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First Report and Morphological Study of *Paraplagusia bilineata* (Bloch, 1787) in the Arabian Sea, Gujarat, Northwest Coast of India

Ritesh V. Borichangar [a*], Jeet N. Parmar [a], Sheetal K. Bharda [a], Bhavika R. Tandel [b], Lata V. Tandel [a] and Upasana D. Vyas [c]

[a] Department of Fisheries Resource Management, College of Fisheries Science, Kamdhenu University Navsari-396 450, India.
[b] Department of Fisheries Resource Management, College of Fisheries Science, Kamdhenu University Veraval-362 266, India.
[c] Department of Fisheries Resource Management, College of Fisheries Science, Himmatnagar-383 010, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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**Corresponding author: Email: rvb@kamdhenuuni.edu.in;*

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ABSTRACT

The present study reports an additional record of the rare flatfish, Double lined tongue sole *Paraplagusia bilineata* (Cyanoglossidae), off Dholai fishing harbour, Gujarat, India. One specimen was caught in a trawl net at a depth of 30–32 m around the coast of Gujarat. The total length and weight of the specimen were recorded as 20.4 cm and 60.5 g, respectively. In total, 18 morphometric parameters were closely observed and recorded for the taxonomic identification and confirmation of the species using morphometric analysis with traditional morphometrics. *Paraplagusia bilineata* is categorized as 'Least Concern' in the IUCN Red List, with the latest assessment conducted in 2021. Previously, *P. bilineata* was not reported in Gujarat. This study serves as the initial report of the presence of *Paraplagusia bilineata* from Dholai fishing harbour, Gujarat, on the Northwest coast of India.

Keywords: Cyanoglossidae; dholai fishing harbour; Paraplagusia bilineata; trawl net.

1. INTRODUCTION

Flatfishes, belonging to the order Pleuronectiformes, are characterized by their deep, laterally compressed bodies. Within this order, the family Cyanoglossidae includes species commonly known as tonguesoles. These fishes are noted for their distinctive tongue-like shape, featuring a high degree of compression and tapering towards the caudal fin.

In Indian waters, 67 species in 28 genera belonging to 6 families of flatfishes of order Pleuronectiformes have been recorded, of which the family Cyanoglossidae is represented by 16 species that belong to 2 genera namely *Cyanoglossus* and *Paraplagusia* (Froese & Pauly, 2024).

The genus *Paraplagusia,* commonly called large-tooth flounders, is represented by 11 valid species globally, (Froese & Pauly, 2024). However, only 2 species of this genus are known from the coastal waters of India.

The species in this study is categorized under the IUCN category of 'Least Concern'. This demersal, marine species inhabits soft substrates of estuaries and shallow coastal areas. Its diet consists of diverse benthic invertebrates, including crustaceans, such as penaeids and amphipods. This species is also frequently part of the bycatch of demersal trawl fisheries, which is sometimes discarded at sea and processed for fishmeal (Munroe, 2021). It attains a maximum size of 35 cm total length but is more common to 15-25 cm (Fischer W., 1984). The objective of this study was to identify and give detailed taxonomic and morphological descriptions of *Paraplagusia bilineata*.

2. MATERIALS AND METHODS

The specimen analyzed in this study was obtained from a trawler boat operating out of the Dholai fishing harbour (Fig. 1). During a survey targeting rare fish species in Gujarat, this specimen was collected and transported to the College of Fisheries Science in Navsari for

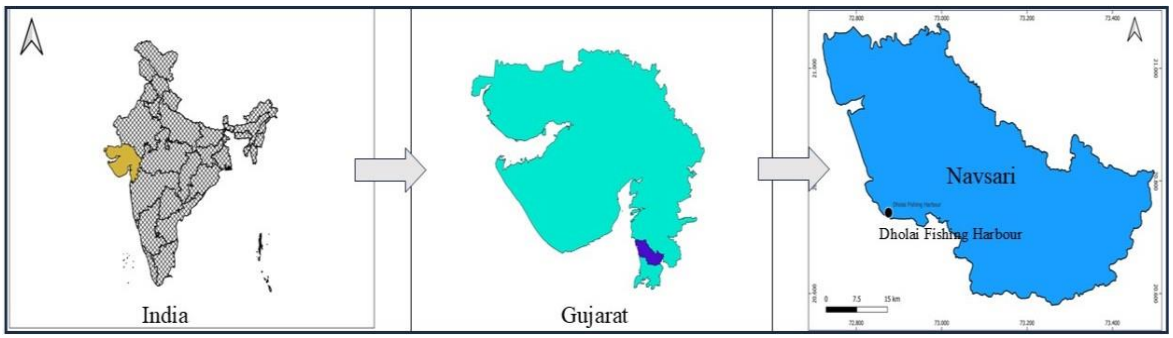

Fig. 1. Location of dholai fishing harbour in The Navsari District (Qgis, 3.32.0)
Paraplagusia bilineata (Bloch, 1787); *Kingdom: Animalia Phylum: Chordata Subphylum: Vertebrata Gigaclass: Actinopterygii Class: Teleostei Order: Pleuronectiformes Family: Cynoglossidae Subfamily: Cynoglossinae Genus: Paraplagusia Species: Paraplagusia bilineata (Source: WoRMs, 2024)*

detailed examination. Morphometric parameters were recorded, the study utilized specialised taxonomic trays, Vernier callipers, and various measuring scales. FAO species identification sheets (Fishcher, 1984), The fauna of India (Day, 1888), and Commercial Seafishes of India (Kacker & Talwar, 1984) were used for the identification of the species. Before its deposition in the Aquatic biodiversity museum at the college, the specimen was photographed and preserved in 10% formalin (Accession No: A 16.1.2.1).

3. RESULTS AND DISCUSSION

Material Examined: A 16.1.2.1, TL: 20.4 cm weight 60.5 g. Dholai fishing harbour, Southwest coast of Gujarat, India (21.7081° N latitude and 72.9007° E) Capture Date: (18th January 2024). In the present study total of 18 morphometric parameters were recorded as per the FAO standard (Table 1).

Species description: These are tongue-shaped flatfishes with sinistral eyes. Both eyes on the left side of the body with scales present in the interorbital space (Fig. 2a). Lips on the ocular side of the body with fringed tentacles in two rows (Fig. 2b). Snout strongly hooked overhanging the mouth opening, the tip almost reaching the border of the lower eye. Rostral hook long and reaching beyond lower eye. Mouth inferior, teeth minute and on the blind side only. A very well-developed tubular nostril present on the blind side of the body. Dorsal fin originates on the head, before the eyes, no spines or spiny rays present in dorsal or anal fins. Two lateral lines present on the ocular side of the body, both lateral lines originating at the snout tip, and extending all the towards caudal fin. Dorsal and anal fins confluent with caudal fin; dorsal fins with 105-106 soft rays and anal fin with 78-79 soft rays. Only left side pelvic fin present (Fig. 2c). Anus opening present between pelvic and anal fins. Small ctenoid scales present on the both sides of body. 110-111 scales present on the middle lateral line; 15-16 scales present between upper and middle lateral lines.

Colouration: When fresh, the ocular side of the body appears brown, while the blind side has a slightly yellowish hue.

The morphometric data collected in the present study align closely with FishBase (Froese & Pauly, 2024), with all parameters nearly matching those reported in previous studies (Fig. 3). By analyzing and comparing these characteristics with established identification keys, we have confirmed that the fish in present study is indeed *Paraplagusia bilineata*. This consistency not only validates our findings but also reinforces the reliability of the identification keys used for this species

Table 1. Morphometric parameters of *Paraplagusia bilineata*

Sr. No	Parameter	cm	% TL	% SL
1	Total length (TL)	20.4	100.00	111.48
2	Standard length (SL)	18.3	89.71	100.00
3	Pre-anal length	4.5	22.06	24.59
4	Pre-pelvic length	4.0	19.61	21.86
5	Body depth	5.1	25.00	27.87
6	Head length	4.3	21.08	23.50
7	Head height	4.6	22.55	25.14
8	Eye diameter (upper)	0.3	1.47	1.64
9	Eye diameter (lower)	0.3	1.47	1.64
10	Inter orbital length	0.2	0.98	1.09
11	Pre-orbital length	1.9	9.31	10.38
12	Post-orbital length	2.2	10.78	12.02
13	Angle of mouth to gill opening	1.8	8.82	9.84
14	Angle of mouth to snout tip	2.4	11.76	13.11
15	Upper jaw length on ocular side	0.8	3.92	4.37
16	Upper jaw length on blind side	0.8	3.92	4.37
17	Lower jaw length on ocular side	1.3	6.37	7.10
18	Lower jaw length on blind side	1.3	6.37	7.10

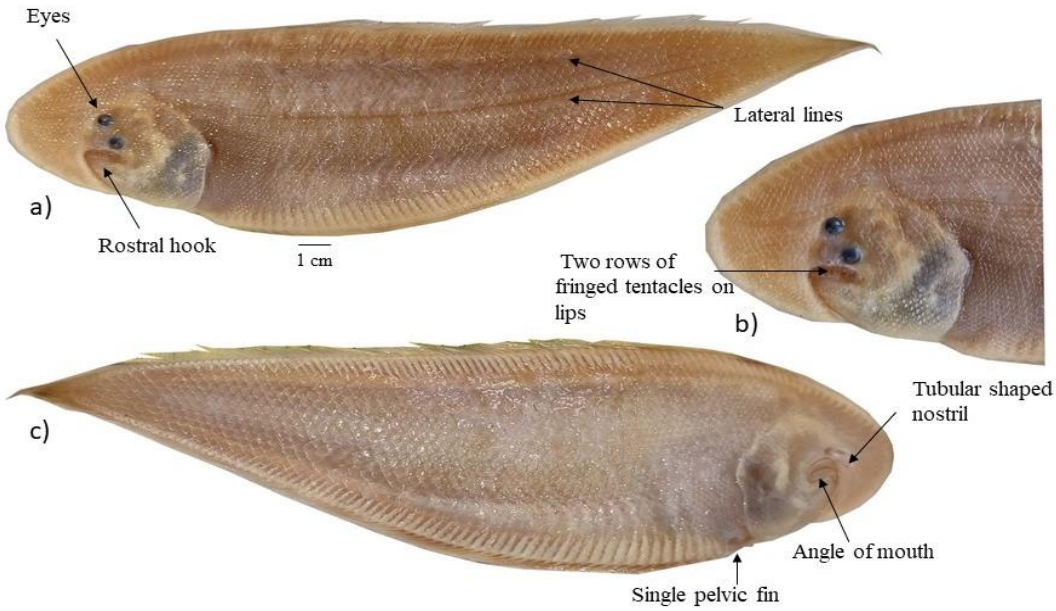

Fig. 2. a) Ocular side (left side) lateral view b) Ocular side head view c) Blind side (right side) lateral view

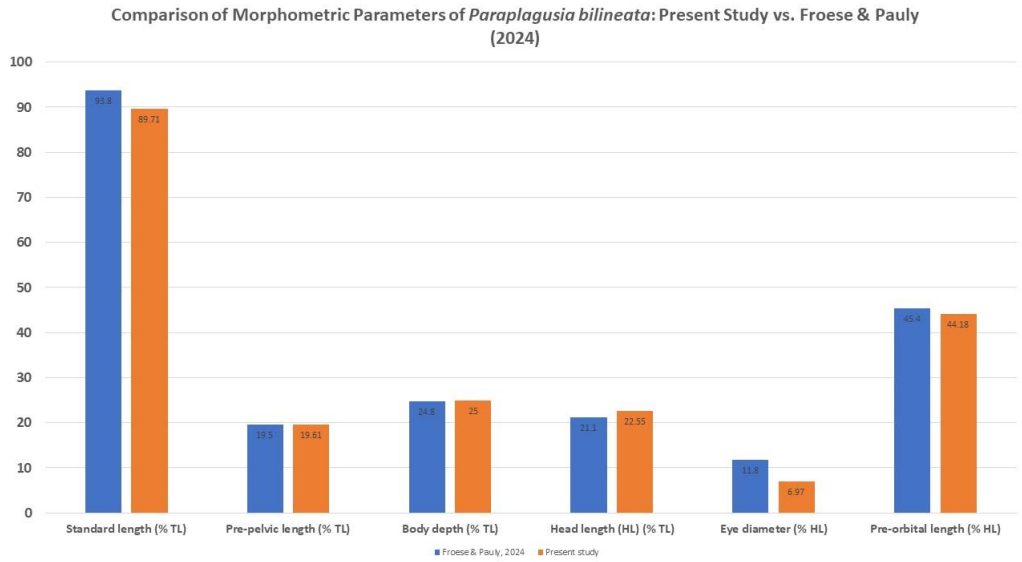

Fig. 3. Comparison of various morphometric parameters against total length (TL)

4. CONCLUSION

The ichthyofaunal diversity along the northwest coast of Gujarat has been extensively studied, with research focusing on areas such as Okha Port, the Gulf of Kachchh (GoK), the Mandvi coast, Sutrapada, and the Veraval coast. Despite these efforts, no records of *Paraplagusia bilineata* or any other species from the genus *Paraplagusia* have been documented in these studies. In contrast, biodiversity assessments on the southwest coast of Gujarat remain limited, and existing research similarly lacks any mention of this genus. This study, therefore, represents the first report of the genus *Paraplagusia* and *Paraplagusia bilineata* in Gujarat, offering detailed morphological descriptions from the northwest coast of India.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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