Study on vermetid worm shells in Mon coastal area of Myanmar.

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Abstract: Vermetid worm shell of *Thylacodes decussatus* (Gmelin, 1791) belonging to genus *Thylacodes* Guettard, 1770 under the family Vermetidae collected at Kyakkhami, Setse, Kawdut, Sitaw and Kabyarwa in Mon coastal area from January to December 2018. A total of 2561 individuals collected from rocky hard substrates, boulders, rock pool, and water-leveled benches of supra-tidal to lower sub-tidal levels. Regarding percentage species composition, September was maximum species composition, and April was minimum species composition. The range of mean was 47.67-28.67 (September-April), and standard deviation was 40.66-18.06 (November-February). Maximum and minimum species abundance were recorded in Kawdut coastal area (792 individuals) and Sitaw coastal area (207 individuals), respectively. Moreover, the habitats, zonal distribution and coiling patterns of worm shells in intertidal and shallow water environments of Mon coastal area were studied in brief.

Key words: Composition, worm shells, Vermetidae, abundance, Mon coastal area.

Introduction

The vermetids are a distinct group of sessile gastropods, which have high morphological plasticity characterized by irregular shells growth, adapted to the substratum. Coiling pattern and shells ornamentation change with the environment, such as turbidity of water and topography of the substratum. Vermetids live in intertidal or shallow subtidal habitats in tropical and temperate waters between 44°N and 44°S, not only in warm and oxygenated waters, but also under the cold upwelling conditions off northern Chile. On the coast of Mon State, can be found vermetid bio-constructions with other organisms, such as bivalve shells, barnacles and marine benthic algae from North to South coasts located between (Lat. 14° 55' N and 16° 35' N and Long. 97° 20' E and 97° 48' E). Extensive taxonomic and biological investigations were undertaken on Myanmar shallow water vermetids by Soe Thu. Based on literature records, Laborel highlights a possible impoverishment of the reef-building vermetids in the South Atlantic and Poutiers documents the habitat, biology, and fisheries of worm shells in Western Central Pacific regions. The purpose of this study is to study the occurrence of worm shells in the Mon coastal area.

Materials and methods

In this study, quantitative analysis was used by the quadrat (50 cm × 50 cm), which divided into a (10 cm × 10 cm) grid made of aluminum for light and durable. For each site, at least 5 transects of 25 m length are lined perpendicularly to the shore at the interval of 5 m for each site (Figure 1).

Sampling was conducted monthly from January to December 2018. Drift and live specimens of vermetid worm shells living in hard and rocky substrates of intertidal and shallow subtidal areas were collected from the following coastal regions (Figure 2).

Results and Discussion

The vermetid worm shells, locally called ‘Kyauk-kyoe-khway’ were conducted from 6 collection sites in central and southern Mon coastal areas. In this study, a total of 2561 individuals of worm shells were observed from different hard substrates at intertidal and shallow subtidal levels, to a depth

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of about 25m. This systematic account follows the identifying set out by Poutiers12 Abbott13 and WoRMS14 in detailed.

**Family Vermetidae Rafinesque, 1815**

Shell irregularly coiled or even disjunction, resembling a worm tube but composed of 3 layers. Aperture without a siphonal canal. Operculum horny, spiral, sometimes absent.

**Genus Thylacodes Guettard, 1770**

Shell long, usually irregularly coiled or even disjunction and resembling a worm tube, but composed of 3 layers, with the inner one porcelainous. Shell permanently attached to a hard substrate. First, whorls coiled around an axis at a 90° angle to that of the larval shell. Sculpture weak, longitudinal or transverse, and irregular. Aperture rounded, sharp-edged, without a siphonal canal. Operculum horny, spiral, sometimes absent. Head with short tentacles bearing eyes at their outer bases. Foot small.

**Thylacodes decussatus** (Gmelin, 1791)

**Synonyms**

*Serpula decussata* Gmelin, 1791; *Serpulorbis decussatus* (Gmelin, 1791).

**Shell characters**

Shell large, robust, tubular, irregularly coiled, often straight or only slightly curved in the adult, partly embedded in the substrate. Sculpture variable, with weak lamellar, transverse threads. Operculum well developed, as large as the aperture.

![Map showing the study sites of vermetid worm shells in Mon coastal area.](image)

### Sampling area
1. Kyaikkhami (Lat. 16° 04’ N, Long. 97° 33’ E)
2. Setse (Lat. 15° 52’ N, Long. 97° 34’ E)
3. Hnitkayin (Lat. 15° 34’ N, Long. 97° 45’ E)
4. Kawdut (Lat. 15° 32’ N, Long. 97° 45’ E)
5. Sitaw (Lat. 15° 11’ N, Long. 97° 48’ E)
6. Kabyarwa (Lat. 15° 04’ N, Long. 97° 48’ E)
Table 1. Zonal distribution of vermetid worm shell in Mon coastal area.

| Sampling site | From landward to seaward |
|---------------|--------------------------|
|               | Supra-tidal | High tide | Mid tide | Low tide | Sub-tidal |
| Kyaikkhami    |             |           |          |          |           |
| Setse         |             |           |          |          |           |
| Hnitkayin     |             |           |          |          |           |
| Kawdut        |             |           |          |          |           |
| Sitaw         |             |           |          |          |           |
| Kabyarwa      |             |           |          |          |           |

Figure 3. Phylum: Mollusca Linnaeus, 1758; Class: Gastropoda Cuvier, 1795; Order: Mesogastropoda Thiele, 1929; Family: Vermetidae Rafinesque, 1815 ; Genus: Thylacodes Guettard, 1770; Species: T. decussatus (Gmelin, 1791)

Table 1. Zonal distribution of vermetid worm shell in Mon coastal area.
ranged 47.67-28.67 in September and April, and 40.66-18.06 in November and February. The noticeable range of percentage composition was (11.17%-6.72%). Maximum species abundance were recorded 792 individuals in Kawdut and followed by 464 individuals in Setse, 399 individuals in Kyaikkhami, 387 individuals in Hnittayan, 312 individuals in Kabyarwa and 207 individuals in Sitaw, respectively. During the study period, monthly species composition from maximum to minimum individuals was recorded in September, November, August, December, January, June, May, March, February, October, July and April (Figure 3).

Vermetidae has distinct and variable shell shape due to their settle substrate and environmental conditions. Shells formed irregularly coiled or even disjunction and resembling a worm tube and permanently attached to a hard substrate. Sculpture of the shell is weak, longitudinal or transverse, and irregular in shape. There are seven coiling patterns of vermetid worm shells recorded in this study. Coiling patterns of

### Table 2. Species composition of vermetid worm shell in Mon coastal area.

| Months      | Sampling sites | Mean | SD | % composition |
|-------------|----------------|------|----|---------------|
|             | Kyaikkhami     |      |    |               |
| January     | 28             |      |    |               |
| February    | 46             |      |    |               |
| March       | 03             |      |    |               |
| April       | 16             |      |    |               |
| May         | 18             |      |    |               |
| June        | 21             |      |    |               |
| July        | 10             |      |    |               |
| August      | 33             |      |    |               |
| September   | 57             |      |    |               |
| October     | 56             |      |    |               |
| November    | 94             |      |    |               |
| December    | 17             |      |    |               |
| Total       | 399            |      |    |               |

![Figure 4. Monthly species composition of vermetid worm shells in Mon coastal area.](image-url)
Table 3. Coiling patterns of vermetid worm shell in Mon coastal area.

| Type of coiling       | Shell length (cm) |
|----------------------|-------------------|
|                      | 0-5               |
|                      | 5-10              |
|                      | 10-15             |
| Circular             |                   |
| Semicircular         |                   |
| Conical              |                   |
| Ovate                |                   |
| Spindle-shaped       |                   |
| Cylindrical          |                   |
| Rhomboidal-shaped    |                   |

Figure 5. Types of coiling of vermetid worm shells in Mon coastal area.

**Conclusions**

The vermetid worm shell *Thylacodes decussatus* (Gmelin, 1791) is one of the dominant gastropods in Mon coastal area. It has a high composition throughout the study period. Mean, and percentage species composition was moderately related between the study sites. The variation of shell structures showed distinct coiling patterns with their settlement substrate types. Zonal distribution can be predicted and measured the species dispersion of vermetid worm shells in study areas.

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