India: Tamil Nadu, on 13 August 2021. CASMBAURM/232116483-84, 2 specimens (109.1-115.23 mm SL), Sadamuniyanvalasai near Ervadi, India: Tamil Nadu, coll. on, 24 September 2021. CASMBAURM/232116485-86, 2 specimens (106.81 - 117.45 mm SL), Keelakarai fish landing centre, India, Tamil Nadu, on 24 September 2021. Comparative material: Comparative material: RMNH 4660 (holotype= Molucca Islands, Indonesia).

RESULTS AND DISCUSSION

Systematics

Order Gobiiformes; Günther, 1880
Family Gobiidae Cuvier, 1816
Genus *Valenciennea* Bleeker, 1856
Species *Valenciennea helsdingenii* (Bleeker, 1858)

Synonyms

Calleleotris helsdingenii (Bleeker, 1858)
Eleotriodes helsdingeni Bleeker, 1858 (misspelling)
Eleotriodes helsdingenii Bleeker, 1858
Valenciennea helsdingeni (Bleeker, 1858) (misspelling)
Valenciennesia helsdingenii (Bleeker, 1858)

Description

Valenciennea helsdingenii with the following combination of characters: VI, I- 12 dorsal-fin rays; I, 12 anal-fin rays; 22/22 pectoral-fin rays; I, 5 pelvic-fin rays; 17, Caudal segmented rays and 10+16 vertebrae. (Fig.2).

The head and body are slightly elongated and compressed; the anterior profile of the head is almost rounded. The jaws are less equal length; the upper jaw extended slightly than the lower jaw; the mouth is terminal, below the long snout; teeth villiform; Vomerine tooth patch present; a row of conical and curved teeth in the upper jaw; lower jaw with two rows of teeth. Gill opening narrow to pectoral fin base, upper part of 1st gill arch with fleshy pads and short lobes. Pectoral, pelvic, anal and caudal-fin rays branched. Dorsal fins divided two: first dorsal fin rounded, third and fourth spines are longest in the first dorsal fin; second dorsal fin parallel to anal fin; pelvic fins entirely separated with no frenum; upper-most and lower-most caudal fin with filamentous rays. The lateral line continuous on body, extending from the preopercular to caudal-fin base. Pectoral base and prepelvic area covered with cycloid scales. The body is entirely covered with small ctenoid scales, absent at head and cycloid scales on belly. The ranges, means of morphometric characters and meristisc characters are given in the Table 1 and Table 2.

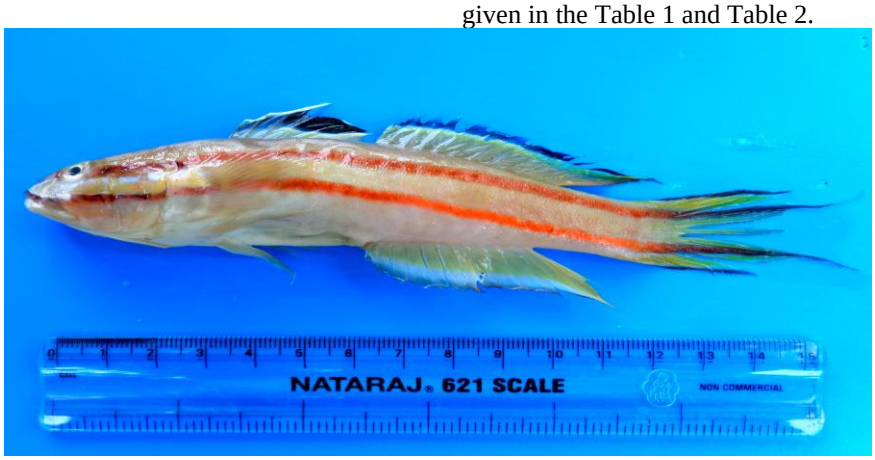

Fig. 2. *Valenciennea helsdingenii* (Bleeker, 1858), collected from trawl by-catch at Keelakarai, Tamil Nadu, India.

Fig. 3. Live *Valenciennea helsdingenii* (Bleeker, 1858), collected from Mandapam North, Tamil Nadu, India.

Table 1: Ranges and means of morphometric characteristics of *Valenciennea helsdingenii* (n=6).

Parameters	Present study (n=6) CASMBAURM/232116481~86		Kannan *et al*., 2013 (n=2) GB.31.66.230.1 and GB.31.66.230.1.1
	Range	Mean	Range
Total length (mm)	127.64-158	148.157	-
Standard length (mm)	93.74-127.64	109.342	97- 145
% of Standard length			
Head length	29.93-28.15	29.11	25.5-23.7
Length of first dorsal-fin base	29.28-18.26	22.54	-
Length of second dorsal-fin base	34.18-23.44	27.67	-
Length of anal-fin base	28.3-23.25	25.07	-
Body depth at origin of dorsal fin	21.88-16.06	18.86	17.9-17.5
Body depth at origin of anal fin	21.82-18.48	19.81	-
Body Width at origin of anal fin	15.98-12.5	14.33	-
Pre-first dorsal length	36.19-34.98	35.65	33.1-33.0
Pre-second dorsal length	58.43-53.98	56.25	-
Pre-pectoral length	35.72-30.44	32.81	31.0-27.8
Pre pelvic length	36.67-26.69	30.21	29.0-27.8
Pre-anal length	61.93-50.51	58.62	59.3-57.7
Pectoral fin length	19.37-16.06	17.77	-
Pelvic fin length	20.56-14.75	16.82	-
Caudal fin length	38.28-30.73	34.53	-
Length of caudal peduncle	17.88-14.34	16.52	17.2-16.5
Width of caudal peduncle	5.61-4.68	4.96	11.3-10.3
Least depth of caudal peduncle	5.61-4.68	12.03	-
% of Head length			
Snout length	39.68-33.62	36.06	-
Eye diameter	18.97-15.58	18.88	-
Upper-jaw length	40.2-32.54	36.988	-
Lower-jaw length	36.83-27.96	33.98	-
Inter-orbital length	31.54-24.47	29.12	-
Head width	53.49-43.74	49.18	-
Head depth	76.23-55.78	68.19	-

Table 2. Meristic characteristics of *Valenciennea helsdingenii* (n=6).

Parameters	Present study (n=6) CASMBAURM/232116481~86	Holotype RMNH 4660	Kannan *et al*., 2013
First Dorsal-fin rays	VI	VI	VI
Second Dorsal-fin rays	I,12	I, 11-12	I,11-12
Anal-fin rays	I, 12	I, 11-12	I, 11-12
Pectoral-fin rays	22	23-24	22
Pelvic-fin rays	I, 5	I, 5	I, 5
Caudal-fin rays (Segmented)	17	-	17
Vertebrae	10+16	-	-

Live coloration. Body brownish gray dorsally; ventrally white; distinct dark double strips extending from head to caudal fin; first dorsal fin with a large, black spot at third, fourth and fifth dorsal spines (Fig. 3). The first stripe passes through the eye, whereas the second stripe from the end of the upper jaw. Preserved specimen: Whole body fades and the two stripes turns black.

Remarks. *V. helsdingenii*, can be differentiated from the congeneric species based on the presence of large oval shaped dark spot at the third, fourth and sixth dorsal fin, the presence of upper and lower filamentous caudal fin rays and black horizontal stripes passing throughout the body, which ends at the tip of caudal fin.

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