SMALL FAMILIES
BASKET CLAMS, DIPLODON SHELLS, SAXICAVE CLAMS, SOFT-SHELLED CLAMS, WATERING POTS and SHIPS' WORMS
Corbulidae, Ungulinidae, Hiatellidae, Myidae, Penicillidae, Teredinidae

List of species	Family
Corbula fortisulcata E. A. Smith, 1879	Corbulidae
Diplodonta cf. *indica* (Deshayes, 1832)	Ungulinidae
Hiatella arctica (Linnaeus, 1767)	Hiatellidae
Indosphenia cochinensis (Preston, 1916) (?)	Myidae
Verpa penis (Linnaeus, 1758)	Penicillidae
'*Terebra*' sp. 1	Teredinidae
'*Terebra*' sp. 2	ditto

Family: CORBULIDAE Lamarck, 1818 – Basket clams, Corbulas

Shells solid with unequal valves. Often the right valve is considerably larger and partially encloses the left. Shells more or less triangular with rounded anterior and narrowed, often beaked, posterior. The umbones in front of the mid-line. The ligament internal in a groove perpendicular to the umbones. The hinge weak with one cardinal tooth on each valve. The exterior sculptured with strong concentric ridges.

Found on shallow sandy bottoms. They are suspension filter-feeders.

Corbula fortisulcata E. A. Smith, 1879 Thick ribbed corbula
[*Corbula sulcata* Lamarck, 1801 *sensu* Lynge, 1909 (misapplication)]
No collection data. Single right valve 13.08 x 9.32 mm.

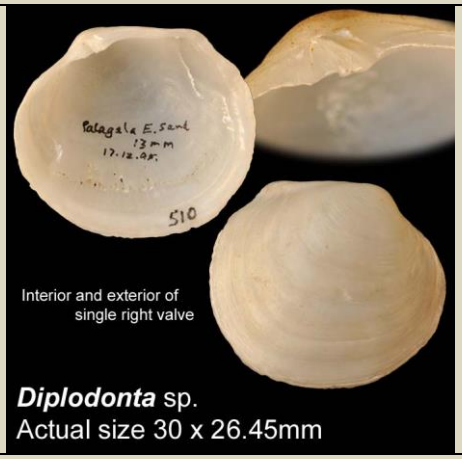
Small thick (right valve) shell with nearly central prominent umbo turned inwards. Anterior rounded, posterior drawn out to a beak beyond an oblique groove from umbo to ventral margin. Strong concentric ridges with wide interspaces cover median aspect of valve from anterior margin to the posterior groove. A single peg-like cardinal tooth projects from under the umbonal beak.

- de Bruyne, 2003 p. 293; Dance, 1977 p. 272; Subba Rao & Dey, 2000 p. 286.

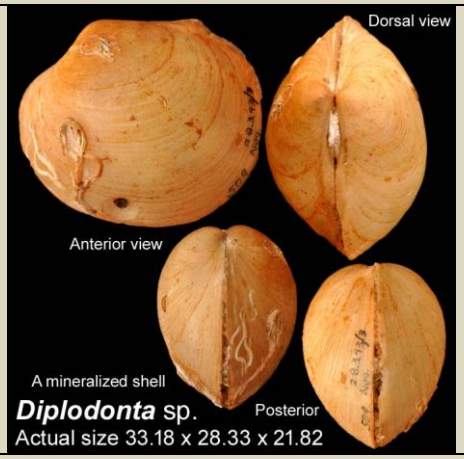
Family: UNGULINIDAE Gray, 1854 – Diplodon clams, Globe shells

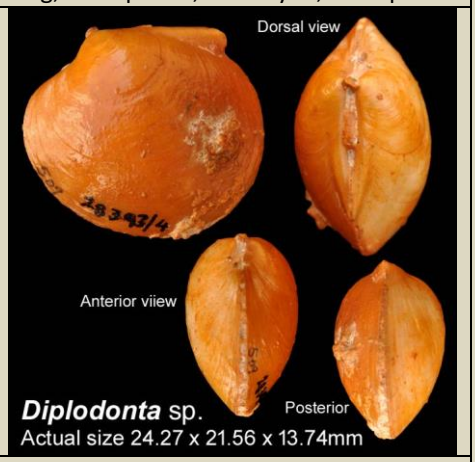
Shells small, nearly circular, very inflated. Finely sculptured or with growth lines only. External ligament. One or two divergent cardinal teeth; lateral teeth reduced or absent. Adductor muscle scars nearly equal, no pallial sinus. On sand or mud flats, intertidal to deep water, temperate to tropical.

- Eisenberg, 1989 p. 200; de Bruyne, 2003 p. 277



MF510: Colombo, Palagala (reef), 13 m, sand bottom, by diving. Single right valve.





MF509: Negombo, "Fossil reef", 15 m, sand bottom, by diving. Mineralized, sub-fossil shells.
MF583 & 749: Wattala, Pegasus Reef Hotel beach, beached.

***Diplodonta* cf. *indica* (Deshayes, 1832)** Indian diplodont

A *nomen nudum* as listed in Worms (2020) with a comment that Deshayes did not describe a shell of this name. (*nomen nudum*: Unavailable name or not validly published)

Basis of record: Hylleberg, J. & Kilburn, R.N. (2002), Melvill, J. C. & Standen, R. (1907) and Comber E. (1906), from the Gulf of Mannar.

Shell subcircular, inflated. Ligament external in a groove. Umbo small, in front of midline, pointing forwards. Postero-dorsal margin straight with elliptical cardinal area containg the ligament, distinctly angular, rounded, raised above the convex posterior margin. Antero-dorsal margin excavated, anterior margin convex confluent with the convex ventral and posterior margins. Left valve dentition not seen; right valve with two cardinal teeth - a narrowly triangular anterior and a broad, bifid, triangular posterior. Anterior muscle scar elongated, broad and crescentic, the posterior shorter, oval; pallial line entire, wide attachment. Exterior roughened by irregular growth lines. Shell white.

This shell is imilar to *Diplodonta rotundata* images seen, especially that in de Bruyne, 2003 p. 277, but differs in the raised, ridge-like postero-dorsal margin ending in a rounded, angulated termination at the postero-dorsal junction. It is noteworthy that two collections of mineralized, articulated shells have been made and only one single valve that is not mineralized and one partly mineralized. Eisenberg, 1989 makes this statement: "Forms nest of mud or sand cemented with mucus" — perhaps this habit would have contributed to the mineralization process.

MF509: Negombo, Fossil Reef, 33.18 x 28.33 x 21.82; 24.27 x 21.56 x 13.74 mm. Mineralized, articulated, on sand bottom.
MF510: Colombo, Palagala shorewards, 13 m, sand, empty, 30.0 x 26.45 mm. Single r/v, creamy white.
MF583: Wattala, Pegasus Reef Hotel beach, 30.78 x 25.9 x 20.27; 18.52 x 16.13 x 9.44 mm (l x ht x w).
MF749: ditto, single right valve, predator bored hole, early mineralization, 29.4 x 24 mm.
MF749: Wattala, Pegasus Reef Hotel beach, r/v: 29.4 x 24 mm. Slight marginal damage ventral, predator bored, early mineralisation.

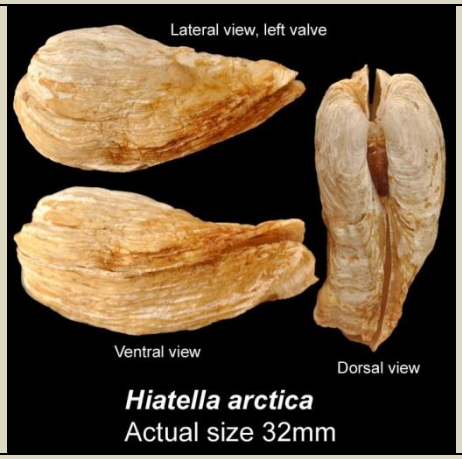
- de Bruyne p. 277 (*Diplodonta rotundata*)

Family: HIATELLIDAE Gray, 1824 – Saxicave and Panope clams

Medium-sized, elongate-trapezoidal shells, often quite irregular, thick-shelled. Shells chalky with flaky periostracum gaping at both ends. Surface wrinkled, a strong external ligament in a deep furrow. Thick hinge, teeth lacking or with a single conical tooth in each valve. Discontinuous pallial line, a pallial sinus may be present. Some species byssally attached to rocks and shells, others buried in mud or nestling among seaweeds or in rock crevices.

- Eisenberg, 1989 p. 204; de Bruyne, 2003 p. 295

"Recent research has shown that living members of the genus *Hiatella* are genetically diverse. The nestling habitat of this genus results in an extremely variable shell morphology. That nestling can occur among epibionts on boats and floating debris suggests that transport of some genetic entities has occurred for centuries. It may thus be difficult or impossible to correlate shell morphologies with genetic entities, particularly with the many nominal species described since 1758 based solely on shells. An entirely new classification may be needed for this difficult genus, and some authors are now using letters, such as "Hiatella sp. J" to indicate genetic entities.**"** (WoRMS Note 16.7.2020)



MF 310, 315 & 316: Mount Lavinia, Bellangala, by diving, 1986 & 2006, on three occasions. At depths of 2-3m, buried in or under black sponges; under zooanthid colonies; under colony of the coral *Favia*.

31 x 16 x 15; 28 x 12 x 11; 20 x 14 x 14; 13 x 7.5 x 5 mm (ht x l x w).

***Hiatella arctica* (Linnaeus, 1767)** Arctic hiatella, wrinkled rock borer

[*Mya arctica* Linnaeus, 1767 – original name; numerous synonyms, including as genus *Saxicava*]

Shells irregular in shape, more or less rectangular, twisted to varying degrees, gaping in front and behind. Ligament external, right valve has a peg-like tooth with a pit behind into which fits a rounded tooth in the left valve. No lateral teeth. The teeth are largely eroded in the older shells.

Beaks anterior, front of shell very short and rounded. Greatly extended behind with a truncated posterior. A keel runs from beak to postero-ventral angle with an obsolete rib behind this. Sculpture consists of irregular growth lines that give the surface a wrinkled appearance. Dirty white in colour with a yellowish or brownish periostracum seen in patches.

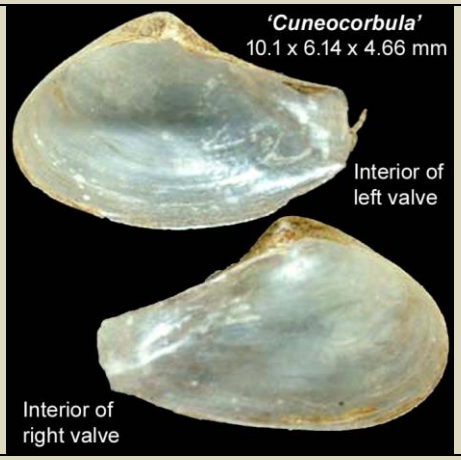
These have been found between sponges and the substrate or embedded within black sponges, embedded in zooanthid colonies to varying degrees and under worm tube and coral colonies, in accordance with their nestling habit.

- De Bruyne, 2003 p. 295; Eisenberg, 1981 p. 173, Kira, 1962 p. 178 (as *H. flaccida* Gould), Sabelli, 1979 # 174; Abbott & Dance, 1982 p. 370.

Family Myidae Lamarck, 1809 – Soft-Shelled Clams

The family widely distributed from Arctic to tropical waters. Shapes vary from ovate to elongate, often irregular, some with truncated posteriors, posterior gape. Right valve more convex, larger than the left. Ligament mostly internal in a chondrophore. Small cardinal teeth, one in each valve, a pallial sinus present. Usually burrowing deeply in mud or sand. Many species edible. This is the only representative of the family in Sri Lanka recorded by the author.

- Eisenberg, 1989 p. 204



MF513: No collection records

This shell was at first thought to be a dipper shell in the family Cuspidaria, on account of the produced and narrowed posterior. Search of the literature through the Internet led to the paper by Preston on Indian brackish water bivalves and the description of *Cuspidaria cochinensis.*

This has subsequently been assigned to a new genus – *Indosphaenia*, in the family Myidae. More collections are needed before the correct identity of the Sri Lankan shell is established.

***Indosphenia cochinensis* (Preston, 1916) (?)**

[*Cuspidaria cochinensis* Preston, 1916; *Cuneocorbula cochinensis* (Preston, 1916)]

This species, from brackish water in India, was named *Cuspidaria cochinensis* Preston, 1916 in the family Corbulidae. It was subsequently transferred to *Cuneocorbula* in the same family (Oliver et al 2016). Subsequent review has moved it to the family Myidae under the new genus *Indosphenia*. (See - Preston, 1916: 39, figs 17, 17a, Oliver et al. 2016: 1224–5, fig. 2 and Oliver et al, 2018.)

The external morphology of the Sri Lanka shell agrees with the descriptions in Preston's 1916 paper and that by Oliver et al in 2016 therefore the shell was referred to *C. cochinensis*. But it was noted that an examination of the hinge failed to find agreement with the hinge described in the 2016 paper. The revised description in the 2018 paper does not place importance on a "projecting tooth" in the right valve which is absent in the SL shell.

This shell is provisionally determined as *Indosphaenia cochinensis* (Preston, 1916) (?) in the Family Myidae until more collections are made enabling a final determination. This species is not listed in WoRMS as at July, 2020.

- Preston HB (1916). Report on a collection of Mollusca from the Cochin and Ennur backwaters.

- Oliver PG, Jayachandran PR & Nandan SB (2016). *Cuspidaria cochinensis* Preston, 1916 transferred to the Corbulidae (Mollusca, Bivalvia) and assigned to the genus Cuneocorbula.

- Oliver PG, Hallan A, Jayachandran PR, Joseph P, Sanu VF, Nandan SB (2018). Taxonomy of myid bivalves from fragmented brackish-water habitats in India, with a description of a new genus Indosphenia (Myida, Myoidea, Myidae).

Family: PENICILLIDAE Gray, 1858 – Watering pot shells

A number of genera in the family Clavagellidae d'Orbigny, 1844, including *Penicillus* and *Brechites* were separated off and placed in the family Penicillidae Gray, 1858 by Morton, 2007.

The shells extremely small. A calcareous tube secreted by the mantle grows out from one or both of the embryonic valves. The tube is open at the posterior and closed at the anterior by a perforated disc ringed with small tubes, similar to a watering pot, hence the common name. Pebbles, sand and small shells may be attached to the tube. The tube is buried in soft substrates vertically with the open end exposed. Water and food particles are drawn in through the perforated end. Some forms are attached to hard substrates. They occur in warm water (Mediterranean and Red Seas, Indo-Pacific).

- de Bruyne, 2003 p. 298; Eisenberg, 1989 p. 205

***Verpa penis* (Linnaeus, 1758)** Common watering pot shell
[*Serpula penis* L. 1758, original name; *Brechites penis* and *Penicillus penis* (L. 1758) synonyms]

The juvenile bivalve shells are seen in detail at the bottom right-hand.
98 to 72 mm long
MF497: Mannar island causeway, beached.
MF615: Wattala, Pegasus Reef Hotel beach, 45 mm fragment of the lower end, mineralized and sand encrusted, beached.

- de Bruyne, 2003 pp. 298-299; Oliver, 1989 p. 310 (*Penicillus penis*); Eisenberg, 1989 p. 174, Abbott, 1991 (1994) p. 104, pl. 50 all in family Clavagellidae.

Family: TEREDINIDAE – Shipworms or Teredo worms

The boring bivalves of the family Teredinidae Rafinesque, 1815 are placed in 17 genera in 3 subfamilies (WoRMS July, 2020). A number of species are reported from the Indian and Bangladesh coastlines, including the Andaman and Nicobar Islands, and elsewhere in the Indian Ocean, inhabiting mangroves and wooden structures in harbours (Das & Dev Roy, 1980; Dey, 2006; Subba Rao & Dey, 2000; Siddiqui et al, 2007.)

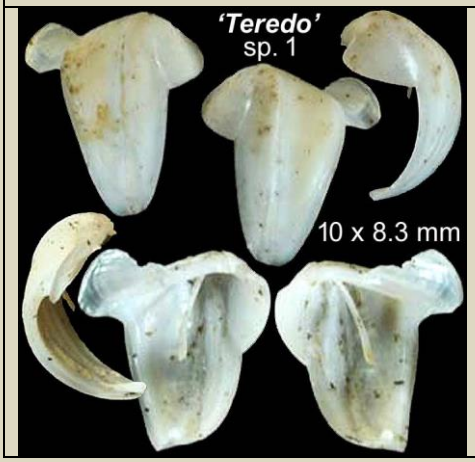
The shell is greatly reduced covering only the anterior end of the long, worm-like animal which burrows into wood. It secretes a calcareous lining inside its burrow that is open to water at its beginning. The siphons of the animal are at this end protected by calcareous structures called “pallets” that are important in distinguishing between species.

The shell is in two parts, hemispherical or ear-shaped, widely gaping in front and behind, divided into three parts: an anterior slope, a median disc and a posterior slope. Antero-ventral margin with a deep right angled notch, the posterior margin often lobed. The dorsal margin more or less rolled over the umbones forming an umbonal reflection. The outside of the valves have a groove from the umbones to the ventral margin. Corresponding to this groove on the inside is an umbono-ventral ridge with knobs at either ends—a dorsal and a ventral knob. The shells rock on these knobs during the boring process. Sculpture is mainly concentric on the anterior slope, the fine ridges being rough. The internal ligament is reduced. There are no hinge teeth. The umbonal cavity has a finger-like process (“apophysis”) to which the foot muscles are attached. The foot itself is sucker-like protruding forwards through the anterior gape. There are three adductor muscle scars that are obscure: the anterior muscle is small on the umbonal reflection, the posterior is large on the lobed posterior slope and the ventral is small.

These specialised animals are adapted to burrow into submerged wood and other plant material. They alternate between filter feeding on plankton and utilising the wood particles rasped during the boring process that are initially digested by symbiotic bacteria.

Shipworms are recognised as causing damage to wooden ships and manmade structures such as jetties. Some species are eaten by local people. The Sri Lanka species are unknown to the author. Empty shells have been recovered from a piece of mangrove timber washed ashore on a Jaffna island and calcareous tubes have been seen on a heavy log washed ashore on a Kayankerni beach (Thennadi Bay, east coast). Empty shells of a different species have been collected from a beached log at Erakkandy, north of Nilaveli.

- Poutiers, 1998, p. 359

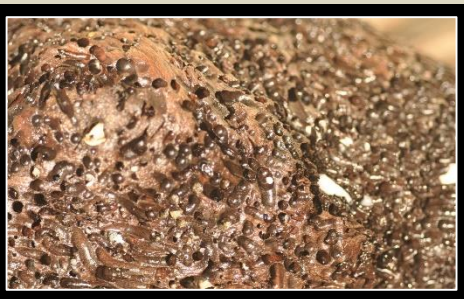


Left - MF528: Jaffna, Analaitivu, cast ashore in floating mangrove log, 10.0 x 8.3 mm largest.

Right - MF685: Trincomalee, Erakkandy, lagoon mouth, cast ashore. Boring into hard wood log, Ht. 4-5mm. Bore diameter 6-7mm (without calcareous lining).

In the panels below are images of the two logs showing the characteristic borings of shipworms.

Internet image of exposed shipworms (left), collected for raw consumption.
Images courtesy of Dharshana Jayawardena.



The log from Erakkandy showing numerous tunnels all over and a few *Martesia striata* borings.

The log from Jaffna: Left – a cross-section showing teredo borings in the long axis of the log. Centre – a surfact view showing teredo borings with a fragment of the calcareous lining and a *Martesia striata* in its boring which is perpendicular to the surface. Right – Teredo borings with calcareous linings seen at the broken-off end of the log.

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MF: 19.10.2016; 18.2.2017; 28.2.2017; 12.2.2018; 3.5.2018; 11.3.2020; 7.8.2020 - reviewed and updated.