



Faculty of Resource Science and Technology

**ECOLOGY AND BIOLOGY OF MUD LOBSTER (*THALASSINA* SP.)
IN SADONG JAYA, SARAWAK.**

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Ecology and Biology of Mud Lobster (*Thalassina* sp.) in Sadong Jaya, Sarawak

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This project is submitted in partial fulfillment of the requirements for the degree of Bachelor
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DECLARATION

No portion of the work referred to in this dissertation has been submitted in support of an application for another degree qualification of this any other university or institution of higher learning.



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LIST OF ABBREVIATIONS

DO	Dissolved Oxygen
GPS	Global Positioning Unit
FTU	Formazine Turbidity Units
pH	Potential of Hydrogen
PSU	Practical Salinity Unit
°C	Degree Celsius
mm	millimeter
mg/l	milligram per liter
cm	centimeter
m	meter
km	kilometer
m ²	square meter
g	gram
tl	total length
cl	carapace length
P2	Second pereopods
P4	Fourth pereopods

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Ecology and Biology of Mud Lobster (*Thalassina* sp.) in Sadong Jaya, Sarawak.

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ABSTRACT

The study of ecology and biology of mud lobster (*Thalassina* sp.) was conducted in mangrove area of Kampung Jemukan Laut, Sadong Jaya, Sarawak. The objective of this study is to determine the distribution of mud lobster in mangrove area of Kampung Jemukan Laut, Sadong Jaya, to identify the species of mud lobster occur in this area, to analysis the gut content of mud lobster, to investigate the characteristic of burrowing of the hole by it and to survey the used of mud lobster as medicinal value by the local people. The appearance, shape and distribution of the mud lobster were studied. A few physicochemical parameters of the water in the mud lobster hole were taken. We identified the species of mud lobster in the area as *Thalassina anomala*. The physicochemical water parameter in mud lobster hole such as the pH ranged from 6.84 to 7.70, the dissolved oxygen ranged from 0.03 mg/l to 5.83 mg/l, the turbidity ranged from 23 FTU to 1000 FTU, the temperature ranged from 26.7 °C to 28.0 °C and the salinity ranged from 11 PSU to 36 PSU. This animal is found abundant at 90 m from the high tide mark. It is possibly a deposit feeder where its gut content is found abundant of mud particle and plant fibre. The study contributes to the baseline data of mud lobster in Sarawak.

Key word: Mud lobster, *Thalassina anomala*, Sadong Jaya, distribution

ABSTRAK

Kajian mengenai ekologi dan biologi udang ketak (*Thalassina* sp.) dilakukan di kawasan paya bakau Kampung Jemukan Laut, Sadong Jaya, Sarawak. Tujuan kajian ini adalah untuk menentukan taburan udang ketak di kawasan paya bakau Kampung Jemukan Laut, Sadong Jaya, untuk mengenalpasti jenis udang ketak di daerah ini, untuk analisis isi usus udang ketak, untuk menyasat ciri – ciri udang ketak menggali lubang dan kajian mengenai udang ketak sebagai nilai ubat oleh masyarakat tempatan. Rupa bentuk, bentuk dan taburan udang ketak dipelajari. Beberapa parameter air di lubang udang ketak diambil. Kami mengenalpasti jenis udang ketak di daerah ialah *Thalassina anomala*. Parameter air di dalam lubang udang ketak seperti pH berkisar antara 6.84 hingga 7.70, oksigen terlarut berkisar antara 0.03 mg / l hingga 5.83 mg / l, kekeruhan berkisar antara 23 FTU hingga 1000 FTU, suhu berkisar 26.7 °C hingga 28.0 °C dan kemasinan berkisar 11 PSU hingga 36 PSU. Haiwan ini dijumpai berkepadatan tinggi di kawasan 90 m dari tanda air pasang. Hal ini mungkin kerana ia pemakan deposit di mana isi ususnya dijumpai berlimpah zarah lumpur dan serat tumbuhan. Sumbangan hasil kajian terhadap data asas udang ketak di Sarawak.

Kata kunci: Udang ketak, *Thalassina anomala*, Sadong Jaya, taburan

1.0 INTRODUCTION

Thalassina sp. is a common creature that found in mangrove area at Kampung Jemukan Laut in Sadong Jaya. However, lately their population seems to be declined. It may due to many causes but obviously it is due to the development in that area. So, it is vital to have information of ecological and biological aspect of this creature.

This mud lobster is also known as mangrove lobster. The size of this creature is about 30 cm long. It is more of a giant shrimp rather than a lobster. Ghost shrimp of the genus *Callinasa* is more closely related to this mud lobster. In Singapore, there are two species of this genus found which are *T. anomala* and *T. gracillis* species. There are new species established from Singapore, India, Indonesia and Vietnam. They are *T. spinirostis*, which is almost similar to *T. gracilis*, *T. spinosa* and *T. krempfi* (Nguyen and Laurent, 2009).

It lives in a hole of U- shaped tunnel and deep up to 2 m below waterline. The mangrove lobster is a nocturnal creature. It will plug up their entrance with mud during the day and opened and emerge in the evening. It prefers to dig at high tide regions. It was believed to eat the tiny organic titbits in mud which may contain small pieces of other invertebrate. It will eat and dig through the mud (Tan, 2003).

It plays a key role to sustaining life in mangrove because it recycle nutrient from the bottom the mud as it eats and dig which would otherwise be out of the reach of other plants and animals. The mud will loosen by its digging and allows oxygenated air to penetrate the oxygen poor ground (Tan, 2003). The observation on how it makes the hole is also important in order to study behaviour and daily activity. The tiny organic titbits that the

mud lobster eats during digging the hole are still unknown. The water quality result of its burrow will be taken in order to know the conditions and environment inside the burrow.

A study of mud lobster in Sadong Jaya is still unknown. Therefore mud lobster species found in Sadong Jaya will be identified. The observation mud lobster on how it makes the hole is equally important in order to study their behaviour and daily activity. The tiny organic titbit that had been eaten by mud lobster during digging the hole is still unknown. Therefore this study will focus on 5 objectives below:

- To determine the distribution of mud lobster in mangrove area of Kampung Jemukan Laut, Sadong Jaya area.
- To identify the species of mud lobster occur in this area.
- To analysis the gut content of this creature.
- To investigate the characteristics of burrowing of the hole by it.
- To survey of the used of mud lobster as medicinal value by the local people

2.0 LITERATURE REVIEW

2.1 Taxonomy of mud lobster

Genus *Thalassina* is under family of thalassinidae, under super family of Thassinioidea, infraorder Thalassinidea, order of Decapoda, class of Malacostraca, subphylum of crustacean, Phylum Anthropoda and kingdom of Animalia (Latreille cited in Holthuis, 1991). The suborder Macrura Reptantia consists of three infraorders which are Astacidea (marine lobsters and freshwater crayfishes), Palinuridea (spiny lobsters and slipper lobsters) and Thalassinidea (mud lobsters). The Thalassinidea, contains a single superfamily, the Thalassinioidea which contains around 100 species. Only a few representatives of this superfamily are known to be used as food and bait (Bouvier cited in Holthuis, 1991). The Thalassinidea contains a single superfamily, Thalassinioidea (Latreille cited in Holthuis, 1991) with 7 families, which are Axianassidae, Axiidae, Callianassidae, Callianideidae, Laomediidae, Thalassinidae and Upogebiidae with all together more than 350 known species. Of these 7 families only 3 are dealt with here as the other do not have species of which it is known that they are of interest to fisheries. Of these three families, Thalassinidae, Callianassidae and Upogebiidae, perhaps two or three species are used for human consumption (Latreille cited in Holthuis, 1991).

2.2 Diagnostic features of mud lobster

According to Holthuis (1991), the integument of the body is very firm. The carapace is high; in dorsal view it is elongate oval in outline. In adults the carapace measures less than 1/3 of the total body length. The rostrum is narrowly triangular and short, it is depressed and its lateral margins continue for some distance on the carapace as short divergent ridges. The rostrum has no teeth. The carapace ends posteriorly in a distinct posteriorly directed median tooth that overhangs the articulation with the first abdominal somite. The abdomen is long and narrow, more than 5 times as long as wide in the males, about 4 times as long as wide in the females.

The somites are of about equal width throughout their length, they have a longitudinal carina over the base of the pleura. The telson is about as long as the previous somite, but slightly narrower, the posterior margin is broadly rounded. The uropods are styliform. The eyes are small. The first pair of pereopods is very strong and asymmetrical, both chelae are subchelate, the larger less conspicuously so than the smaller. The second legs are smaller, also subchelate; the other legs are simple. Epipods are present on the pereopods. The whole body is rather uniformly yellowish or reddish brown.

According to Lazaroff (n.d.), crayfish which is under same class of mud lobster (class Malacostraca) are dimorphic. The first pair of swimmerets of male is modified as a capulatory organ. They use this gonopod to transfer sperm into the female. Female will not have this structure instead they will have seminal receptacle opening, at the ventral side between the third and fourth pair of walking legs.

2.3 Ecology and biology of mud lobster

According to Nguyen and Laurent (2009), major works on the ecology and biology of *Thalassina* refer to *T. anomala*. This species is the largest and most widely distributed species. In the vicinity of Port Darwin, Australia *T. anomala* is cited as abundant but *T. squamifera* and *T. emeritii* are more likely to occur there. *T. anomala* lives at the edge of estuaries near the high tide mark (Pearse cited in Nguyen and Laurent, 2009) or in wherever there are mangroves, even if these are many miles from sea (Nguyen and Laurent, 2009). The burrows are found on the upper edge of the shores (Chuang cited in Nguyen and Laurent, 2009), or from low tide level to far above high tide level (Sankolli cited in Nguyen and Laurent, 2009). Deep burrow are found in heavy, clayey or water logged soil, they are used as refuges by several *Sesarma* crabs (Scharff and Tweedie, Ferguson, McNae cited in Nguyen and Laurent, 2009) and sometimes erroneously regarded as "crab holes".

Burrow are always branched but the pattern varies according to studies by Pearse in the Philippines, by Sunier in Batavia and by Das and Misra in west Bengal, India cited in Nguyen and Laurent (2009). The excavated mud resulting from the burrowing activity forms a chimney or mound over the openings of the burrows and their height makes a most conspicuous feature of the landscape. A single animal may produce several mounds; the chimneys can be high 75 cm, but sometimes several chimneys together can form complex hills of mud up to 1.5 m high (Nguyen and Laurent, 2009). The mounds of mud lobster provide a home for great many animal, from snails to flatworms, bivalves and crabs for example *Episesarma* crab, *Ellobium* gastropod, or a brown mussel, *Glaucornome rugosa* L., and a smaller relative belonging relative to the Upogebiidae, *Wolffogebia phuketensis* is frequently found on the sides of the mound (Nguyen and Laurent, 2009). *T. anomala* is

mud feeder obtaining nourishment from algae, protozoa, small organic particles in the interstice of the mud.

According to Nguyen and Laurent (2009) considered the differences in the range of occurrence of *T. anomala*, from low tide to the high tide and the extremely changes in salinity prevailing in the creek during the monsoon and summer. According to Macintosh cited in Nguyen and Laurent (2009), reported that *T. anomala* lives in the deep below the surface, under apparently hypoxic conditions in the mud-water layer at the bottom of its burrow. According to Nguyen and Laurent (2009), *T. anomala* seems to have developed a remarkable tolerance to the harsh environment of noxious anaerobic mangrove mud.

In many areas *T. anomala* is considered a pest (Holthuis, 1991). It is notorious for causing damage to bunds (of prawn ponds) by its burrowing activities, also to embankments or dykes of ponds making them leak water and eventually collapse (Macintosh, 1988). Referring to Nguyen and Laurent (2009), indicated that mud lobster build large mounds out of subsoil material which acidifies strongly upon aeration and oxidation.

2.4 Application of mud lobster

In Thailand, the species is not eaten but used as medicine against asthma; it is then either dried, ground to powder, and the powder drunk with water, or the specimen is placed in a kind of alcoholic liquor and left there for a couple of days, after which the liquor with the beneficial substances dissolved in it is drunk (Holthuis, 1991).

3.0 MATERIALS AND METHODS

3.1 Study area

Sadong Jaya is located 15 km from Asajaya, 75 km from Kuching, 25 km from Samarahan (Figure 1). There are 21 villages under Sadong Jaya Kecil administration office which includes Sebang and Sadong Jaya area. Besides, the villagers are consists of *Melayu*, *Iban*, *Cina*, *Bugis* and *Jawa*. The mangrove area is subjected to inundation of the tide at least twice a day. This area is dominated by *Rhizophora* sp. and other mangrove plants existed as well. The sediment types are sandy and silt at the high tide whereas silt and clay at the low tide mark. The area is closed to the Sadong Jaya river mouth. The coordinates of sampling area was recorded by Global Positioning System apparatus (GPS map 60csx, GARMIN).



Figure 1: Location of Kampung Jemukan Laut, Sadong Jaya, Sarawak (circle). (Source: <http://www.wikimapia.org>)

3.2 Distribution of mud lobster in mangrove area of Kampung Jemukan laut, Sadong Jaya

The distribution of mud lobster holes along high tide level was recorded. The distribution of mud lobster was referred by the existing of their fresh burrow hole. Twenty five holes along 100 m transect parallel with high tide area were studied and measured by using measuring tape. Others parameters measured were the distance of hole with the highest tide, distance between two holes, holes circumference and holes diameter.

The distribution of mud lobster from high tide to low tide levels was identified by performing the lines transect from high tide to low tide marks. Two transect were performed in the study area. Each transect, 30 m distance was measured and marked. A quadrate of 200 m² was made at every mark and all mud lobster holes were recorded (Figure 2). The study area was covered about 9 km² for each transect. The sampling was conducted during spring tides.

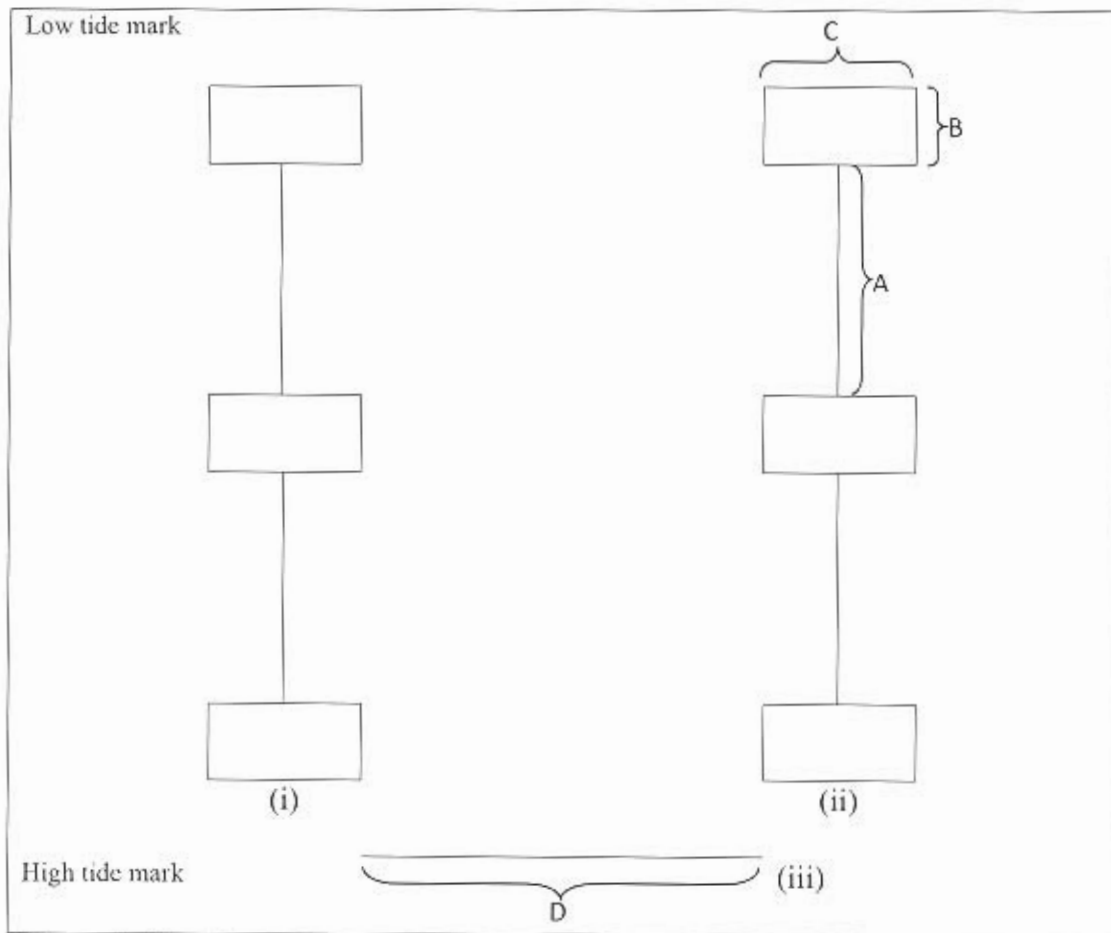


Figure 2: The sketch of transects made during fieldtrip.

Note = (i) Perpendicular from high tide level to low tide level

Date: 3/10/2009

Coordinates: N 01°33.245' E110°42.197'

A – 30 m

B – 10 m

C – 20 m

(i) Perpendicular from high tide level to low tide level

Date: 4/10/2009

Coordinates: N 01°33.248' E110°42.199'

A – 30 m

B – 10 m

C – 20 m

(ii) Parallel at high tide area

Date: 3/10/2009

Coordinates: N 01°33.245' E110°42.197'

D – 100 m

3.3 Water parameters in mud lobster hole

Twenty five holes were chosen for measuring physicochemical parameter of water at mangrove area in Kampung Jemukan Laut, Sadong Jaya, Sarawak. The water parameters measured were pH, dissolved oxygen, turbidity, temperature and salinity. The measurements were divided into two different days which were on dry sunny day and after rain. Salinity were measured using hand refractometer (model MR100ATC, Milwaukee), turbidity was measured using Hanna Instrument (HI 93703) microprocessor turbidity, temperature and pH were measured using Hanna Instrument (HI 9024) microcomputer pH meter and dissolved oxygen were measured using Hanna Instrument (HI 9142). The water sample was taken directly from the holes.

3.4 Species of mud lobster in mangrove area of Kampung Jemukan Laut, Sadong Jaya

To determine the species occurred in this area, four dead mud lobster specimens were brought back to laboratory for identification. Specimen were placed in cooler box and later transferred into the freezer (-20 °C). In the laboratory, the specimens were identified using the keys from "The Genus *Thalassina* Latreille, 1806" (Figure 3). Besides, the difference between male and female morphology were also observed.

KEY TO SPECIES OF *THALASSINA*

1. Rostrum with blunt tip (Fig. 2A1). Long (Fig. 2B) or small (Fig. 13B) dorsomedian process of carapace. Abdominal sternites 2-5 with median (Fig. 2E) or lateral (Fig. 7F) tubercles 2
 - Rostrum with pointed or spine-like tip (Fig. 2A-2). Small dorsomedian process of carapace. Abdominal sternites 2-5 with lateral (Fig. 7F) tubercles on either side of a notch 5
2. Lateral borders of rostrum and lateral dorsal carina of P1 propodus (Fig. 2D-6) with conspicuous tubercles 3
 - Lateral borders of rostrum and lateral dorsal carina of P1 propodus unarmed or with obscure tubercles. Long dorsomedian process of carapace. Abdominal sternites 2-5 with median tubercles (Fig. 2E) *Thalassina krempfi*, new species
3. Long dorsomedian process of carapace. Lateral dorsal carina of P1 propodus extending whole length. Abdominal sternites 2-5 with median tubercles 4
 - Small dorsomedian process of carapace. Lateral dorsal carina of P1 propodus extending half or three-quarter length. Abdominal sternites 2-5 with lateral tubercles *Thalassina squamifera* De Man, 1915
4. Cervical groove unarmed or bordered with a few tubercles. Large species, widely distributed *Thalassina anomala* (Herbst, 1804)
 - Cervical groove bordered with spines. Numerous spines on carapace and appendages .. *Thalassina spinosa*, new species
5. Lateral rostral borders with tubercles 6
 - Lateral rostral borders and anterior border of carapace with tubercles and spines. Pereopod 1 with large ventral proximal spines on merus; propodus with lateral dorsal carina extending to nearly whole length; lateral ventral carina (Fig. 2D-10) with spiniform tubercles or spines. Abdominal sternites 2-5 with lateral tubercles in male, absent in female *Thalassina spirostris*, new species
6. Pereopod 1 with large ventral proximal spines on merus, propodus with lateral dorsal carina extending to nearly whole length. Abdominal sternites 2-5 with faint lateral tubercles in male, absent in female *Thalassina gracilis* Dana, 1852
 - No large ventral proximal spines on pereopod 1 merus; propodus with lateral dorsal carina extending to whole length and lateral subdorsal carina (Fig. 2D-11) extending to about half length. Abdominal sternites 2-5 with one or two lateral tubercles and often numerous additional distally *Thalassina emerii* Bell, 1844

Figure 3: Key to species *Thalassina* (Nguyen & Laurent, 2009).