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Morphological Description of Pedunculate Barnacle *Octolasmis angulata* (Aurivillius, 1894) on Wild Mud Crab Genus *Scylla* from Setiu Wetland, Terengganu Coastal Water, Malaysia

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ABSTRACT

Samples were collected from Setiu Wetland (5°40'47.93"N, 102°42'45.04"E) of Terengganu coastal water, Malaysia. Sixty wild mud crab genus *Scylla* spp. were measured for carapace length (7.9±1.06 cm) and weight (90.8±34.0 g) before further examined. The 473 of barnacle species *Octolasmis angulata* were collected from three species of wild mud crab i.e., *Scylla olivacea*, *S. tranquebarica* and *S. paramamosain*. The basic morphological features and terminology are applied for easily identified the species such as body shape and size, the presence or absence of calcareous plates or scutum, the variations in plate size, shape and disposition. The external and internal parts of pedunculate barnacle, *Octolasmis angulata* were draw and describe the morphological characteristic i.e., capitulum, peduncle, scutum and carina. The entire characteristics were measured for comparison by referring to the previous study. The structures of mandible, maxilla, maxillule, cirri, setae, penis, ovary, teeth, etc. were recognized.

Key words: Pedunculate barnacle, *Octolasmis angulata*, mud crab, *Scylla* sp., morphological characteristic, setiu wetland

INTRODUCTION

Cirripedia included orders Thoracica, rhizocephala, acrothoracica and ascothoracica are a varied group of marine and brackish crustaceans living at depth from the surface down to 6000 m or more. Pedunculate, Goose or Stalked barnacles are the less common of the two varieties and are to be commonly found in the hard substrate of marine or brackish area and it also recorded found attached on the living organisms as their host (Voris *et al.*, 1994; Jeffries *et al.*, 1989; Jeffries and Voris, 1996; Jithendran *et al.*, 2010; Lavilla-Pitogo and Pena, 2004). According to Anderson (1994), most of this barnacle species that previously identified are *Lepas anatifera* and *Balanus trigonus*. Chan *et al.* (2011) has identified and describes most of the barnacle species from the Taiwan coastal water included barnacle from genus *Octolasmis* spp.

These studies have been focused on the wild mud crab, genus *Scylla* host-species of *Scylla olivacea*, *S. tranquebarica* and *S. paramamosain* which is commonly found in Setiu Wetland, Terengganu coastal water, Malaysia. *Scylla serrata* are not found in Malaysia (Ikhwanuddin *et al.*, 2010, 2011). Most of the hosts of *Octolasmis angulata* are from family Calappidae, Palinuridae, Portunidae, Menippidae, Majidae and Xanthidae which most of the area of infection are found in gill chamber (Jeffries *et al.*, 1982, 1989, 2005; Voris *et al.*, 1994; Jeffries and Voris, 1996) and one record found in marine snakes (Jeffries and Voris, 1979). Jeffries *et al.* (2005) also report that most

of the places that are found in Bay of Bengal, Arabian Sea, Malay Archipelago, Off Madras and Singapore. But there is no other mud crab host-species than *S. serrata* that have been mention for mud crab species.

Objectives of this study are to identify the morphological characteristic of the pedunculate barnacle species *Octolasmis angulata* (Aurivillius, 1894) that found attached on the gill of three species of wild mud crab from Setiu Wetland, Terengganu coastal water, Malaysia.

MATERIALS AND METHODS

Three species of mud crab have been selected as a sample to identify the parasites. The mud crab species selected are *Scylla olivacea*, *S. tranquebarica* and *S. paramamosain* identification based on Keenan *et al.* (1995) that are commonly caught from Setiu Wetland, Terengganu Coastal water, Malaysia (Ikhwanuddin *et al.*, 2010). These samplings were started from January 2011 to August 2012. Sixty mud crab specimens with mean Carapace Width (CW) = 7.9±1.06 cm and Body Weight (BW) = 90.8±34.0 g were dissected and recorded. A total number of pedunculate barnacles that live in the gill chamber of the host cemented to the gill lamellae were recorded by species morphological differentiation and were fix in 70% ethanol for further analysis. About 20 barnacles were taken for data measurement. Measurements of capitulum, peduncle, carina and scutum/capitular plates were recorded.

All barnacles were identified based on previous study by Jeffries *et al.* (1982, 2005) by referring to their morphological features of capitulum, scutum, carina and terga. The length of capitulum, peduncle, scutum and carina were measured. The important morphology that has to take into counter is body size and shape, the presence or absence of calcareous plates as well as variation in plate size, shape and disposition.

For barnacle identification, method for parasitology techniques [fixing, capturing using advanced compound microscope (Nikon Eclipse 80i) and advanced stereo microscope (Nikon AZ100) and drawing] were applied. Before the drawing and capturing process is done, the sample were mount using glycerine jelly for the preparation of permanent slide, sample were seal with nail cutex for a long term keeping. After the permanent slide is ready, the drawing process is done using Compound Microscope attached with Lucida Camera (Leica CM E). Ten good specimens were selected for drawing process and every part of the specimen was illustrated.

Preserved sample were also prepare for Scanning Electron Microscope (SEM) process. In this study, the photographs of this sample were directly captured using Portable SEM (Hitachi TM-1000).

RESULTS AND DISCUSSION

The 473 barnacle samples have been collected from 60 wild mud crabs (*Scylla olivacea* (20n); *S. tranquebarica* (20n) and *S. paramamosain* (20n)). About 20 of sample were measured for the length of capitulum, peduncle, scutum and carina. This part is the most commonly verified for species identification. Detail measurement of capitulum, peduncle, scutum and carina as in Table 1. The shapes of scutum are one of the morphological characteristic that can differentiate with other species.

Table 1 shows the size of CL from this present study are slightly similar with Chan *et al.* (2011). Chan *et al.* (2011) also shows the PL are much longer than this present study. The host-species and occupancy can be assumed as a factor to the differentiation of species size i.e., small size has evolved through juvenilization, early cessation of growth, reduced plate calcification and a precocious onset of sexual maturity (Anderson, 1994). According to Jeffries *et al.* (1982, 2005) marine crustacean of the order Decapoda are frequently infested with this pedunculate barnacle

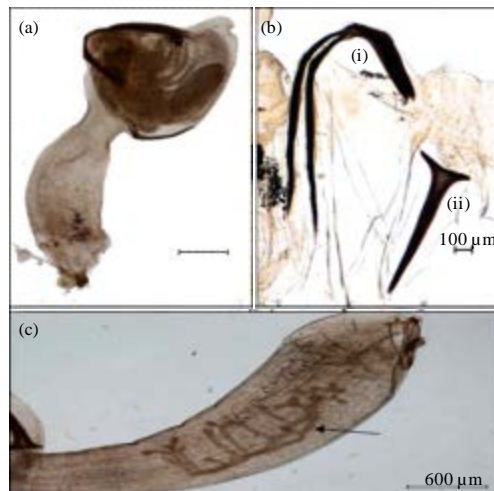


Fig. 1(a-c): (a) Whole body of *Octolasmis angulata*, (b) Shape of (i) Scutum and (ii) Carina and (c) Ovary (arrow)

Table 1: Comparison of morphological characteristic *O. angulata* from the present study with previous study

Parameters	Jeffries <i>et al.</i> (2005)	Chan <i>et al.</i> (2011)	Present study
Capitular Length (CL)	2.40±0.34 mm	1.34-2.56 mm	1.6±0.34 mm
Capitular plates	3	3	3
Peduncle Length (PL)	-	1.15-4.06 mm	2.2±0.88 mm
No. of scutum	2	2	2
Length of scutum	-	-	1.8±0.45 mm
Present of carina	✓	✓	✓
Length of carina	-	-	0.9±0.24 mm
No. of terga	-	-	-

of genus *Octolasmis*. They also mention that more than seven *Octolasmis* sp. have been infested to 27 species representing nine families of decapods in the sea adjacent to Singapore (Jeffries *et al.*, 2005) while 26 species representing 11 families of decapods were infested by 4 *Octolasmis* sp. They have 10 species of genus *Octolasmis* have been recorded in South East Asia (SEA) which attached on living organisms i.e., *Octolasmis angulata*, *Octolasmis bullata*, *Octolasmis cor*, *Octolasmis lowei*, *Octolasmis neptuni*, *Octolasmis tridens*, *Octolasmis warwickii* and three unidentified species (Jeffries *et al.*, 1982, 2005).

Morphological characteristic for *Octolasmis angulata* (Aurivillius, 1894); capitulum oval-shape or robust and partially calcified, with 3 plates (Fig. 1a). Body are slightly compressed and semi-transparent (specimen can be more transparent after fixed with glycerine jelly). Tergum lacking; scutum or capitular plates (including occulent and arm of scutum) very narrow, tapering-end and 45 degree shaped (Fig. 1a); arm of scutum showing the layer of calcareous that growth especially in young specimen; carina are deeply forked and have a T-shape with narrow and expanded in horizontal directions in basal region. The colors of live sample are pale-brown to yellow (Fig. 1b). Surface structures of small specimen are smoother. Have a dotted surface at the peduncle and capitulum (Fig. 2). Maxilla segmented semi-globular with setae; maxillule narrow, with 7 pair of cirri and every segment have 4-7 setae; two notches bearing short, stout setae; mandible with 4 teeth (Fig. 3). The main characteristic that differentiate this species with others are the shape of scutum and carina (Jeffries *et al.*, 2005).

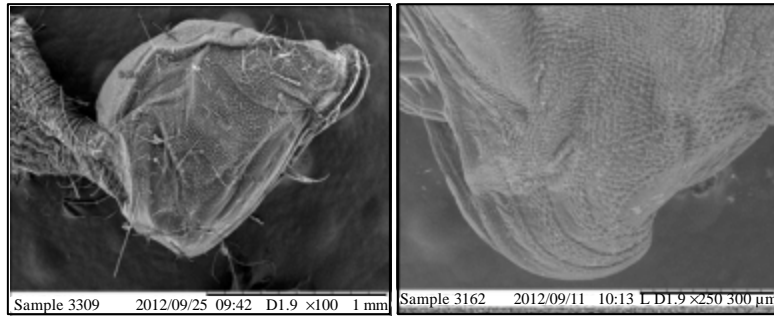


Fig. 2: Dotted surface of capitulum using Tabletop Scanning Electron Microscope (Hitachi TM-1000)

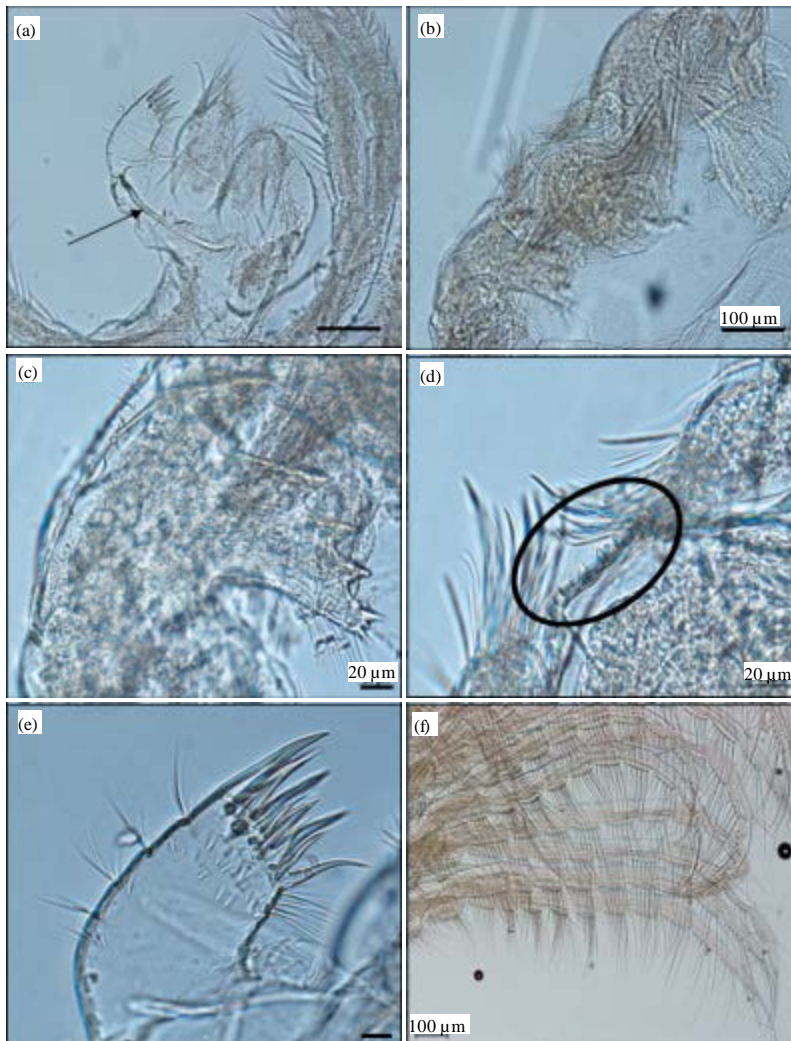


Fig. 3(a-f): (a) Filamentary appendage (arrow), (b) Whole part of mouth, (c) Mandible, (d) Close up view of teeth (circle) including 4 teeth between the maxilla, (e) Maxillule and (f) Cirri with setae (Capturing using Advanced Compound Microscope (Nikon Eclipse 80i))

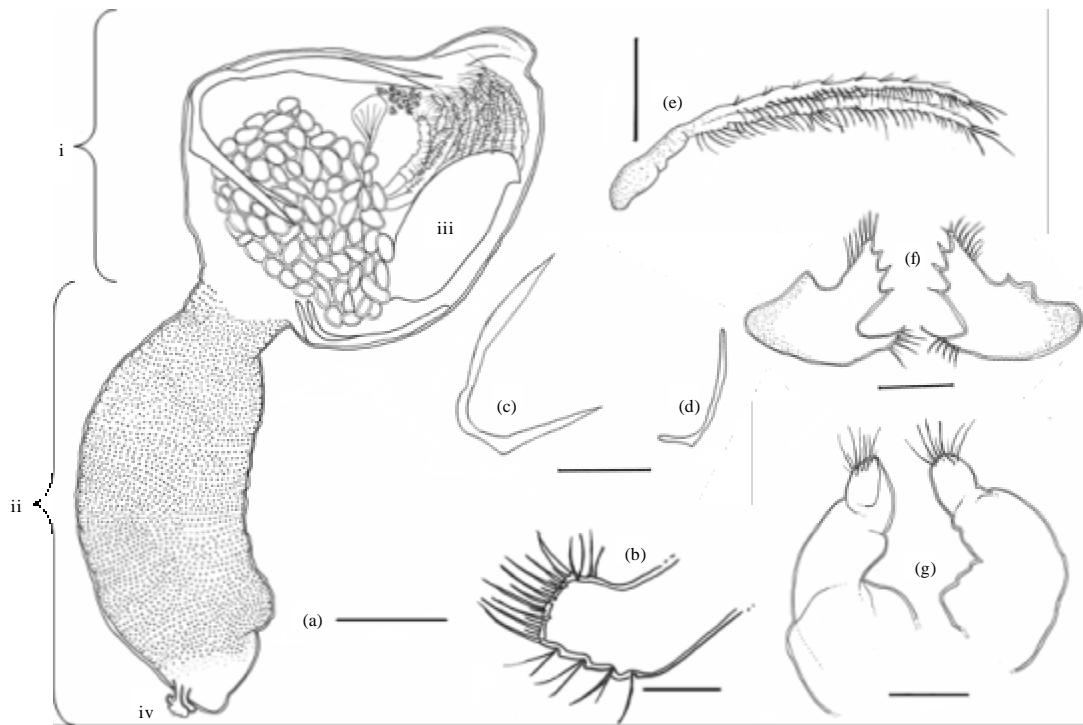


Fig. 4(a-g): (a) Whole body; (i) Capitulum, (ii) Peduncle, (iii) Penis and (iv) Attachment part, (b) Maxillule, (c) Scutum or capitular plates, (d) Carina, (e) Cirri with setae, (f) Pairs of mandible and (g) Pairs of mandibulatory palp (Scale bar a, c, d, e = 50 μ m; Scale bar b, f, g = 10 μ m)

Octolasmis spp. is hermaphrodites which have both sex organs (Anderson, 1994). Normally the ovaries produce the eggs inside the peduncle (Fig. 1c) and will be fertilise in the capitulum which have a male organ (Fig. 4a(iii)). The eggs will be matured in capitulum (Fig. 4a) and will be release to the water body as a nauplius after hatches. The attachment will be occurred if the nauplius became cyprid larvae and this cyprid stage will be found in the live-host i.e., portunid crab.

CONCLUSION

Most of the morphological characteristics have been describe by comparing to the previous study. And that is sure this species are *Octolasmis angulata* (Aurivillius, 1894). The taxonomic classification of this pedunculate barnacle species is as below; this species are commonly found in the gill chamber of wild mud crab in Setiu Wetland of Terengganu coastal water, Malaysia. The infections of this barnacle are not seriously killing the young mud crab. Most of the heavily infection of barnacle are affected the mud crab that molting rarely. Normally, the presences of the barnacle on the gill chamber are in a large number. Thus, this increasing number can be result to the death of the host because of the debilitated of gill respiration. This infection can be solved until the mud crab molting. Further studies have to be done especially DNA sequencing to confirm the species. All the important morphological parts were described in this study with compared to previous study that have been done. Here, we present the first published confirmation of

Octolasmis angulata (Aurivillius, 1894) from the East Coast of Peninsular Malaysia and it is first record found in the 3 species of wild Mud Crab genus *Scylla* spp.

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