WORM SHELLS

List of species

Siliquariidae Anton, 1838

1. *Tenagodus anguinus* (Linnaeus, 1758)
2. *Tenagodus cumingii* Mörch, 1861
3. *Tenagodus* sp.1 (?)

Vermetidae Rafinesque, 1815

4. *Thylacodes* cf. *sipho* (Lamarck, 1818)
5. *Thylacodes* sp. 3
6. *Vermetus* sp. 1
7. *Vermetus* sp. 2
8. *Vermetus* sp. 3

Other species reported from Sri Lanka

nil

Worm shells are so called because they resemble the structures made by tubeworms of the family SERPULIDAE. These are sedentary segmented worms (Phylum Polychaeta– bristle worms) that secrete calcareous tubes, in which the worms live. Worm tubes are open at both ends and have a two-layered wall, the inner layer of which is not shiny.

The mollusc worm shells, on the other hand, have tubes with three layers, the innermost one being shiny, open only at the wider aperture end and often closed by a horny operculum. They all start off as spirally wound shells, but after a time the whorls separate from each other and form haphazard coils or un-coiled lengths. Many species live attached to hard substrates like rocks or other molluscs such as bivalves, others are free-living on soft substrates or buried within sponges.

All worm shells are filter feeders filtering organic matter (plankton and detritus) from the water. Two methods are employed. In the ciliary feeding method, what organic material that is carried into the mantle cavity in the water current during its normal respiratory activity is filtered by the gill filaments, wrapped in mucous and transported along ciliary tracts to the mouth, where it is swallowed. In the mucous feeding method, threads of mucous (slime nets) are secreted by glands in the foot to trap food material, after which they are withdrawn and passed to the mouth.

Worm shells are now classified under three families:

- Family SILIQUARIIDAE Anton, 1838 (slit worm shells): The disentangled coils are usually buried within sponges. They are characterised by a slit or series of perforations down one side of the shell.
- Family TURRITELLIDAE Lovén, 1847 subfamily VERMICULARIINAE Dall, 1913 (worm shells): Mostly free-living on sandy or muddy substrates, some species attached to hard substrates, often in the vicinity of sponges.
- Family VERMETIDAE Rafinesque, 1815 (worm shells): These shells form colonies attached to hard substrates and are found in all warm seas, mostly in the intertidal and sublittoral zones. The operculum is small or absent.

Slit worm shells are fairly characteristic and specimens in the collection have been identified positively to genus level. No specimens attributable to the Turritellidae subfamily Vermiculariinae have been collected. A number of specimens have been attributed to the family Vermetidae. Definitive diagnosis depends on the characters of the embryonic whorls, which are often lacking or hidden in the specimens in the collection.

"The taxonomy of the uncoiling "worm-snails" belonging to the marine gastropod families Vermetidae, Siliquariidae and Turritellidae is notoriously confused and their nominal species frequently mixed (in the literature as well as in type specimen collections) with members of superficially similar tube-building polychaete worms or members of unrelated molluscan groups." – Bieler & Petit, 2011.



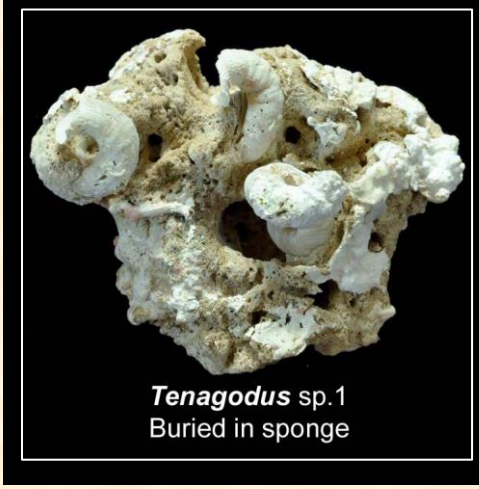

SILIQUARIIDAE Anton, 1838 and VERMETIDAE Rafinesque, 1815
Slit worm shells and Worm shells

Siliquariidae


Tenagodus anguinus
Up to 8mm diam. 450mm unwound


Tenagodus cumingii
Actual size uncoiled
90mm, 5mm diam.


Tenagodus sp.1
Diameter 8 to 8.5mm


Tenagodus sp.1
Buried in sponge

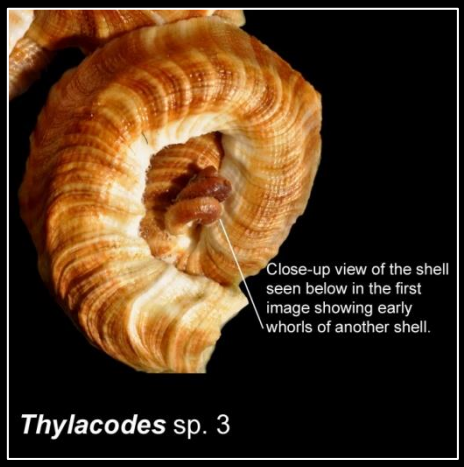
Tenagodus sp. 1 is likely to be *Tenagodus cumingii*. It has been placed without a specific name as it is greater in diameter.

The image at left shows a fragment of sponge with a number of these shells with the apical portions buried within it.

Vermetidae - *Thylacodes*

Thylacodes* cf. *sipho
On sandstone substrate
Aperture diameter 7mm

Up to 10 mm diameter
***Thylacodes* sp. 3**



Close-up view of the shell seen below in the first image showing early whorls of another shell.

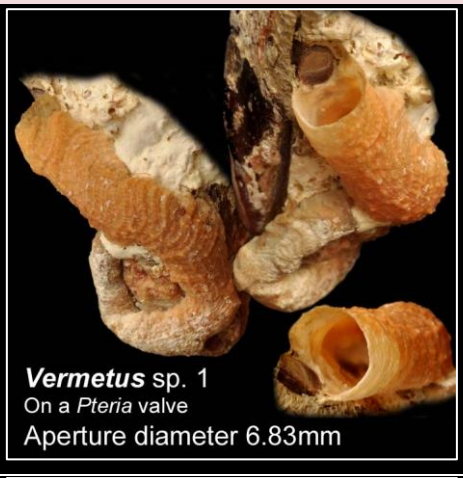
***Thylacodes* sp. 3**

Early whorls seen from below, the larval shell missing.

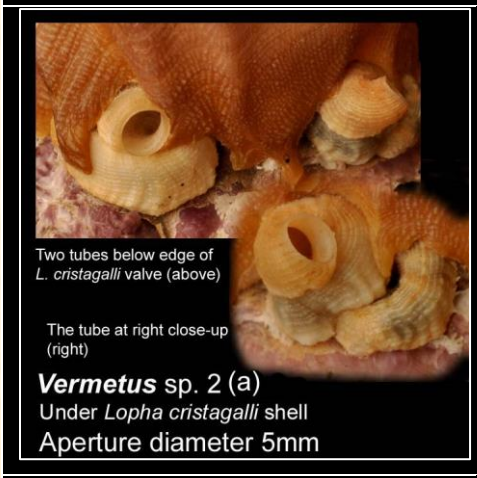
Close-up view of the shell seen upper left in previous image, with dark coloured early whorls.

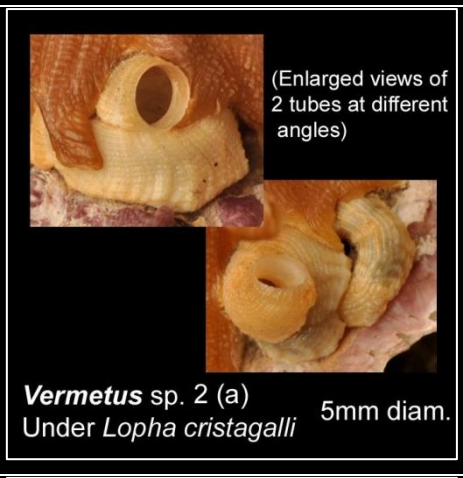
***Thylacodes* sp. 3**

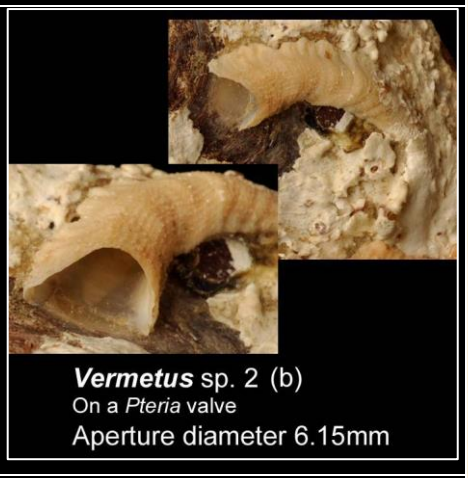
Vermetidae – "*Vermetus*"

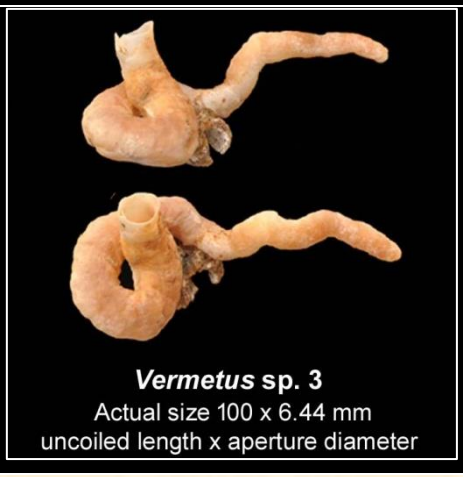


***Vermetus* sp. 1 and sp. 2 (b) both share the same host – a *Pteria avicular* shell that was collected alive, the tubes being empty.**









***Vermetus* sp. 3 was found lying on the seabed with other trash. There is a fragment of the sand tubes formed by the segmented sedentary worm *Idanthysus* attached, suggesting that this tube was attached to a hard substrate when the animal was alive.**

SILIQUARIIDAE Anton, 1838
Slit worm shells

The shell has a strong resemblance to worm shells of the families TURRITELLIDAE and VERMETIDAE, but may be differentiated from these by the presence of a slit or row of holes along all or part of its length. The first whorls are spirally wound but start to become disengaged from each other later and adopt irregular shapes. No umbilicus, operculum horny. Sublittoral and deeper waters (to 200 m). Usually buried in sponges.

(Abbott, 1994; de Bruyne, 2003)

1. *Tenagodus anguinus* (Linnaeus, 1758) Squamous worm shell or Pod shell

[*Serpula anguina* Linnaeus, 1758 original name. Also *Siliquaria anguina*]

Shell a loosely wound tube with a slit throughout its whole length. Aperture damaged (in 4 specimens), circular in cross-section. Shell thin and light. Early whorls tightly coiled, but separated from each other, later coils increasingly wider apart and more spaced out. Externally angulated by 9 spiral (longitudinal) rounded, scaled ridges, well defined in early coils, becoming flatter in later ones. The scales "closed", spaced, c 1 mm high. The slit margins scalloped, the opposing scallops meeting in the midline, often fused - at least in the deeper layers of shell wall - resulting in a series of elliptical perforations. The slit is dorsal (apical) in the coils. Colour pink to mauve.

Internal diameter 5 - 6.5 mm, external 6 - 8 mm. Unwound length 150 to 450 mm.

Kalpitiya, Kandakuliya, 5 m, empty on sea-bed; Colombo, beached at Dehiwela, presumed fishing trash; Maggona, Thudawa Bay, fishing trash; Galle Harbour, "Pipe Wreck" site, weathered shells presumed washed in from the sea. All specimens damaged to varying extents.

Note: Said to be usually buried in sponges, some attached, some free living. These may have been buried inside sponges as they are free of encrusting organisms.

1. These shells were earlier placed in the genus *Siliquaria* Bruguière, 1789, subgenus *Tenagodus* Guettard, 1774; they are now treated under the genus *Tenagodus.*

2. Two similar species, *anguina* and *armata*, are illustrated by de Bruyne and Hardy. *T. anguina* is described by de Bruyne as having “rough spicules,” while Abbott describes “small prickles.” *T. armata** is said by de Bruyne to have “both scales and coarse spicules.” The four specimens in the collection have definite “scales” that are described as “closed.” They have been referred to *anguina* as they resemble more closely shells of this species as reproduced in Hardy’s Guide. In the series of pictures in Hardy’s Guide, *anguina* appears to have more robust “spicules” than *armata*; however, there are exceptions under both names, where the “spicules” could be described as “closed scales” as in the shells described here. Whereas de Bruyne gives Indo-Pacific as the distribution for both species with the addition of Japan for *anguina*, Hardy gives West Pacific for *anguina* and Japan to Indonesia (Java) for *armata*. The type locality contained in Indonesia (WoRMS, 2020).

*The correct spelling is *Tenagodus armatus* (WoRMS, 2020.)

Siddiqui et al do not list any Siliquariidae for Bangladesh and neither does Apte, 1988 for India, but Subba Rao and Dey list *Siliquaria (Tenagodus) muricata* (Born) Lamarck, 1818 for the Andaman and Nicobar Islands. *Tenagodus muricatus* (Born, 1780) is listed in MolluscaBase (2020)/WoRMS as a taxon inquirendum (a taxon, of which the taxonomic validity is uncertain or disputed).

The correct name of the Sri Lanka species needs to be confirmed.

- Eisenberg, 1989 p. 48; Abbott, 1994 p.27; Apte, 1998; Subba Rao and Dey, 2000; de Bruyne, 2003; Hardy’s Internet Guide [accessed 8.5.2009]

2. *Tenagodus cumingii* Mörch, 1861 Ribbed, scaled worm shell

[*Siliquaria cumingii* (Mörch, 1861) synonym]
Kirtisinghe, 1978 p. 55 as *Siliquaria cumingii* Morch

Shell coiled for 5 whorls, then loosely coiled for 2 and then unwinding to form straight and curved segments. Damaged terminally. A slit present throughout its whole length, on the upper (apical) aspect in the coiled portion. Margins of slit scalloped, scallops touching, mostly fused so that the slit consists of a series of elliptical perforations. Towards the aperture the deep layers of the shell wall are fused while the superficial layers are apart. Aperture is missing, cross-section circular. Ornamentation consists of numerous very fine spiral (longitudinal) threads crossed by lamellar growth lines. No sign of scales or spines that may have been rubbed away. Colour white.

The terminal 10 mm encrusted with bryozoans, serpulid worm tubes and red algal filaments, suggesting that this portion alone was exposed. (Siliquariidae said to live mostly buried in sponges.)

Internal diameter 3 mm, external 5 mm, uncoiled length c 80 to 90 mm.

Trincomalee, Dutch Bay, empty shell on sand bottom amongst rocks, corals, by diving.

Note: Referred to *T. cumingii* as the closest match found. That species 25 - 200 mm, Japan, Australia (Queensland), E. India (Hardy). Is similar in appearance to the index shell but has scaled spiral threads. No evidence of scales in the Sri Lanka specimen. MolluscaBase (2019)/WoRMS gives the distribution as ‘Indian Ocean’. On-line images do not show scaled threads (e.g. idscaro.com), mostly what appear to be growth lines. But one image in femorale.com does show spiral (longitudinal) threads. Kirtisinghe, 1978 describes this species as having “longitudinal threads”.

3. *Tenagodus* sp.1 (?) Ribbed, scaled worm (?)

Thought to be different from *T.* cf. *cumingii* on the following grounds: greater width of tube, possible lack of straight segments, ornamentation of thicker but weaker threads that are more widely spaced. The collection consists of two pieces, one with protoconch intact and three pieces embedded in sponge and sand concretions, the apical portions not visible. Tubes of these narrower, but still greater than the Trincomalee specimen. The image shows two apical segments and 3 tubes (apertures missing) emerging from the sponge substrate.

Maximum diameter 8.0 and 8.58 mm.

Maggona, Thudawa Bay, fishing trash.

VERMETIDAE Rafinesque, 1815

Thylacodes Guettard, 1770
Vermetus Daudin, 1800

Shells of this family are long, thick and irregularly coiled. The early whorls may be regularly coiled. Sculpture of longitudinal ridges, some with spiral cords or growth lines. Thin, round, multispiral opercula. Feed on diatoms, plankton and detritus, some species spinning mucous nets. Members of this family are attached to hard substrates, forming colonies. (Eisenberg, 1989, p. 181)

The presumed members of this family in the collection have not been identified to species level. Two are assigned to *Thylacodes* based on similarity to images on the internet and one is referred to the species '*sipho*' – reported from Australia – as being the closest match found. Three other collections are arbitrarily assigned to the genus '*Vermetus*', no images being found that match.

4. *Thylacodes* cf. *sipho* (Lamarck, 1818) Worm shell

[*Serpula sipho* Lamarck, 1818 original name. *Serpulorbis sipho* (Lamarck, 1818) synonym]

Shell calcareous, fairly thick, underside flattened, the convex side of coils margined (angulated). Early coils hidden under later ones, the latter loosely coiled in a haphazard fashion. Terminal portion turning up, circular in cross-section. No slit or perforations. Ornament consists of close-spaced, even, equal-sized spiral (longitudinal) cords crossed by axial (transverse) ribs enclosing square spaces. Specimens are quite weathered, no remnants of scales or spines seen even in sheltered nooks. Fragments of very early coils present growing on top of old shells measuring 0.5 to 1.0 mm diam., white in colour, with only axial (transverse) striations. Colour of mature shells biscuit with tan shading on the dorsum. Early coils (2-3 mm diam.) reddish-brown.

Diameter of later coils 7 mm, aperture (damaged) 5 mm.

Beruwela, harbour, beached, probably fishing trash. A colony of 3-4 weathered tubes attached to a hard substrate.

Thylacodes sipho is from S. Australia. It has a fine cancellate ornamentation, unlike the coarse ornament seen here. Referred to it for convenience. Most of the pictures in Google images are of solitary tubes, of a number of species.

5. *Thylacodes* sp. 3 Worm shell

A clump of 3 tubes without the substrate attachment. Shells coiling tightly, irregularly, the later whorls superimposed on earlier ones. Upper surface rounded, lower flattened, edges margined, irregular. Sculpture coarsely cancellate underlying thick growth lines giving a very uneven surface. Honey coloured upper surface, pale edges, whitish underneath. Juvenile whorls brown.

Diameter up to 10 mm (broken extremity).

Jaffna, Mandaitivu, boat anchorage, beached fishing trash, weathered and damaged, terminal portion missing.

This appears to be a species different from the previous one (cf. *sipho*). It is designated 'sp. 3' as it was the third worm shell collected before generic names were assigned.

6. *'Vermetus'* sp.1 Wrinkled worm shell

Tube solitary, calcareous, complete, no slit or perforations. Early whorls narrow, hidden under later coils that are irregular concentric spirals attached to the substrate. Edge angular at point of attachment, the tube being flattened below. Terminal portion 7 mm dia., aperture circular with flat base, 6.83 mm dia. Surface wrinkled, cancellate, with thick and thin rounded, smooth, spiral (longitudinal) cords crossed by coarse growth lines. Colour reddish-brown, areas not covered by encrustations glossy. Empty when collected, no data regarding operculum.

Aperture diameter 6.83 mm

Trincomalee, Nilaveli, Pigeon Islands, 4.1 m, attached on a *Pteria avicular* valve, one of two worm shells of different spp. Attached along the whole length of the tube.

Note: This specimen is assigned to the genus *Vermetus* arbitrarily, separated from those assigned to *Thylacodes*. The nearest match found (in Hardy's Guide) was *Vermetus rugulosus,* now accepted as *Thylaeodus rugulosus,* with coarse transverse ridges. A number of images available on-line, some showing the terminal portion turned up vertically. However, the size is given as 1 to 1.3 mm, much smaller than the Sri Lanka specimens and the distribution of *T. rugulosus* is in the Atlantic Ocean and the Mediterranean Sea.

7. *'Vermetus'* sp. 2 Scaled worm shell

Two tubes with different growth habits but identical sculpture and colour are assigned to *Vermetus* sp. 2 and described below as (a) and (b).

(a) Tube calcareous, complete, no slit or perforations, aperture circular, an operculum present. Whorls coiling over earlier ones, earliest parts obscured. Portions attached to host valve by flattened ventral aspect, the edge widened, margined and rumpled. Ornament consists of numerous fine, scaly, spiral (longitudinal) threads with narrow interstices on dorsum, coarser and with wider interstices towards the ventral edge. The scales semicircular, aligned along growth lines. Brownish-cream. Operculum horny, circular, outer aspect concave, inner with a central, knob-like nucleus, 4 mm diameter.

4 mm internal diameter at aperture earlier coils 5 mm external diameter.

Trincomalee Harbour, attached to a dead oyster valve, overgrown by a *Lopha cristagalli*. Operculum present. Three adult shells together with 2-3 juvenile shell fragments. Collected by diving, the whole colony lying free on the sand bottom. Two of the adult shells figured in the images as well as the juvenile tubes.

(b) Tube calcareous, complete, no slit or perforations, empty, no information regarding operculum. Attached along whole length of tube to host - a *Pteria avicular* valve - by a widened, flattened base, the edges of contact margined, angulated, and rumpled. Aperture an inverted 'U' - 4 mm vertically, 6 mm across the floor that consists of the nacreous layer of the host, the superficial layers being lost. Earliest parts of tube obscured by another shell (*Vermetus* sp. 1), later part a semicircle 30 mm long. Ornament consists of fine, scaled, spiral (longitudinal) threads, narrow interstices dorsally, coarser and with wider interstices towards ventral edge. The scales semi-circular, aligned along growth lines.

Note: Differentiation between the genera of Vermetidae is unclear. Poutiers, 1998 & de Bruyne, 2003 say *Serpulorbis* (now accepted as *Thylacodes*) has no operculum; Siddiqui et al describe an operculum (for the same species). This specimen has an operculum, so assigned to *Vermetus*. ID322 has different growth habit but sculpture similar, so assigned same name but filed separately. The brown shell on the same valve with ID322 also assigned to *Vermetus* as sp.1. Three collections assigned to *Thylacodes* (=*Serpulorbis*) as they are gregarious and resemble *Thylacodes* (=*Serpulorbis*) in Eddie Hardy's Internet Guide (gastropds.com) and other on-line images.

8. *'Vermetus'* sp.3

An empty tube with a portion of *Idanthysus* worm-tube attached. Was probably attached to an *Idanthysus* colony.

Tube irregularly sinuous ending in a loosely coiled anterior with upturned terminal portion. Larval and juvenile stages not present, the oldest portion ending bluntly, rounded, closed. No slit or perforations. Exterior wrinkled, abraded, close-set rounded ribs in the long axis. Light tan coloured.

100 x 6.44 mm (uncoiled length x aperture diam.) External diameter 3 to 8 to 6.44 mm, being widest over the terminal loop.

Wellawatte, Kinross lagoon, 3 m, empty, with other reef trash lying on the sand bottom, by diving.

Note: Absence of juvenile coils suggest that this is not a gastropod, however, being closed at one end, the terminal coil with up-turned aperture, the external sculpture and the colour suggest that this is one. It is assigned to *Vermetus* arbitrarily and designated sp. 3 as it is quite different from those designated sp. 1 and 2.

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and http://www.gastropods.com/2/Shell_1302.shtml;
and
http://www.femorale.com/shellphotos/detail.asp?species=Tenagodus+cumingii+Morch%2C+1861&url=%2Fshellphotos%2Fthumbpage%2Easp%3Ffamily%3Dsiliquariidae%26cod%3D1052a

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