A New Distributional Record and Taxonomic Descriptions of *Mierspenaeopsis hardwickii* (Miers, 1878) From the Arabian Sea on the Gujarat Coast, India

Abstract

This study documents the first occurrence of *Mierspenaeopsis hardwickii* in the Dholai fishing harbour, Gujarat. The primary objective of this study was to identify and describe the *Mierspenaeopsis hardwickii* in the region. FAO standard keys were used in the identification and morphological analysis of the specimen. Despite extensive research along the Gujarat coast, studies on crustacean diversity are limited, and no previous reports mention *Mierspenaeopsis hardwickii* in this region. This finding expands the known geographic distribution of the species and underscores the importance of further studies on its ecological and commercial impact along the Gujarat coast.

Keywords: Dholai fishing harbour, *Mierspenaeopsis hardwickii*, Spear shrimp

INTRODUCTION

The shrimp resources along the 8118 km long coastline of India are being increasingly exploited both by the artisanal as well as industrial sectors. The pressure of fishing on existing stocks within the 75 m depth zone along the east and west coasts is increasing with the additional inputs of efforts [1].

Total shrimp production from India was 496,000 tonnes for the year 2022, with Gujarat being a significant contributor, accounting for 10% of the total. Of the 496,000 tonnes, the Penaeidae family was the major contributor, producing 396,000 tonnes [2].

The family Penaeidae has 200 species globally in 41 genera, out of 200 species the highest number belongs to *Metapenaeopsis* (79) species, followed by 36 species of *Metapenaeus* and 30 species of *Penaeus* genera according to [3].

Species of the genus *Parapenaeopsis*, Alcock, 1901 (family: Penaeidae) have a wide distribution across the Indo-Pacific region; from the Persian Gulf and the east coast of Africa to Japan and Australia [4].

The species *Mierspenaeopsis hardwickii* is popularly known as spear shrimp. The name has been changed to *Mierspenaeopsis hardwickii*, which was previously known as *Parapenaeopsis hardwickii* [4]. Other synonymised names include *Parapenaeopsis cultirostris, Parapenaeopsis hardwickii, and Penaeus hardwickii.*

Mierspenaeopsis hardwickii inhabits on the seafloor at depths of up to 90 meters, with its habitat consisting of sandy, sandy mud, or mud bottoms. Juveniles of this species are commonly found in estuaries and mudflats [3]

MATERIALS AND METHODS

Sample Collection

Specimens of *Mierspenaeopsis hardwickii* were collected from a sea-going trawler boat operating in the coastal waters near Dholai fishing harbour in the south Gujarat region, and the specimens were caught at a depth of around 40-50 meters (Figure 1). The trawler landed at the Dholai fishing harbour, where the shrimp specimens were gathered and carefully transported to the College of Fisheries Science, Kamdhenu University, Navsari.

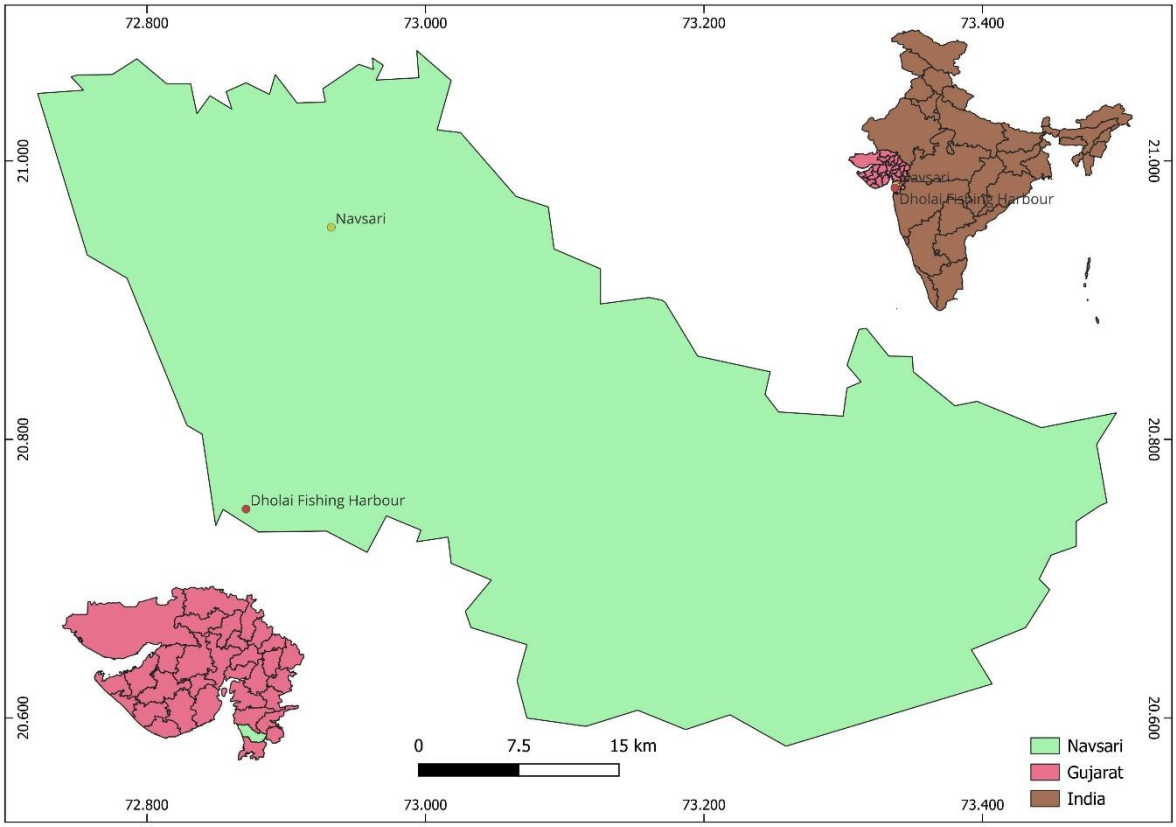

Figure 1: Location of Dholai fishing harbour in Gujarat (QGIS: 3.32.0)

Species Identification

The shrimp specimens were identified as *Mierspenaeopsis hardwickii* using the FAO standard key authored by Fischer, W. in 1984. The identification process involved a detailed examination of the specimens' morphological characteristics and measurements of various morphological parameters using vernier calipers, comparing them with the descriptions provided in the identification sheets

Preservation and Storage

Following the morphological analysis, the identified specimens were preserved in 10% formalin solution and stored in the Aquatic Biodiversity Museum at the College of Fisheries Science, Navsari. The preservation process ensured the specimens remained in good condition for future reference and research (Accession No: C 1.3.2.1).

RESULT AND DISCUSSION

A male and female specimen of Mierspenaeopsis hardwickii were examined for species description. Detailed morphological measurements were taken shown here in table 1.

Species Description: The rostrum is armed with 8 dorsal teeth, and the rostral teeth on the ventral side are absent. There are 3 dorsal teeth after the eye. The rostrum is sigmoid-shaped in females, whereas it is small and downward-curving in males. The rostrum is shorter than the scaphocerite (Figure 2). The eyestalk is without a tubercle. An adrostral crest is present between the penultimate teeth of the rostrum and the epigastric tooth, with the adrostral groove reaching up to the epigastric tooth. The postrostral crest extends to the posterior edge of the carapace. The carapace is grooved in females, with a longitudinal suture reaching 3/4 or more of the carapace length; non-grooved in males but has lateral keels and a cervical groove. The epigastric tooth is small. There is a small orbital spine but no postorbital spine. The antennal spine is present, while the branchiostegal spine is absent. The pterygostomian and hepatic spines are present, whereas the suprahepatic spine is absent.

The dorsal crest and submarginal crest are present. Both longitudinal and transverse sutures are observed. The Orbitoantennal groove lacks a gastro-orbital crest. The first to third pereiopods end in pincers, and exopods are present on all pereiopods. Epipods are present on the 1st and 2nd pereiopods. The telson is armed with four movable spines.

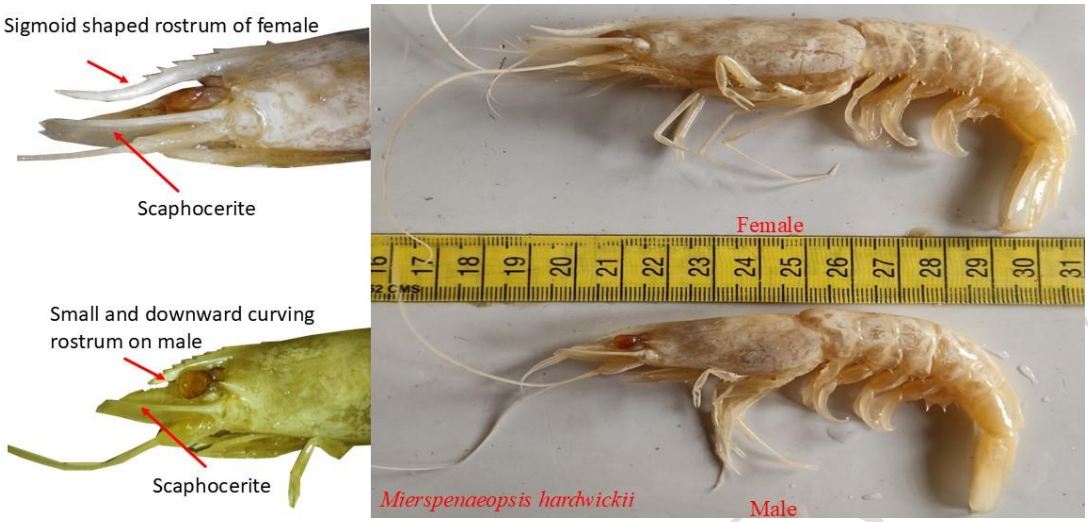

Figure 2: Lateral view of *Mierspenaeopsis hardwickii*

Females: The shape of the thelycum is characterized by a concave, round anterior process (Figure 3). The posterior process is flat and has anterolateral tooth-like projections, while the middle section is covered with setae.

Males: Petasma with wing-like distomedian projections, its width exceeding length, distolateral projections short and directed lateral side, proximolateral lobes very large and dorsally curved (Figure 3).

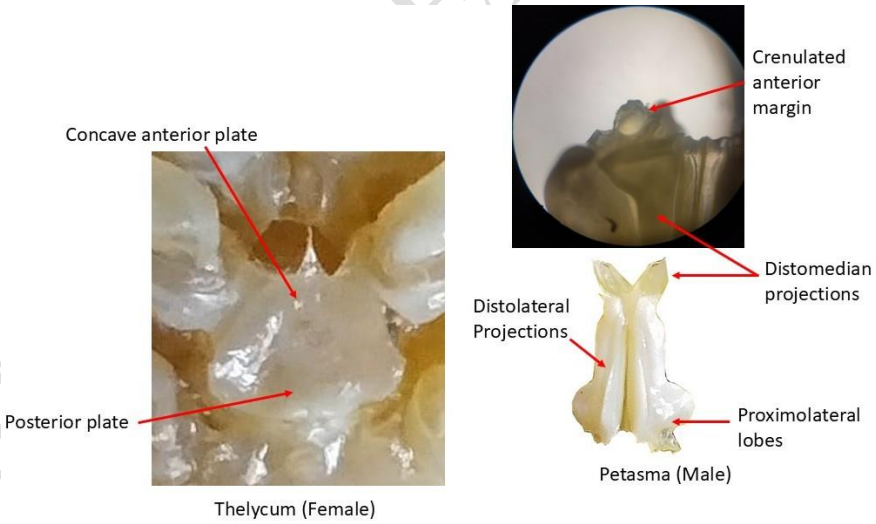

Figure 3: Reproductive organs of female and male *Mierspenaeopsis hardwickii*

Colour: usually grey, sometimes with a touch of pink, rarely pink; rostrum and postrostral crest dark grey; pereopods brownish pink; pleopods usually reddish pink; uropods and telson grey or pink, each with a dark grey median longitudinal stripe.

From the analysis of the morphological parameters, it can be concluded that females are larger than males, with female has larger sigmoid shaped rostrum and abdomen and telson are larger than male, where as all the pereopods and cephalothorax are larger in male (Table 1).

Sr. No	Parameter	Female	Male
		% TL	% TL
1	Total length (T.L.)	100.00	100.00

2	Rostrum length	20.00	18.37
3	Carapace length	28.18	34.69
4	Cephalothorax length	48.18	53.06
5	Abdomen length	51.82	46.94
6	Telson length	20.91	15.31
7	Length of antennule flagella	22.73	18.37
8	1st Walking leg length	18.18	23.47
9	2nd Walking leg length	23.64	26.53
10	3rd Walking leg length	34.55	37.76
11	4th Walking leg length	23.64	24.49
12	5th Walking leg length	37.27	41.84

Table 1: Morphometric characters of *Mierspenaeopsis hardwickii*

This is the first reported occurrence of this species from the Dholai fishing harbour in Gujarat, on the northwest coast of India. Previous studies from the Dholai fishing harbour, such as [5], have not mentioned this species. Although various research has been conducted along the Gujarat coast, very few studies have included crustacean diversity. Notable research from fishing harbours like Okha [6] and from Veraval [7] does not mention the species *Mierspenaeopsis hardwickii*, only one researcher [8] mentions the species from the Gulf of Kutch region. However, this species has been commercially targeted in the neighbouring Maharashtra region, particularly around the Mumbai coast.

CONCLUSION

In conclusion, the present study successfully identified *Mierspenaeopsis hardwickii* from the Dholai fishing harbour, extending its known geographic distribution in the region. This research also provides a detailed morphological and taxonomic description of the species, contributing valuable information to the existing knowledge of the *Mierspenaeopsis* genus. These findings enhance our understanding of the biodiversity in the region and may serve as a reference for future studies on related species or further exploration of the area's marine fauna.

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