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MORPHOMETRIC AND MERISTIC STUDY OF MANTIS SHRIMP (*Harpiosquilla raphidae*) IN SEI BEROMBANG COASTAL WATER, NORTH SUMATRA

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ABSTRACT

As basic information on identification process, the morphometric and meristic of mantis shrimp study can be used to initiate of mantis shrimp resource from Indonesia especially from North Sumatera. Mantis shrimp *(Harpiosquilla raphidea)* have big chance as one of the potential crustacean species as the source nutrition of future but not used optimally. This research was used the quantitative method were determining the sampling point through the purposive random sampling method. This study was conducted from November 2021 to January 2022 in around of Sei Berombang coastal water. The *H. raphidea* samples was carried out at 3 observation sites using trawl nets. The morphometric result showed that *H. raphidea* body length size was found range from 8.45 to 30.32 cm. In the meristic analysis of mantis shrimp, there were 5-6 telson spines, 7-8 spines for dactylus, and 15-17 for propodus. These results were described that the body length size of mantis shrimp dominated by small size class. and with this part has confirmed that the mantis found in Berombang estuary waters is *H. raphidea*.

Keywords: *Harpiosquilla raphidae*, Meristic, Morphometric

INTRODUCTION

Mantis shrimp *(Harpiosquilla raphidae)* is one of the crustaceans in Sei Berombang. *Harpiosquilla raphidea* (Fabricius) is the largest species with a total length of more than 300 mm. As one of the stomatopod crustaceans, mantis shrimp is a group widely found in tropical and subtropical seas and brackish benthic ecosystems throughout the world. Morphology of mantis shrimp has a black line on the back between the antennae and the eye segment. According Ahyong et al., (2008) the carapace of the mantis shrimp only covers the back of the head and the first three ribs. The head of mantis shrimp morfology has describe with the first pair of antennae, called fly antennae, which grow and attach to the labrum. There are three ends of the tentacles were had functions as sensory organs. Although the second or tip antenna is commonly called an unbranched antenna, it can also be used as a sensor organ. Each mantis shrimp also has a caudapod. The inner and outer caudapods are black and have fine hairs. Body yellowish, Telson has 6 small spines.

In terms of trade names or regional names of mantis shrimp in Sei Berombang, called heiko shrimp as local name. Mantis shrimp is also known as Lipan shrimp in the Belawan area (Dimenta et al., 2020), in the Indra Giri Hilir area of Riau the mantis shrimp called Nenek shrimp (Astuti & Arestyani, 2013), and called "prawn killers" in Australia (Astuti & Arestyani, 2013), and commonly referred to as Cekrek Shrimp or Plethok Shrimp in the Serang area, Banten (Sukarni et al., 2018). Moreover, especially the Petetea'a Village community, North Buton was recognize this shrimp with Pangko (Dini et al., 2013). Mantis shrimp is the species of marine crustacean that get great

demand for consumption, especially for foreign people (Astuti & Arestyani, 2013).

There are some data on the origin of mantis species and species found, including *Harpiosquilla harpax* found on the northern coast of Java, from the Malacca Strait to the Pacific Ocean. According to Astuti & Arestyani (2013), mantis shrimp *(H. raphidea)* can live in seawater and brackish water and is often found in coastal areas and aquaculture. Sihombing (2018) stated that mantis shrimp mostly like beach habitats and prefer to live on the bottom of the water, especially on sand. Mantis shrimp are very adaptable, even in areas that have been contaminated. However, Maulana (2020) stated that another factor affecting the population of mantis shrimp *(H. raphidea)* in the Banyuasin coastal area is the quality of the waters in the related area. Dini et al. (2013) said that this shrimp is also found in waters with short seagrass leaves and low seagrass density. The short seagrass leaves and low seagrass density make it easier for ronggeng shrimp to catch prey. So far, mantis shrimp are harvested by fishermen whose supply depends on the season. Astuti & Arestyani (2013 found that mantis shrimp is one of the by-catch of fishermen with the main catch target of fish and shrimp.

Characteristics that make its farming prone to occur at a quite-developed stage. However, morphological characterization is required to establish a conservation program. Martinez et al., (2020); Wardiatno & Mashar (2013) added the morphometric and meristic are commonly used for taxonomical studies, it features help to identify and classify the crustacea species (Hossain et al., 2016) and also describing the life history and morphological characteristics of populations, describing the population character, evaluating population structure for stock and population identification across regions (Parvin et al., 2018; Khatun et al., 2019). Common works in taxonomical studies are to illustrate and describe morphometric usable characters displayed in adult, juvenile or larvae stage of genus or species of various organisms found in certain area (Wardiatno & Mashar, 2013).

This research represents a first step towards the development of breeding and conservation plans for mantis shrimp resource in Sumatera Island where inhabiting fragile ecosystems and presenting an endangered situation. To achieve sustainable development goals and to maintain the way of life of the fishermen and the rural population associated with it, the information such as morphological characteristics were needed as the first step to determine the diversity of species and population in the Sumatera waters. And to find out which species of mantis shrimp are dominant live in the estuary Berombang. Ahyong et al., (2008) inform that there are about 400 species of mantis shrimp scattered in waters around the world, especially in tropical and subtropical waters. In Sumatra, the data on mantis shrimp's species, number, and distribution area *(H. raphidea)* have not been widely fullreported especially in Sei Berombang.

The study for the morphometric & meristic of mantis shrimp in North Sumatera is limited, especially in the estuarian waters of Berombang. Several mantis shrimp studies around 15years ago for *H. raphidea* on Muzammil (2010) were inform about the morphometric and meristic study of Mantis shrimp *(Oratosquillina gravieri and Harpiosquilla raphidea)* in the muddy coastal area of Kuala Tungkal, Species Morphometric and Meristic Study of Mantis Shrimp *(Oratosquillina gravieri)* in the Percut Sei Tuan Coastal Waters, North Sumatra Province (Sihombing et al., 2018), and Morphometric study of two Indonesian mantis shrimps *(Harpiosquilla raphidea* and *Oratosquillina gravieri)* in Kuala Tunggal, Jambi, North Sumatra (Wardiatno & Mashar, 2013). Morphometric analysis of *H. raphidea* and *Scylla serrata* on the coast

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of Tarakan, East Kalimantan (Salim et al., 2020), Identification of Mantis Shrimp (Stomatopoda) found in Bengkulu City Waters by Situmeang et al., (2017), and Growth Aspects Study of Nenek Shrimp *(H. raphidae)* in the Juata Sea Waters of Tarakan City (Chandra et al., 2014), Zairion et al., (2021) Investigation of Morphometric Differentiation Among Mantis Shrimp (Stomatopods) in South Madura Waters. In addition, the analysis of the population growth and condition index of *H. raphidea* in the Juata waters of Tarakan City (Kalalo et al., 2015), the catch of juvenile shrimp in the waters of the river and estuary of Wulan, Demak using traps (Istigfarin et al., 2016), Population dynamics of *O. gravieri* in Pelabuhan Ratu (Ambarsari, 2016), Population dynamics of mantis shrimp *H. harpax* and *Oratusquillina* sp. in the waters south of Madura Island, Indonesia (Ekalaturrahmah et al., 2020), Grasshopper Shrimp *H. raphidea*, Leading Commodity from Jambi Province (Sukarni et al., 2018), and Species Composition, Distribution and Shrimp Stock Density in the Southern Season in East Kalimantan Waters (Tirtadanu et al., 2018).

METHOD

Location

The sampling location used the purposive random sampling method. Its means consideration to determine of sampling stations using this method, because the habitats mantis shrimp was generally fond of estuary aquatic, especially muddy estuaries associated with mangrove roots. Ritonga et al., (2017) explained the influence of mangrove density conditions on the density and distribution of macrozoobenthos such as shrimp. Wardiatno and Mashar, (2013); Siringoringo et al., (2017); Alkautsar et al., (2017); Patel and Desai (2009) added the waters with muddy bottom substrate types. The sampling location where near the fishing catch location which following the pattern and time of shrimp sampling refers to the habits of local fishermen.

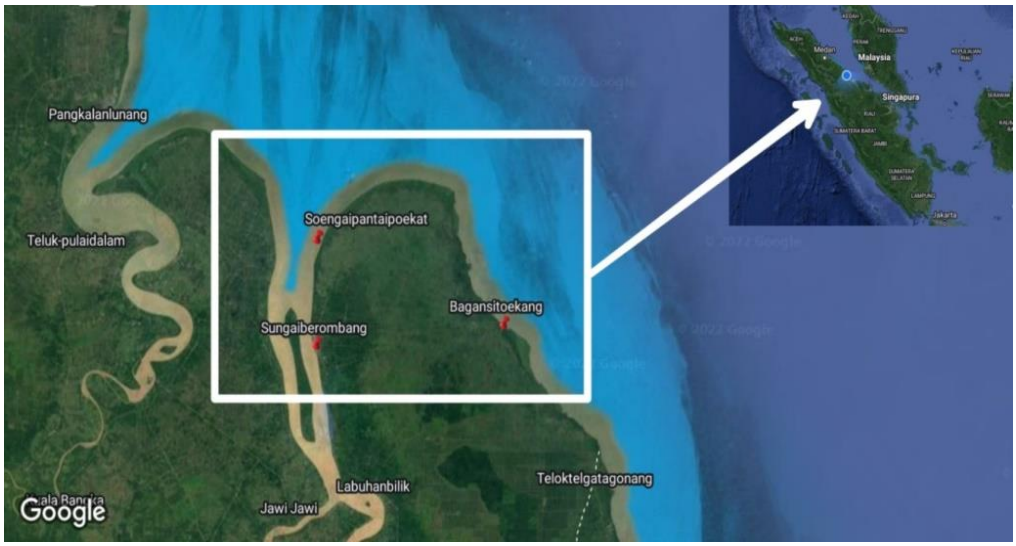

Figure 1. Research Location Map

The sampling was carried out from November 2021 to January 2022 around the Sei Berombang estuary waters, Labuhanbatu Regency, North Sumatra Province (Figure 1). This study was conducted at 3 point stations:

- The first station (Ist) was located around the Berombang estuary with the ordinate

point 2°35'33.43" North Latitude, 100° 6'22.66" East Longitude and was located around an ecosystem overgrown by mangrove vegetation,

- The second station (IInd) was located on the Poekat beach with the ordinate point 2°41'18.35" North Latitude, 100° 8'15.67" East Longitude and was around the mouth of the Berombang river, which was widely used as a fishing location by fishermen,
- The third station (IIIrd) was in Bagan sitoekang with the ordinate point 2°35'43.61" North Latitude, 100°16'43.35" East Longitude. Description of this station were around of water which found Nypa sp. & Mangrove species as the dominan vegetation.

Tools and Materials

The tools used in this study included GPS (Global Positioning System), digital camera, callipers or ruler digital scales, millimeter paper, trawl nets (various mesh size 0,5 - 2 inchs), Styrofoam box, ice cubes, tissue, label paper, 70% alcohol.

Research Procedure

The procedure steps in taking samples were carried out using trawl nets, assisted by fishing boats, and carried out by 3 stations. The steps of the sampling procedure included: 1) the sampling of mantis shrimp was carried out at each station on specimens that were still alive and actively using trawl nets (with various mesh size) as bait; 2) the mantis shrimp obtained were put in a Styrofoam box filled with salted seawater so that the mantis shrimp was still alive, and 3) the collected samples were brought to the laboratory for morphometric and meristic measurements on each shrimp.

The Measurement of Morphometric and Meristic Character of Mantis Shrimp

The total length of the mantis shrimp was measured using a calliper or ruler with an accuracy of 0.1 cm. Meanwhile, to measure the weight of mantis shrimp using a digital scale with an accuracy of 0.1 grams. Mantis prawns were caught observe the meristic character of *H. raphidea* measured were number spines of telson, spines of dactylus, and number of spines on propodus. The morphometric measurements were total length, right and left propodus length, right and left propodus width, right and left carpus width, right and left penis length for males and right and left diameters for females, and total weight of body.

Data Analysis

The morphometric characters of mantis shrimp were analyzed through the correlation matrix of morphometric characters and a comparison of morphometric characters. The correlation analysis would produce a data matrix whose values indicated how closely the characters were related to each other. The variable relationship could be positive or negative. A positive relationship occurred when the growth of another variable followed the growth of one variable. Meanwhile, on the other hand, a negative relationship could occur if it followed the growth of other variables and decreased. According to Wardiatno & Mashar (2013); Sihombing et al., (2018), this morphometric character correlation analysis shows characters that have interrelated relationships with other characters.

Meristic data analysis of Mantis Shrimp was carried out by comparing the meristic data obtained in the field with research literature data that had been carried

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out previously. According to Zairion et al., (2021); Sihombing et al., (2018) Meristic data was compared as a number for each character calculated or tested. Observation of meristic character were done by observing the morphological features found on the body of this mantis shrimp, such as the spines on telson, dactylus, and propodus. The guidelines used to determine the meristic characteristics of shrimp were according to Wardiatno & Mashar (2013); Zairion et al., (2021) who take the comparison of research data found would reveal information with in the form of differences in the meristic size of of *H. raphidea* caught.

RESULTS AND DISCUSSION

The Distribution of Length Class Mantis Shrimp

The mantis prawns are caught in various sizes. The catch data are presented in graphical form on the 8 class distribution of mantis shrimp length size classes. The distribution of mantis shrimp length class can be seen in the following figure 4. The distribution data of mantis shrimp length class is used to determine the frequency of distribution of mantis shrimp in Sei Berombang waters. Figure 4 informs the distribution data of the mantis shrimp length class, which is divided into 8 body length classes with different amounts. Several factors affect the growth of mantis shrimp, one of them is gender differences. Male and female mantis shrimp usually have little difference in body length growth. The measurement of the results of this study shows that female shrimp and small shrimp dominate mantis shrimp. The total length of the mantis shrimp ranges from 80.02 to 300.00 mm, and the weight of the mantis shrimp is 1.10-305 grams. In line with Kalalo et al. (2015) were informed that the mantis shrimp (*Harpiosquilla raphidae*) in Juata waters, Tarakan City, obtain 326 samples from the total number. There are 203 males and 123 females with a length range of male mantis shrimp between 98 mm-380 mm and weight ranging from 4.36 grams to 214.9 grams.

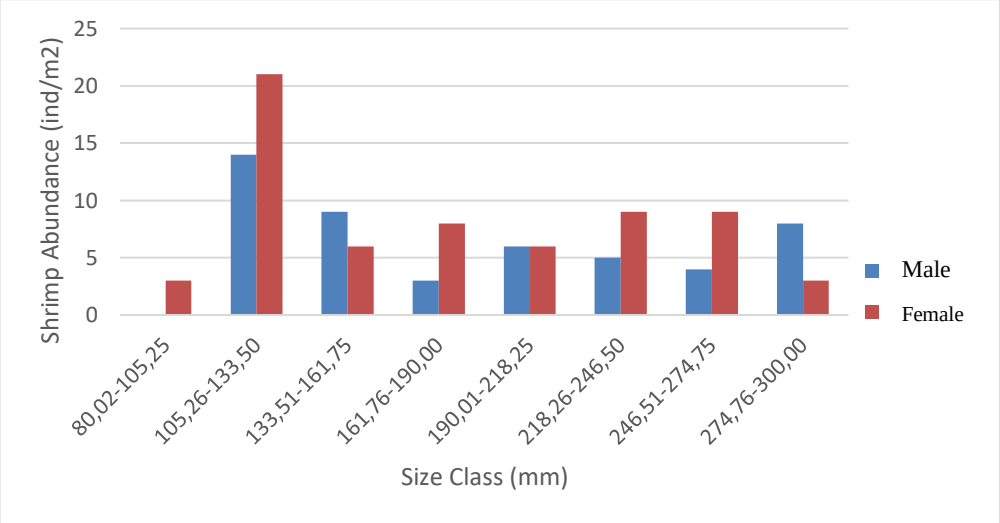

Figure 2. Size Class of Body Length Distribution of Mantis Shrimp (*H. raphidae*) Caught

The distribution of the length class size of mantis shrimp shows that the number of shrimp that is found the most during the study is small, with a size class range of 105.26-133.50 mm with 36 ind/m2 (with individual male dominance of 14

ind/m2 and female 22 ind/m2). In addition, the lowest distribution data is found in the class range of 80.02-105.25 mm with 3 ind/m2 (with the dominance of female individuals). The result probably showed the condition population of *H raphidea* in this estuary influenced by the availability of natural nutrients. According to Situmeang et al. (2017), populations tend to cluster when conditions occur of fluctuating nature.

Sihombing's research (2018) found that in the coastal waters of Percut Sei Tuan, 90 mantis shrimp are used during the study with different lengths, consisting of 51 females and 39 males and total length of Mantis shrimp ranges from 8.10 – 17.52 cm, and the weight of Mantis shrimp obtained is around 8.00 – 37.39 g, the body length-frequency data shows that the highest number of shrimp found during the study is in the class range of 10.45 - 11.63 cm with a relative frequency of 27% and the lowest frequency is in the class range 16.35 -17.52 cm with a value of 1%.

Based on the research results by Ambarsari (2016), the maximum length of male and female Mantis shrimp caught in Pelabuhanratu Bay during the study are 11.56 cm and 12.58 cm, respectively, while the minimum length is 39.77 mm and 34.90 mm. Meanwhile, according to the research results of Muzammil (2010), in the muddy coastal area of Kuala Tungkal, it is known that the minimum and maximum lengths of mantis shrimp found are 2.8 cm and 15 cm, respectively. In this type of mantis shrimp, the minimum length of the male found is 4.4 cm, and the maximum length is 15 cm, while in the female, the minimum and maximum length are 2.8 cm and 13.4 cm, respectively. From several other result was describing that distribution body length size influenced by the flew of nutrition (natural feed, demand oxygen, dan light). Mulyono et al., (2018) said that the distribution of individuals that occurs in nature results from the behavior of individuals in the population towards the conditions of the surrounding environment. In the Northern Waters of Tarakan Island Chandra et al. (2014) found the length-weight of male *H. raphidea* obtains showed body length (b value 2.7). The balance of ratio of amount of male and female individuals results in the possibility of fertilising eggs by spermatozoa to become individuals.

Morphometric Character Analysis

The morphometric character measurement results are one of the things that can be used as taxonomic characteristics when identifying (Mulyono et al., 2018). The regression values obtained vary depending on the type of character and measurement data from the research results. Each species of mantis shrimp has a different absolute size, which is influenced by age, sex, and environmental factors. Environmental factors include food, temperature, pH and salinity (Sihombing et al,, 2018). The results of the measurement of morphometric characters on the Mantis Shrimp (*H. raphidae*) can be seen in table 1.

Based on the morphometric measurement data, the measurement results of each morphometric character are measured and have a different range. There is a comparison of morphometric characteristics including total length (PT) compared to right propodus length (PPKa) y=0,3101x-1.3994, total length (PT) compared to left propodus length (PPKi) y=0,3115x-1,4397, total length (PT) compared to right propodus width (LPKa) y=0.0529x0.1346, total length (PT) compared to left propodus width (LPKi) y=0.0537x-0.136, total length (PT) compared to width right carpus (LCKa) y=0.0205x-0.0984, total length (PT) compared to left carpus width (LCKi) y=0.0206x-0.1002, total length (PT) compared to left penis length (PVKa))

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y=0.0972x-0.0877, total length (PT) compared to right penis length (PVKa) y=0.0997x-0.0086, right propodus length (PPKa) compared to left propodus length (PPKi) y= 1.0033x-0.029, right propodus width (LPKa) compared to left propodus width (LPKi)y=0.986x-0.0237, right propodus length (PPKa) compared to right propodus width (LPKa) y=0.1676x-0 ,1165, left right propodus length (PPKi) compared to left propodus width (LPKi) y=0.1674x-0.1324, right carpus width (LCKa) compared to left carpus width (LCKi) y=1,0002x-0.0011, left penis length (PVKi) compared to right penis length (PVKa)y=0.116x-0.0542.

Table 1. Morphometric Measurement of Mantis Shrimp *(H. aphidae)*

Morphometric Character	Male			Female		
	Min (cm)	Max (cm)	Average	Min (cm)	Max (cm)	Average
Total length	11,3	30,32	18,77	8,45	28,78	16,45
Right Propodus length	2,42	16,58	12,43	1,58	17,54	10,62
Left Propodus length	2,35	16,47	12,39	1,32	17,17	9,97
Right Propodus Width	0,23	1,17	0,88	0,31	1,04	0,81
Left Propodus Width	0,21	1,1	0,79	0,29	1,01	0,8
Right carpus width	0,41	1,02	0,85	0,41	0,99	0,82
Left Carpus width	0,5	1	0,82	0,39	0,98	0,8
Right Penis Length	0,8	2,75	2	-	-	-
Left Penis Length	0,78	2,65	2	-	-	-

The result showed that comparison of male & female of body length *H. raphidea* (male: 18.77 cmBL; female: 16.45 cmBL). Tabel 1 showed measurement of morphometric characteristics of *H. raphidea* confirmation of the mantis shrimp species found in Berombang estuaries were *H. raphidea* whose clasified to small size class of body length than population from Kuala Tungkal, Jambi Province. Wardiatno & Mashar (2013) found body length *H. raphidea* in Kuala Tungkal, Jambi Province (male: 26.50 cmBL; female: 24.60 cmBL). morphometric characters could estimate the maturation of stomatopod. According to Felder & Lovett (1989) used morphometric characters (i.e. carapace length, chela width, and chela height) to estimate maturation size of male and female estuarine shrimp Callianasidae. Kampouris et al., (2018) added the difference in the range of comparisons of morphometric characters in these species is caused by species differences and differences in age and sex. Meanwhile, in Muzammil's research (2010) showed the water quality does not affect the comparison of morphometric values because the extraction is carried out in the same waters.

The Correlation Analysis between Morphometric Characters of Mantis Shrimp *(H. aphidea)*

The relationship analysis from each morphometric character is influenced by correlation analysis, where the relationship analysis provides how much correlation one morphometric character has with other morphometric characters. The correlation analysis can be seen in table 2. Relationship analysis of each morphometric character is determined by regression analysis and correlation where correlation analysis shows how much relationship one morphometric character with another morphometric character. While regression analysis shows how the increase

in the length of one character by knowing the value of other characters. Regression a measurement is presented in the form of a linear regression equation Y= a + bX.

From result of table 2 and figure 5 to 14, help us describe about the relationship correlation analysis of morphometric characters showed comparison of total length (TL) to propodus length (RP-LP) has the highest value were 0.97 (0.05 %) and the lowest value found on total length (TL) to propodus width were 0.84 ($p < 0.05$) where classified to allometric category. The slopes of the linear regression lines (vs. BL) are regarded as non-parallel for all morphometric characters, except for total length (BL) between right penis length and left penis length in male *H. raphidea* were got parallel. Its mean the result describe the scatter plots for each pair of variables in *H. raphidea*, in which body length (BL) is fixed on the abscissa.

Table 2. The Correlation Analysis between Morphometric Characters of Mantis Shrimp *(H. raphidea)*

No.	The Types of Morphometric Comparison	Regression Equation	R^2	Slopes
1	Total length-Right propodus length	y = 0.3101x – 1.3994	0.972	Non-parallel
2	Total length- Left propodus length	y = 0.3115x – 1.4397	0.971	
3	Total length-Right propodus width	y = 0.0529x – 0.1346	0.876	Non-parallel
4	Total length-Left propodus width	y = 0.0537x – 0.136	0.868	
5	Total length-Rigth carpus width	y = 0.0205x – 0.0984	0.852	Non-parallel
6	Total length-Left carpus width	y = 0.0206x – 0.1002	0.857	
7	Total length- Right penis length	y = 0.0972x + 0.0877	0.926	Parallel
8	Total length- Left penis length	y = 0.0997x + 0.0086	0.926	
9	Right propodus length -Left propodus length	y = 1.0033x – 0.029	0.996	Non-parallel
10	Right propodus width-Left propodus width	y = 0.986x + 0.0237	0.936	
11	Right propodus length -Right propodus width	y = 0.1676x + 0.1165	0.870	Non-parallel
12	Left propodus length -Left propodus width	y = 0.1674x + 0.1324	0.844	
13	Right carpus width-Left carpus width	y = 1.0002x + 0.0011	0.990	
14	Left penis length -Right penis length	y = 1.0116x – 0.0542	0.972	

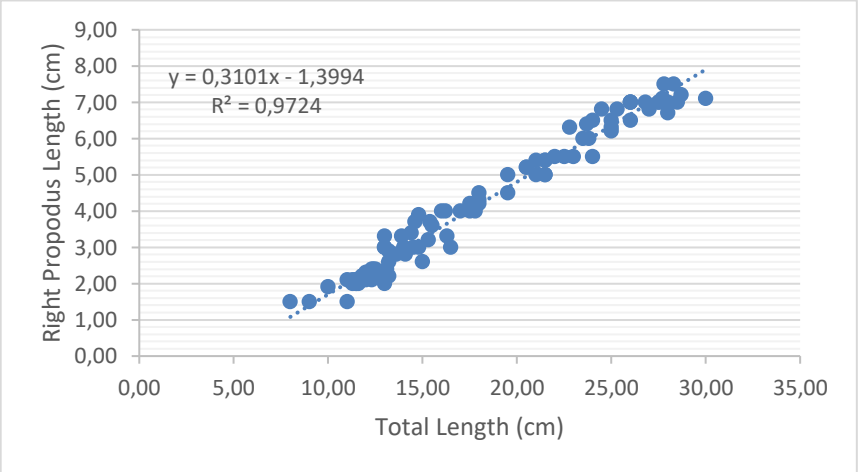

Figure 3. Right Propodus Length (cm)

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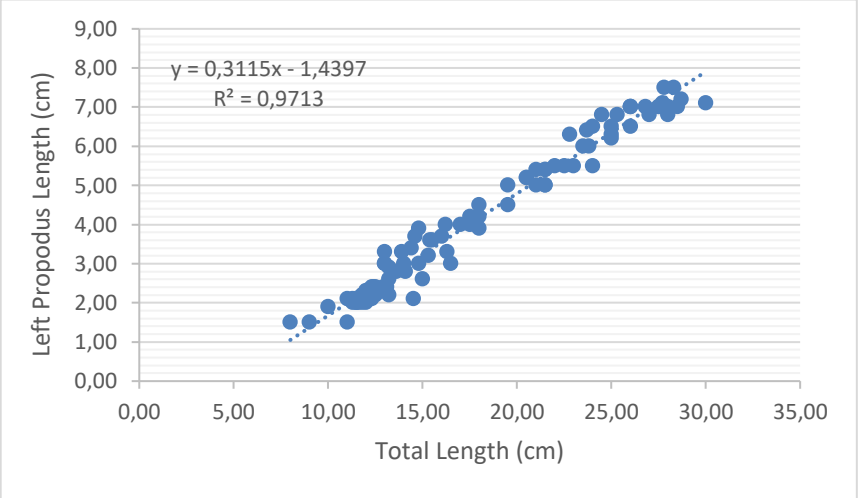

Figure 4. Left Propodus Length (cm)

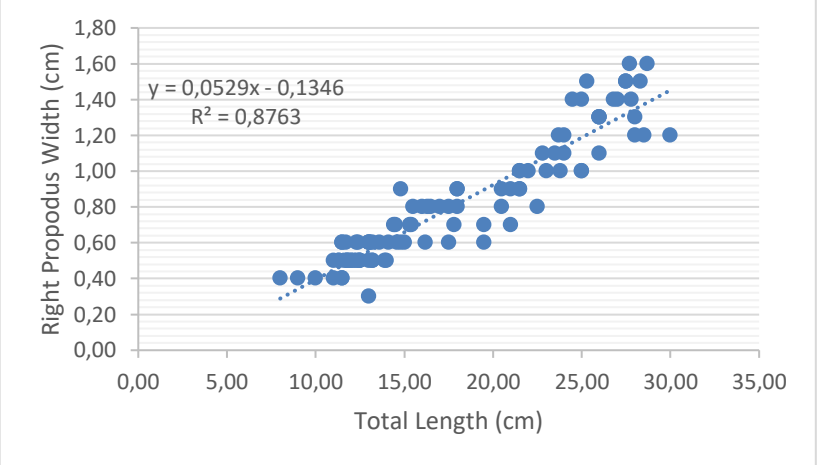

Figure 5. Right Propodus Width (cm)

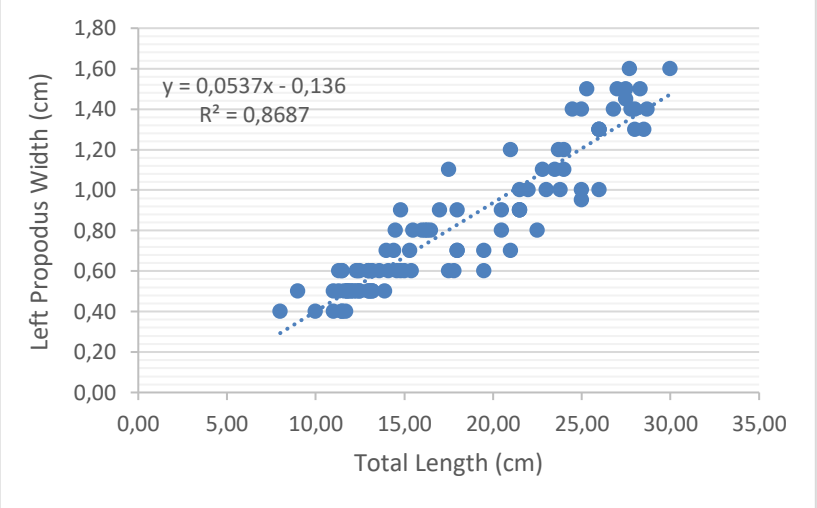

Figure 6. Left Propodus Width (cm)

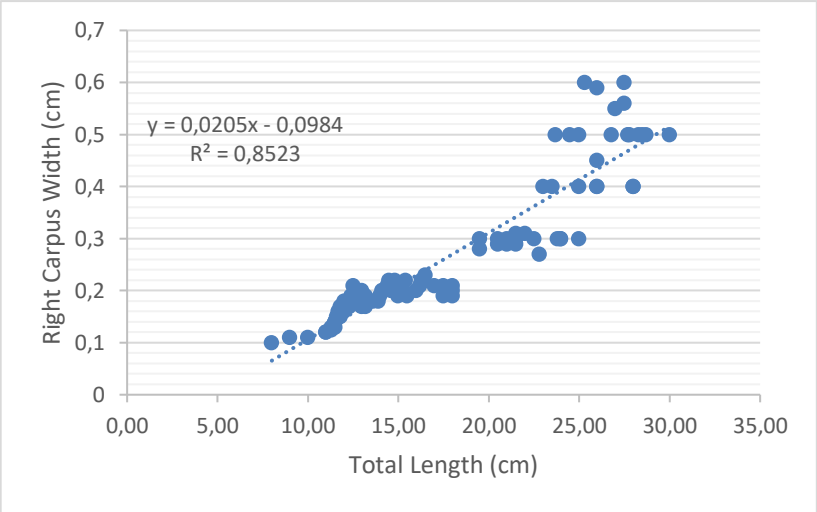

Figure 7. Right Carpus Width (cm)

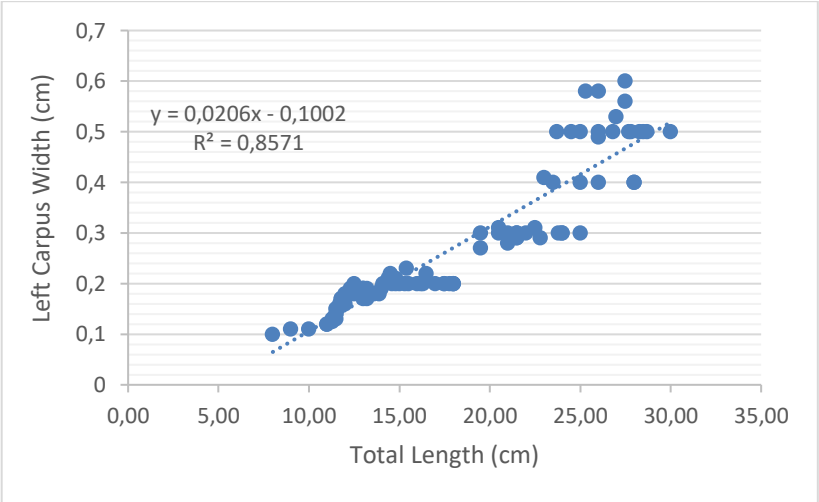

Figure 8. Left Carpus Width (cm)

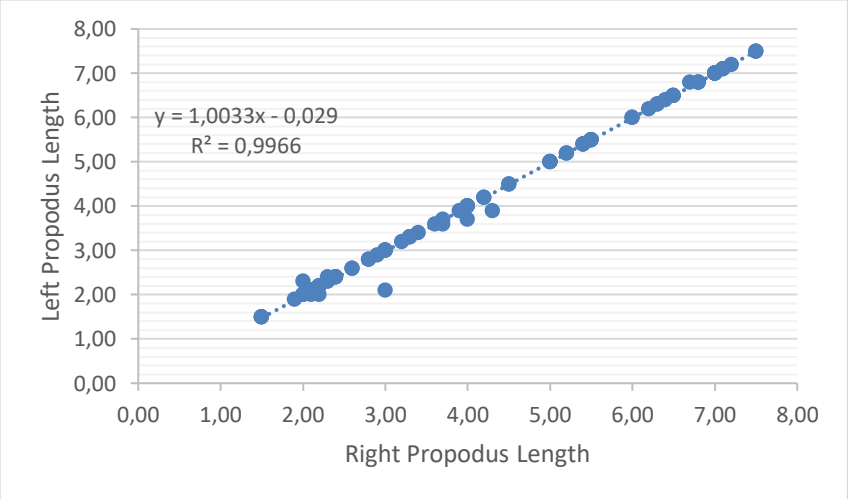

Figure 1. Left and Right Propodus Length (cm)

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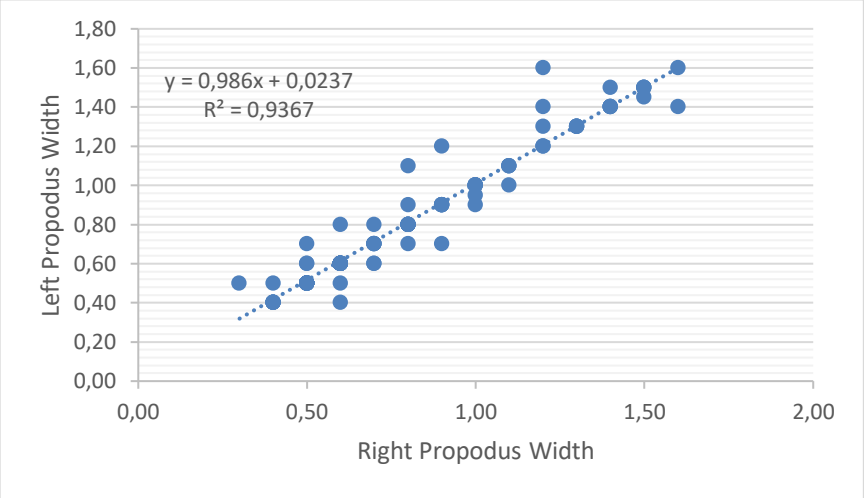

Figure 102. Left and Right Propodus Width (cm)

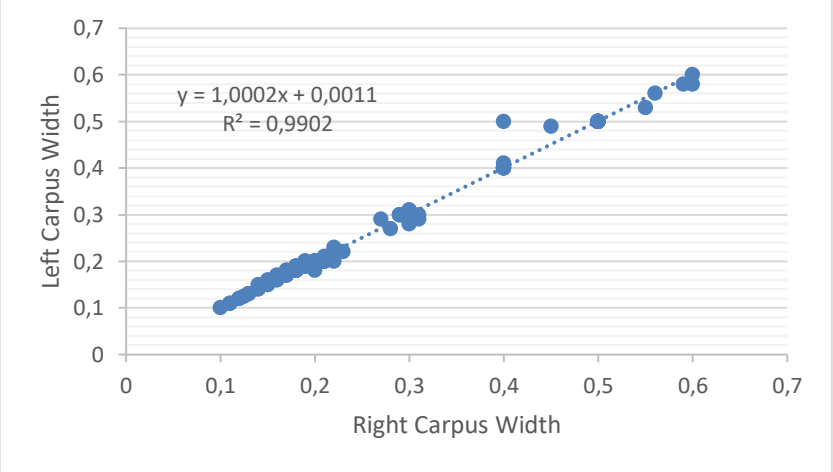

Figure 11. Left and Right Carpus Width (cm)

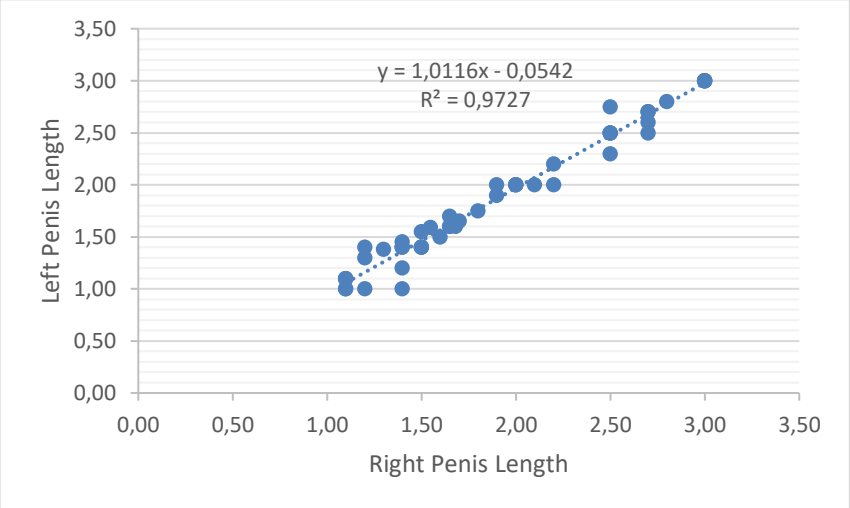

Figure 12. Left and Right Penis Length (cm)

For all cases, the values of the ordinate variables linearly increase with the Body Length value, and their linear regression equations were summarized in table 1. Total body length, propodus, carpus and penis were main morphometric characters where describe their heavy activity in substrat. its might be related to the Antagonistic behavior of *H. raphidea*, especially in male commonly mantis shrimp which burrowing (bioturbation ability) to spatially compete with other benthic species. Wardiatno & Mashar (2013); Wardiatno & Tamaki (2003) studied mantis shrimp *Neotrypaea* sp. were found the species as superior competitor due to its bioturbation ability. Such asymmetrical competition via bioturbation has been assumed to explain the segregated zonation patterns for the *species.*

Meristic Character Analysis

Meristic character counts are the number of spines on the telson, the number of spines on the dactylus, and the number of spines on the propodus. In the research results in Sei Berombang Waters, Panai Hilir District, Labuhanbatu Regency, Mantis Shrimp has 4-6 thorns on the telson, the number of spines in dactylus 7-8, while in the propodus 1-3 thorns. Meanwhile, in Percut Sei Tuan coastal waters, North Sumatra province, Sihombing et al., (2018) found Mantis Shrimp *Oratosquilla gravieri* with 4-6 thorns on the telson, 6 thorns in dactylus, while 0-2 thorns in propodus. The difference in the number of spines is related to the age and size of a mantis shrimp. The growth of hard spines for small Mantis shrimp has not been formed properly. Wardiatno & Mashar (2013) Differences in the range of morphometric character comparisons in mantis shrimp species caused by differences in age and sexual category.

Table 3. The Results of Meristic Measurement of Shrimp Mantis (*H. raphidea*)

Meristic Character	Male	Female
Number of spines on telson	4-6	4-6
Number of spines on dactylus	8	7-8
Number of spines on propodus	1-3	1-3

The size of the *H. raphidea* caught during the study ranges from 11.30 to 30.32 cm. The results of the correlation analysis of the morphometric characteristics of *H. raphidea* show that several characteristics influenced other characters, such as total length (PT) 11.33-30.32 cm, Right Propodus length (PPKa) 1.58-17.54 cm, Left Propodus length (PPKi) 1.32-17.17 cm, Right Propodus Width (LPKa) 0.23-1.17 cm, and Left Propodus Width (LPKi) 0.8-1.1 cm, Right Carpus Width (LCKa) 0.41-1.02 cm, Left Carpus Width (LCKi) 0.5-1 cm. Based on morphometric measurement of *H. raphidea* data obtained measurement results of each morphometric character measured has different range. According to Wardiatno & Mashar (2013); Affandi et al., (1992) Differences in the range of morphometric character comparisons in these species, in addition to being caused by differences in species, are also caused by differences in age and sex (especially for sexual dimorphism of mantis shrimp species, such as the propodus size of major cheliped), and environmental factors such as food, temperature, pH, and salinity.

Relationships of some morphometric characters to carapace or total length are often included in morphometric studies of decapod crustaceans (Zairion et al., 2021;

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Oh & Hartnoll, 1999; Conan et al., 2001; Wardiatno & Tamaki, 2001). Allometric relationships have been used widely to quantify relative growth of body parts expressing secondary sexual characters in crustaceans. According to Sihombing et al., (2018), the slope of the allometric relationship undergoes a sudden change at the molt before maturity and to estimate maturation size of male and female.

CONCLUSION

These results of research were described that the body length size of mantis shrimp dominated by small size class, on measured each characteristic of morphometric and meristic has different range with small length different were among 0.844-0.996, and with this result has confirmed that the mantis shrimp species found in Berombang estuary waters were *H. raphidea* and these results of morphometric and meristic studies will give basic information about mantis shrimp that can be used to assist in the identification stage, analysis of growth patterns and selection of appropriate future management efforts especially in Berombang waters.

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REFERENCES

Ahyong, S. T., Chan, T., & Liao, Y.C. (2008). *A Catalog of the Mantis Shrimps (Stomatopoda) of Taiwan*. National Taiwan Ocean University (ed.)). Taiwan. 190 pp. https:// doi.org/10.1071/ZO00042

Al-kautsar, M.R., & Irwanmay P P. (2017). Kajian Potensi Hutan Mangrove Untuk Pembangunan Ekowisata di Kelurahan Belawan Sicanang Kecamatan Medan Belawan Provinsi Sumatera Utara. *Jurnal Aquacoastmarine, 5*(2): 56-68. https://doi.org/10.18478/JAQM.5.2.2017.56-68

Ambarsari, R. N. (2016). *Pengelolaan Sumberdaya Udang Mantis (Oratosquillina Gravieri Manning, 1978) di Teluk Palabuhanratu, Sukabumi, Jawa Barat*. [Tesis Institut Pertanian Bogor]. https://www.semanticscholar.org/paper/Pengelolaan-Sumberdaya-Udang-Mantis-(Oratosquillina-Ambarsari/4fd4f39f7ea23c183b6d74db1cc7868957bfad1f

Astuti, I. R., & Ariestyani, F. (2013). Potensi dan Prospek Ekonomis Udang Mantis di Indonesia. *Media Akuakultur*, *8*(1), 39-44. https://doi.org/10.15578/ma.8.1.2013.39-44

Chandra, T., Latif, A. abdul, Kalalo, A., & Salim, G. (2014). Studi Aspek Udang Nenek *(Harpiosquilla raphidae)* Di Perairan Juata Laut Kota Tarakan. *Jurnal Harpodon Borneo*, *7*(2), 81–86. https://doi.org/10.35334/harpodon.v7i2.108

Conan GY, M Comeau, M Moriyasu. (2001). Are Morphometrical Approaches Appropriate to Establish Size at Maturity for Male American Lobster, *Homarus americanus* ?. *Journal of Crustacean Biology. 21*(1), 937-947. https://doi.org/10.2307/937947

Dimenta, R. H., Machrizal, R., Khairul, K., Hasibuan, R., Manurung, A. Q., & Ihsan, M. (2020). Biologi Reproduksi Udang Mantis C*loridopsis scorpio* di Ekosistem

Mangrove Belawan, Sumatera Utara. *Depik Jurnal Ilmu-Ilmu Perairan, Pesisir Dan Perairan*, *9*(2), 227–334. https://doi.org/10.13170/depik.9.2.15188

Dini, L., Kasim, M., & Palupi, R. D. (2013). Kelimpahan dan komposisi Ukuran Panjang Udang Ronggeng (*lysiosquilla maculata*) pada Habitat yang Berbeda di Perairan Kauduma Desa Petetea'a Kabupaten Buton Utara. *Jurnal Mina Laut Indonesia*, *1*(1), 1–11. http://dx.doi.org/10.15578/jmli.v1i1.6207

Ekalaturrahmah, Y. A. C., Zairion, & Wardiatno, Y. (2020). Population Dynamics of Mantis Shrimp *Harpiosquilla harpax* and *Oratosquillina* sp. in the Waters South of Madura Island, Indonesia. *Biodiversitas*, *21*(4), 1458–1466. https://doi.org/10.13057/biodiv/d210425

Felder DL, DL Lovett. 1989. Relative Growth and Sexual Maturation in the Estuarine Ghost Shrimp *Callianassa louisianensis* (Schmitt, 1935). *Journal of Crustacean Biology*. 9(1), 540-553. https://doi.org/10.1163/193724089X00566

Hossain, Y., Naser, S. M. A., Bahkali, A. H., Yahya, K., Hossen, A., Elgorban, A. M., Islam, M., & Rahman, M. (2016). Life History Traits of the Flying Barb *Esomus danricus* (Hamilton , 1822) (Cyprinidae) in the Ganges River , Northwestern Bangladesh. *Pakistan Journal of Zoology*, *48*(2), 399–408. https://doi.org/10.1016/j.pjz.2016.06.077

Istigfarin, A. N., Hendrarto, B., & Solichin, A. (2016). Hasil Tangkapan Juvenil Udang Di Perairan Sungai dan Muara Wulan Demak dengan Menggunakan Alat Tangkap. *Diponegoro Journal Of Maquares*, *5*(4), 320–327. ttps://doi.org/10.14710/marj.v5i4.14437

Kalalo, A., Salim, G., & Wiharyanto, D. (2015). Analisis Populasi Pertumbuhan Allometri dan Indeks Kondisi *Harpiosquilla raphidea* Waktu Tangkapan Siang Hari di Perairan Juata Kota Tarakan. *Jurnal Harpodon Borneo*, *8*(2), 78–87. https://doi.org/10.35334/harpodon.v8i2.126

Kampouris, TE., Kouropakis E., Lazaridou M., Batjakas I E. (2018). Length-weight Relationships of *Squilla mantis* (Linnaeus, 1758) (Crustacea, Stomatopoda, Squillidae) from Thermaikos Gulf, North-West Aegean Sea, Greece. *International Journal of Fisheries and Aquatic Studies, 6*(6), 241-246. https://doi.org/10.1254/j.fas.2018.6.06241

Khatun, D., Hossain, M. Y., Rahman, M. A., Islam, M. A., Rahman, O., Azaad, M. A. K., Sarmin, M. S., Parvin, M. F., Haqur, A. T. U., Mawa, Z., & Hossain, M. A. (2019). Life-History Traits of the Climbing Perch *Anabas testudineus* (Bloch, 1792) in a Wetland Ecosystem. *Jordan Journal of Biological Sciences*, *12*(2), 175–182. https://doi.org/10.2108/j.jbc.2019.12.0217

Maulana, Z. G. (2020). Hubungan Hasil Tangkapan Udang Mantis *Harpiosquilla raphidea* dengan Karakteristik Sedimen Habitat di Perairan Pesisir Banyuasin Sumatera Selatan. [*Doctoral dissertation Sriwijaya University*]. https://repository.unsri.ac.id/28853/2/RAMA_54241_08051281520057_0031127501_0012057905_01_FRONT_REF.pdf

Martinez A G., Lopez M., Molero H M., Rodriguez J., Gonzalez M., Barba C., & Garcia A. (2020). Morphometric and Meristic Characterization of Native Chame Fish (*Dormitator latifrons*) in Ecuador Using Multivariate Analysis. *Animals 2020, 10*(10), 1805. https://doi.org/10.3390/ani10101805

Mulyono, M., Abinawanto., Mardiyono., Syam M Y., & Sudiarsa I N. (2018). Morphometric and Genetic Diversity of Mantis Shrimp *Harpiosquilla raphidea* from Karimata Strait and Java Sea Waters, Indonesia. *AACL Bioflux, 11*(6), 1681-1687. No doi.

Volume 5, Number 1, 2022
ISSN: Print 2622-4275 – Online 2622-7770

Muzammil, W. (2010). *Studi Morfometrik Dan Meristik Udang Mantis (Oratosquillina Gravieri Dan Harpiosquilla Raphidea) di Daerah Pantai Berlumpur Kuala Tungkal, Provinsi Jambi*. Tesis Institut Pertanian Bogor.

Oh CW, RG Hartnoll. (1999). Size at Sexual Maturity, Reproductive Output, and Seasonal Reproduction of *Philocheras trispinosus* (Decapoda) in Port Erin Bay, Isle of Man. *Journal of Crustacean Biology. 19*(2), 252-259. https://doi.org/10.2307/1549231

Parvin, M. F., Hossain, Y., Sarmin, M. S., Khatun, D., Rahman, A., Rahman, O., Islam, A., & Sabbir, W. (2018). Morphometric and Meristic Characteristics of *Salmostoma bacaila* (Hamilton, 1822) (Cyprinidae) from the Ganges River in Northwestern Bangladesh. *Jordan Journal of Biological Sciences*, *11*(5), 533–536. https://doi.org/10.2108/j.jbc.2018.11.0178

Patel, S.J., & Desai B G. (2009). Animal-Sediment Relationship of The Crustaceans And Polychaetes In The Intertidal Zone Around Mandvi, Gulf of Kachchh, Western India. *Journal Geological Society of India, 74*(2): 233-259. https://doi.org/10.1007/s12594-009-0125-6

Ritonga, I.A., Sitorus H., & Soemaryono Y. (2017). Hubungan kerapatan Mangrove Terhadap Kepadatan Makrozoobenthos di Pesisir Desa Jaring Halus Kabupaten Langkat Sumatera Utara. *Jurnal Aquacoastmarine, 5*(2): 23-30 https://doi.org/10.18478/JAQM.5.2.2017.23-30

Salim, G., Handayani, K. R., Anggoro, S., Indarjo, A., Syakti, A. D., Ibrahim, A. J., Ransangan, J., & Prakoso, L. Y. (2020). Morphometric Analysis of *Harpodon nehereus*, *harpiosquilla raphidea*, and *Scylla serrata* in the Coastal Waters of Tarakan, North Kalimantan, Indonesia. *Biodiversitas*, *21*(10), 4829–4838. https://doi.org/10.13057/biodiv/d211049

Sihombing, M. O., Sitorus H., Leiodonald R. (2018). Studi Morfometrik dan Meristik Udang Mantis (Oratosquillina gravieri) di Peraian Pesisir Percut Sei Tuan Provinsi Sumatera Utara. *Jurnal Aquacostmarine, 6*(2), 107-115. https://doi.org/10.18478/JAQM.5.2.2018.107-115

Siringoringo, Y.N., Yunasfi., Desrita. (2017). Struktur Komunitas Mangrove di Hutan Mangrove Kelurahan Belawan Sicanang Kecamatan Medan. *Jurnal Aquacoastmarine, 5*(2): 1-7. https://doi.org/10.18478/JAQM.5.2.2017.1-7

Situmeang, N. S., Purnama, D., & Hartono, D. (2017). Identifikasi Spesies Udang Mantis (Stomatopoda) Di Perairan Kota Bengkulu. *Jurnal Enggano*, *2*(2), 239–248. https://doi.org/10.31186/jenggano.2.2.239-248

Sukarni, Rina, R., Samsudin, A., & Purna, Y. (2018). *Harpiosquilla raphidea,* Udang Belalang Komoditas Unggulan dari Provinsi Jambi. *Jurnal Penyuluhan Perikanan Dan Kelautan*, *12*(3), 174–188. https://doi.org/10.33378/jppik.v12i3.108

Titardanu, Suprapto, & Pane, A. R. (2018). Komposisi Jenis, Sebaran dan Kepadatan Stok Udang pada Musim Selatan di Perairan Timur Kalimantan. *Bawal Widya Riset Perikanan Tangkap*, *10*(1), 41–47. http://dx.doi.org/10.15578/bawal.10.1.2018.41-47

Wardiatno, Y. (2014). *Udang Mantis, Harpiosquilla raphidea (Fabricius 1798) Asal Kuala Tungkal, Provinsi Jambi: Biologi, Upaya Domestikasi, dan Komposisi Biokimia* (D. M. Nastirs IPB Taman Kencana i (ed.)). PT IKAPI Kampus IPB Taman Kencana.

Wardiatno, Y., & Mashar, A. (2011). Population Dynamics of the Indonesian Mantis Shrimp, *Harpiosquilla raphidea* (Fabricius 1798) (Crustacea : Stomatopoda)

Collected from a Mud Flat in Kuala Tungkal, Jambi Province, Sumatera Island. *Indonesian Journal of Marine Sciences*, *16*(2), 111–118. https://doi.org/10.14710/ik.ijms.16.2.111-118

Wardiatno, Y., & Mashar, A. (2013). Morphometric Study of Two Indonesian Mantis Shrimps *(Harpiosquilla raphidea* and *Oratosquillina gravieri)*. *Buletin PSP*, *21*(1), 19–30. http://jesl.journal.ipb.ac.id/index.php/bulpsp/article/view/7116

Wardiatno Y, A Tamaki. (2001). Bivariate Discriminant Analysis for the Identification of *Nihonotrypaea japonica* and *N. harmadi* (Decapoda: Thalassinidea: Callianassidae). *Journal of Crustacean Biology, 21*, 1042-1048. https://doi.org/10.2307/10421048

Zairion., Pardhini V., Hakim A A., & Wardiatno Y. (2021). A Note on the Investigation of Morphometric Differentiation Among Mantis Shrimp (Stomatopods) in South Madura Waters, Indonesia. *IOP International Symposium on Aquatic Sciences and Resources Management 744*. IOP Publishing. 13 page. https://doi.org/10.1088/1755-1315/744/1/012109.