

The first record of the fragile file clam *Limaria fragilis* (Gmelin, 1791) (Bivalvia: Limidae) from Ras Juddi, Makran Coast of Pakistan

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Abstract

This article presents the first documented record of the fragile file clam, *Limaria fragilis* (Gmelin, 1791) (Bivalvia: Limidae), in Ras Juddi, Pasni, on the Makran coast in the Northern Arabian Sea. This discovery expands the known distribution of this species in the Northern Arabian Sea contributes to the biodiversity records of Pakistan. Previously, only two species of the family Limidae have been known from Pakistan coastal waters, namely *Limca juglandula* (Melville & Standen, 1907) and *Lima vulgaris* (Link, 1807).

key words: Diversity, Bivalve, Taxonomy, *Limaria fragilis*, New Record, Ras Juddi, Makran coast.

1. Introduction

The bivalve mollusks of the genus *Limaria* Rafinesque, 1815 (Bivalvia: Limidae), commonly known as file clams, can be found throughout the Indo-Pacific region, inhabiting shallow marine habitats, where often takes shelter in crevices or beneath rocks (Gilmour, 1967; Morton, 1979; Donovan et al., 2004). More than 200 recognised species within 10 described genera are known for the family worldwide (WoRMS, 2024).

The file clams are renowned for their distinctive morphological features and unique behavioral adaptations. They have a pair of delicate, asymmetrical white valves that enclose their soft body, and a vibrant red mantle that is bordered by long, tapered tentacles in shades of pink and grey. These tentacles serve multiple purposes, acting both as sensory organs and defensive tools. In addition, the detached tentacles continue to wriggle and secrete a toxic

substance, serving as a decoy to deter potential predators (Gilmour, 1967; Ranade and Joshi, 1973; Morton, 1979; Kilburn, 1998; Donovan et al., 2004).

Only two species of the family Limidae have been reported from Pakistan, namely *Limea juglandula* (Melville & Standen, 1907) and *Lima vulgaris* (Link, 1807) (see Melville and Standen, 1907; Dance, 1992). Kazmi (1993) also reported limid file clam specimens from the rock pool at Buleji, although they only identified them to the generic level as *Lima* sp. This paper provides the morphological description of the rare fragile file clam, *L. fragilis* (Gmelin 1791), found on the rocky shore at Ras Juddi in Pasni, along the Makran coast, representing the first record of the species for Pakistan coastal waters.

2. Materials and methods

Two orange-coloured specimens of *L. fragilis* were collected during low tide (-0.41m) from the intertidal rocky shore at Ras Juddi ($25^{\circ}13'25''N$ $63^{\circ}30'15''E$) on the Makran coast of Pakistan (Figs 1, 2A). The specimens were preserved in 5% formaldehyde in the field. In the laboratory, they were rinsed with distilled water and fixed in 70% ethanol solution for further taxonomical studies. The shell of the collected specimens was measured from their frontal, ventral, and lateral views, and photographed. The valves were separated using a scalpel, and then examined under a Wild 181300 stereomicroscope at a magnification of 10×50 . The studied specimens were catalogued and deposited in the repository of the Marine Reference Collection & Resource Centre (MRC&RC), University of Karachi, Pakistan.

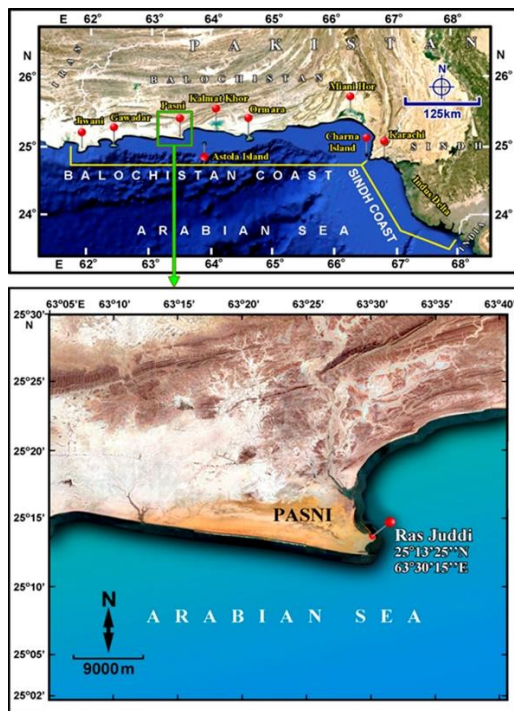


Figure 1. Maps showing (a) coastline of Pakistan, (b) sampling site at Ras Juddi, Makran coast ($25^{\circ}13'25''N$ $63^{\circ}30'15''E$) (map developed by Marine Reference Collection and Resource Centre, University of Karachi)

3. Results and Remarks

Taxonomy

Class Bivalvia Linnaeus, 1758
 Order Limida Linnaeus, 1758
 Family Limidae Rafinesque, 1815
 Genus *Limaria* Link, 1807
Limaria fragilis (Gmelin, 1791)
 (Fig. 2)

Material Examined: 2 specimens (length 24 mm, width 11 mm & length 15 mm, width 8 mm)(MRC&RC-UOK-PEL-52) - Indian Ocean, Arabian Sea, Makran coast of Pakistan, Pasni, Ras Juddi, (25°13'25"N 63°30'15"E), from intertidal rocky shore, 4 December 2021.

Description: Live specimens are whitish brown (Fig. 2B). Tentacles are bright orange and filamentous. Tentacles have segmentations - circular rings with varied length; thick at base (Fig. 2C). Delicate, inflated thin shell, somewhat elongated or oval; slightly formed triangular shape on the outer margin of one side. Valves are thin, fragile and equivalve; oval in outline, tapering towards the umbo (Fig. 2E). Inner edges are smooth without any serration. An elliptical dorsal gape between the valves is formed; narrower ventrally, it is long and continuous at the posterior (Fig. 2F). Interior is nacreous. Radially ribbed with 45-50 strong concentric ridges, radiating from a pointed umbo. Ribs are crossed by strong growth lines (Fig. 2G, H). Shell with a triangular-shaped pit in the hinge to which the ligament is attached (Fig. 2J).

Remarks: Previous research by Kazmi (1993) had collected a limid file clam from the rock pool at Buleji, but was only able to identify it to the generic level as *Limia* sp. During this study, *L. fragilis* was found to be superficially similar to both *Limaria orientalis* (A. Adams and Reeve, 1850) and *Limaria tuberculata* (Olivi, 1792). However, morphological differentiation was made based on radial ribs and valve shape, as observed by Kilburn (1998) in Limidae species collected from South Africa and Mozambique. Radial ribs were found to vary in number 41-50, similar to those found for *L. orientalis* in this study. However, the number of radial ribs in *L. tuberculata* was found to range from 20 to 30. Furthermore, *Limaria fragilis* differed from *L. orientalis* by being more compressed and elongated, with a very shallow internal valve margin adjacent to a posterior thickened gape, as described by Kilburn (1998).

Habitat: Rocky shores, found in crevices and under the rocks.

Distribution: Widely distributed in the Indo-West Pacific. In the Northern Indian Ocean, it has been previously reported from coastal waters of SW India and Oman. The present record significantly expands the known distribution of the species in the northern Arabian Sea.

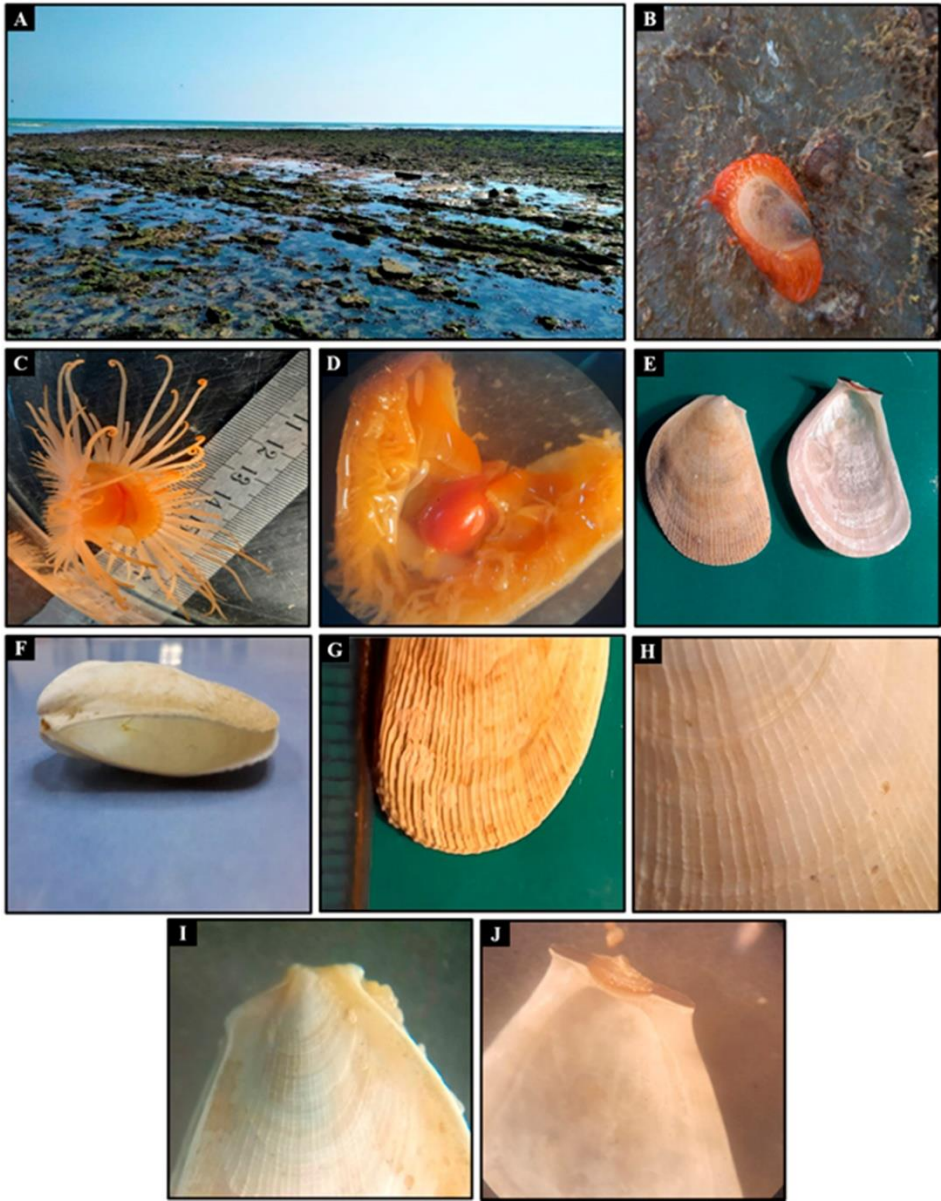


Figure 2. The fragile file clam *Limaria fragilis* (Gmelin, 1791) (Bivalvia: Limidae) from Ras Juddi, Makran coast of Pakistan. **A**, Study area during low tide, Ras Juddi, Makran coast of Pakistan (-0.41m); **B**, Live specimen with habitat; **C**, Live specimen with expended tentacles; **D**, Internal structure; **E**, Right and left valves showing dorsal and ventral view; **F**, Dorsal gape between the valves; **G-H**, Valve showing dorsal view with radiating ribs along with numerous concentric lines; **I**, Umbo and beak, dorsal view; **J**, Ligament, ventral view.

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Conflict of interests

The authors declare that they have no competing interests.

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