



New record of *Hyotissa* species (Bivalvia: Ostreoida: Gryphaeidae) from India with taxonomic description

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Short Communication

Abstract

The southern tip of peninsular India is blessed with marine resources. The oysters are the sedentary form of bivalves' abundant in Indian shore region. *Hyotissa* species are comparatively large oysters with hard shell. Taxonomy of three *Hyotissa* species are described in detail and included in this paper. Detailed taxonomy of the species was worked out based on its morphometry, and comparisons were also made. Three *Hyotissa* species collected were *Hyotissa hyotis*, *Hyotissa inermis* and *Hyotissa sinensis*. In which *H. inermis* and *H. sinensis* are newly reported oysters from Gryphaeidae family. These three species are deposited in Designated National Repository of CMFRI, Kochi, Kerala, India.

Keywords: *Gryphaeidae*, *Hyotissa hyotis*, *Hyotissa inermis*, *Hyotissa sinensis*

Introduction

The order Osteroidea (Phylum: Mollusca; Class: Bivalvia) comprises of well known oysters and consists of two families, Ostreidae and Gryphaeidae. Gryphaeidae is a small superfamily with 11 species. Species in this family are known as honeycomb oysters

or 'foam oysters' because under magnification, their shell structure is foam-like. They are suspension feeders. They can be commonly seen in rock cervices and attached to the coral reefs. Its life span was estimated by counting the concave-convex growth bands on the ligament surface.

Material and methods

Specimens were collected from the Vizhinjam Bay (08°22' 45" N 76°59' 29" E) and Thoothukudi (8.81°N 78.14°E) (Fig. 1). *Hyotissa hyotis* and *Hyotissa sinensis* are abundantly found in southern region of Kerala and Gulf of Mannar region. Live specimens were collected from the rocky shore from Kappil, Vizhinjam and Thiruchendur. One full live specimen of *H. inermis* was collected from the Vizhinjam Bay. The same species is obtained from the shore of Thoothukudi with different color. The live specimen for the study were collected from the rock using chisel with the help of fisherman during low tide. After collection the flesh is extruded from the shell, and after washing the shell thoroughly, it was sundried and photographed. The taxonomic identification was done using online data (<http://www.sealifebase.org>) and literature (Huber, 2010). Systematics was done using *WoRMS (World Register of Marine Species)*. Specimens were deposited in the Designated National Repository of CMFRI, Kochi.



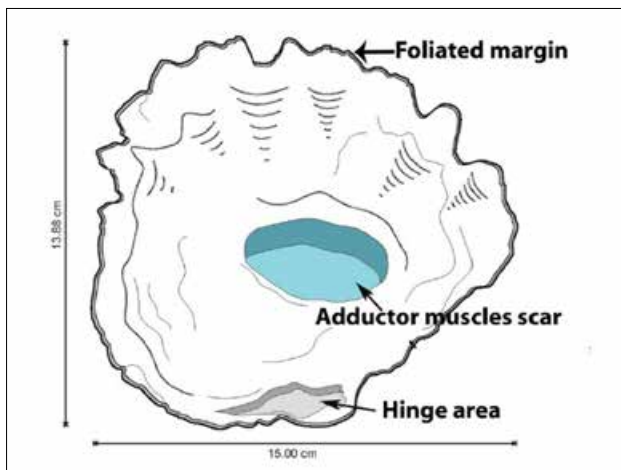
Fig.1. Study sites

Results and discussion

Hyotissa species are inequivalve, ovate and solid shells. A strong muscle scar round- or orbicular is situated closer to the umbones. The unique character of shell is vesicular, honey comb or spongy. Its interior part is chalky (Huber, 2010). The pictorial representation of the *Hyotissa* is shown in Fig. 2.

Taxonomy of the species

Hyotissa hyotis (Linnaeus, 1758)

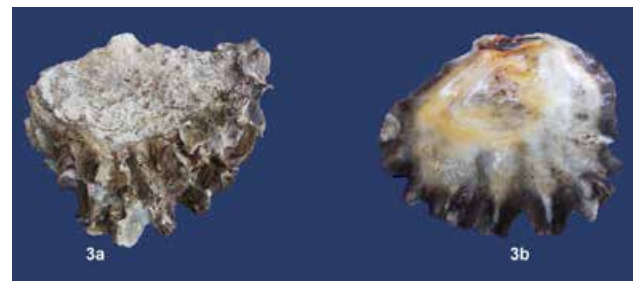
Fig.2. Pictorial representation of *Hyotissa* species

Systematic Position:

Phylum : Mollusca
 Class : Bivalvia
 Order : Ostreoida
 Family : Gryphaeidae (Vyalov, 1936)
 Genus : *Hyotissa*
 Species : *hyotis*
 Locality : Vizhinjam, Kappil, Thiruchendur

Description: Shell subequal, moderately thick, hinge without teeth,

adductor muscle scar orbicular and nearer to hinge, margin irregular, sculptured with radial ribs on outer surface of outer valve, margin with hyotic spines sometimes open, extending beyond margin, interior smooth, outer valve slightly inflated, animal without foot or byssus in adult stage, attached by their left valves to substratum. Central adductor muscle with the characteristic central shell scar. The central adductor muscle is much larger and not bounded by 'Gryphaeidae'. Each valves of this shell solid and thick. Shell is sharply ridged forming a series of arches at the edges. The arches of both valves interlock. Inside the shell surface white and chalky. Ligament strait and elongated (Fig. 3a & 3b).

Fig.3a and 3b are the outer and inner surface of *Hyotissa hyotis*

Remark: This species is reported for the first time from the west coast of India, whereas it was reported earlier from East coast (Stella *et al.*, 2010). It is abundantly present in rocky areas of Vizhinjam. The specimen was deposited in Designated National Repository of CMFRI, Kochi with the accession number DC. 15.1.4.

Hyotissa inermis (G. B. Sowerby II, 1871)

Systematic Position:

Phylum : Mollusca
 Class : Bivalvia
 Order : Ostreoida
 Family : Gryphaeidae (Vyalov, 1936)
 Genus : *Hyotissa*
 Species : *inermis*
 Locality : Vizhinjam and Thoothukudi

Synonym: *Ostrea imbricate* (Lamarck, 1819); *Ostria inermis* (G.B. Sowerby II, 1871); *Ostera nobilis* (G.B. Sowerby II, 1871); *Ostrea quirites* (Iredale, 1939); *Ostrea sellaformis* (Saville- Kent, 1891); *ParaHyotissa* (*ParaHyotissa*) *imbricata* (Lamarck, 1819); *ParaHyotissa imbricata* (Lamarck, 1819).

Description: The Shell collected from Vizhinjam region is brownish black in colour whereas it was pinkish red from Thoothukudi. Shell's halves are not equal. The lower valve is smaller than the upper valve. This is attached to the hard substratum modified according to the substratum. The periostracum is thick and highly foliated with hard spines. The hinge region is blackened due to the presence of narrow ligament. The species is monomyarian. A round white adductor muscle scar is present subcentrally. The inner margin of the shell is bordered by pinkish brown. Margin irregular, sculptured with radial ribs on outer surface of outer valve, margin with hyotis spines, extending beyond margin. The central adductor muscle is much larger and not bounded by 'Gryphaeidae'. Each valves of this shell solid and thick. Shell is sharply ridged forming a series of arches at the edges. The arches of both valves interlock. Inside the shell surface is white. Projecting hyotic spines are the characteristic feature of the family (Fig 4a-5b).



Fig.4a. *Hyotissa inermis* dorsal (Vizhinjam) 4b. *Hyotissa inermis* ventral (Vizhinjam) 5a. *Hyotissa inermis* dorsal (Thoothukudi) 5b. *Hyotissa inermis* ventral (Thoothukudi) 6a, *Hyotissa sinensis* dorsal and 6b. *Hyotissa sinensis* ventral

Remark: This species is reported for the first time from India. The specimen was deposited in Designated National Repository of CMFRI, Kochi with the accession number DC. 15.1.5.

***Hyotissa sinensis* (Gmelin, 1791)**

Systematic Position:

Phylum : Mollusca
 Class : Bivalvia
 Order : Ostreoida
 Family : Gryphaeidae (Vyalov, 1936)
 Genus : Hyotissa
 Species : *sinensis*
 Locality : Vizhinjam and Thoothukudi
 Synonym : *Ostrea fusca* Lamark, 1819; *Ostrea praeadamitica* Roding, 1798; *Ostrea sinensis* Gmelin, 1791.

Description: The shell of *H. sinensis* is thick and solid, but not or weakly plicate, with almost smooth, usually blackish- purple borders, generally flatter, more compressed, the muscle scar not elevated, typically deep purple (Huber, 2010). The specimens examined were weakly plicate, almost circular and flatter. The inner shell is bordered by blackish purple color. The muscle scar is deep purple color. The hinge area had narrow black hinge line as that of other two species. The length of the species ranges from 10 to 12 cm and width is from 9 cm to 11 cm. The length and width is highly influenced by the substratum to which it is attached. They were crowded on the rocky shores (Fig. 6a & 6b).

Remark: This species is reported for the first time from the coast of Tamil Nadu and Kerala. It is reported earlier from Andaman Sea, Polynesia and Tuamotu (Huber, 2010). The specimen was deposited in Designated National Repository of CMFRI Kochi with the accession number DC. 15.1.6.

Fig. 4a and 5a is the same species, *Hyotissa inermis*. The specimen shown in Fig.4a is collected from the Vizhinjam region and 5a is from the Thoothukudi coast. Through these two share same taxonomic character, their color is different. Beside the western Bay of India, the salinity and temperature is high in eastern coast. The study site is the Thermal Beach area is polluted due to thermal plant and salt pans. These physico- chemical factors lead to the regional variation in the morphometric characters of certain species. Based on the morphological characters, comparison of the three species were made and results are presented in the Table 1.

Oyster species is a valuable molluscan species used as food material. In Kerala and Tamil Nadu mainly *Crassostrea* species are used for cultivation. *Hyotissa* species richness is very high in the rocky shores of southern part of India. *H. hyotis* given

Table 1. Comparison of species.

<i>Hyotissa hyotis</i>	<i>Hyotissa inermis</i>	<i>Hyotissa sinensis</i>
Radial rib folded and forming tubular hyotic spines foliated on the lower side of the periostracum as two or three folds	Hyotic spines are irregularly seen on the surface, radial ribs are as wavy folding	Hyotic spines are negligible, shell surface is flattened
Umbo area is more flattened	Umbo area is distinct on the anterior region	Umbo area is not distinctly marked
Adductor muscle scar orbicular and pale yellow in color	Adductor muscle scar circular and white in color	Adductor muscle scar oval and dark purple- black in color
Inner shell margin is highly foliated and dark black in color	Inner shell margin is greenish black or pinkish white	Inner shell margin is dark purple color

the high quality of its adductor muscle, this species can be considered as with a potential for aquaculture.

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References

- Dey, A. and Ramakrishna. 2007. Marine molluscs of Andhra Pradesh: Bivalvia, Scaphopoda and Cephalopoda, Fauna of Andhra Pradesh, State Fauna series, *Zool. Surv. India*, 5 (7): 149-260.
- Huber, M. 2010. Compendium of Bivalves. A Full Color Guide to 3'300 of the World's Marine Bivalves. A Status on Bivalvia after 250 Years of Research. Conch Books, Hackenheim, + CD, 901pp.
- Stella, C., A. Murugan and S. Vijayalakshmi. 2010. New distributional records of *Hyotissa hyotis* (Linnaeus, 1758) Family: Gryphaeidae from Mandapam area-south east coast of India *World J. Fish. Mar. Sci.* IDOSI Publications 2(1) 42-43.
- Souji, S. and Tresa Radhakrishnan. 2015. Incidence and distribution of Gastropod and Bivalve molluscs of Thiruvananthapuram coast (Presentation in National Biodiversity Congress, 2015) *World Register of Marine Species*.