Composition of brachyura cryptic organism (crustacea) on the dead coral of *Pocillopora* in Sabang

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**Abstract.** The purpose of this study to evaluate the environmental conditions of Brachyura cryptic organism (class Crustacea) composition from genus Pocillopora found on dead corals of Sabang waters. The method used in this research by Purposive Sampling. The data were collected in August 2016 at three observation stations: Seulako Island, Rubiah Island, and Sumur Tiga. The number of the station were categorized as deep waters (7-10 m) which have different types and substrate characters. The results of water quality showed the temperature (30 °C), salinity (29.5‰ - 32‰), and pH (7).

Furthermore, there were five families found (Xanthidae, Portunidae, Majoidea, Pilumnidae and Trapeziidae) with a total of 142 individuals that spread into three stations. The most common individual was found in Seulako Island with the dead coral volume of 3.2 liters, while the least was found at the site of Sumur Tiga with the dead coral volume of 1.2 liters. The range of dead coral volume which was found at the Seulako Island, Rubiah Island and Sumur Tiga were 1.2 - 3.2 liters.

1. **Introduction**

Cryptic fauna includes macroinvertebrates and some fish that use either substrate temporarily or permanently. They can create their own cavities on coral reefs, while others are opportunistic invaders of existing space [1]. Cryptic fauna is an important part of food webs on coral reef ecosystems. Cryptic fauna organisms are an important food source for certain coral carnivores, including fish, gastropods, and octopus [2].

The coral reef ecosystem is one of the ecosystems with the highest biodiversity level when compared to other marine ecosystems. A quarter to one-third of all species in the sea is protected in tropical coral reefs [3,4,5]. The diversity and productivity of coral reefs are not only determined by corals, algae, and fish, but...
also by animals that inhabit dead coral and coral fragments [6]. In the case of living and dead corals, it provides very different conditions for association biota, because of its variety of potential food sources for large-sized biota. However, dead corals can provide a greater diversity of food resources than living corals such as plant sessile (for example, calcareous crustose and moss, seagrass) and fauna (ex: Bryozoa, sponge, and foraminifera) [7,8].

Sabang waters have the potential of very interesting marine biota, especially coral reef ecosystems and coral fish populations. Based on unspoiled water conditions, it is very easy to find various types of living marine life basically. Biota is certainly one of the bio-indicators of the health of coral reef ecosystems in water, one of which is Brachyura. The presence of Brachyura in its habitat, especially in the coral reef ecosystem of Seulako Island, Rubiah, and Sumur Tiga which is influenced by environmental conditions both biotic and abiotic factors. Biotic and abiotic factors are interrelated with each other, as well as interactions between the various species that make up the system. Although this cryptic biota has no important economic value, biology and ecology are thought to have an influence on the growth and sustainability of coral reefs [9] suspect that the presence of infauna crabs affects coral growth in response to the presence of other organisms associated with coral reefs.

2. Material and Methods
The sampling of dead coral was carried out in Sabang waters in August 2016 at three different stations, namely in the waters of Seulako Island, Rubiah Island and Sumur Tiga. Then preservation and identification of biota took place at Sabang and Integrated Laboratory of Faculty of Marine and Fisheries, Syiah Kuala University.

The method which was used in this study refers to [10], as many as 3 Pocillopora dead corals were taken from a depth of 10 meters using SCUBA diving equipment. The selection of dead coral colonies using the Purposive Sampling methods, which is a technique for determining research sampling with certain considerations so that the data obtained later can be more representative [11]. Dead coral colonies of the Pocillopora genus were measured by a roller meter in the sea and subsequently photographed using Canon G 15 underwater camera. The average size of Pocillopora dead corals taken was 30 cm in diameter. The dead coral is then cut off the base part using a hammer and chisel and then put into plastic garbage that is still new and then put into a bucket. This aims to prevent biota from escaping from dead coral colonies taken. Dead corals in the bucket are then brought to the surface and then carried out on the surface. Dead corals that have been brought to the surface are then measured in diameter and volume using the water runoff method (Archimedes law) "if an object is dipped in liquid then the object will get a pressure that is equal to the weight of the liquid pressed by the object".

The dead coral was solved using chisels and hammerheads. After being solved, the shorting stage was carried out. All organisms found in the colonies of dead corals were put into plastic cups containing seawater and labels. Each individual was given by different label that informs the location and number of dead corals and individual numbers. Each organism that has been shorted is then identified to the lowest taxon using the Crustacean Guide Of The World identification book [12]. The next stage is relaxation, in the stage of relaxation the organism is put into seawater mixed with 1% clove oil. The purpose of the relaxation phase is to make the organism faint making it easier in the photo-taking the stage. The next stage is taking photographs, each organism than in a photo labeled as well as functioning as a scale. Taking photos using Nikon D 7000 cameras. Samples that have been subsampled are then preserved in a tube containing 96% ethanol solution.

3. Results And Discussion
3.1 Family composition and number of individuals Brachyura
The observation results showed that the average volume of dead Pocillopora species from 3 research stations was 1.2 liters - 3.2 liters with an average volume of dead corals in the three observation stations was 1.9 liters. The families found in each observation location were 5 families, namely Xanthidae, Portunidae, Pilumnidae, Majoidea, and Trapeziidae. The number of Brachyura individuals found in Pocillopora dead corals was 142 Brachyura individuals, where at Station of Seulako Island the number of individuals found was 50 Brachyura individuals, while at Station of Rubiah Island there were 48 Brachyura individuals and Sumur Tiga stations in 44 Brachyura individuals.

Figure 1. The composition of the number of individuals Brachyura

Figure 1 explained that there were different Brachyura individuals found, such as at the Station of Seulako Island has 50 individuals in the form of Xanthidae, Portunidae, Pilumnidae, Majoidea, and Trapeziidae families. The station of Seulako Island found the most Brachyura, where the Xanthidae family is found as many as 27 individuals, while the family of Portunidae was found as many as 3 individuals followed by family Pilumnidae as many as 5 individuals, family Majoidea found as many as 9 individuals, and family Trapeziidae found as many as 6 individuals. The number of families found at the Station of Seulako Island was caused by the volume of dead coral found to be larger, namely 3.2 liters compared to the Station of Rubiah Island, the volume of dead coral was 1.5 liters and the Sumur Tiga station was 1.2 liters.

While at Station of Rubiah Island 5 families were found with a total of 48 individuals including Xanthidae 25 individuals, Pilumnidae 8 individuals, Majoidea 8 individuals, Trapeziidae 6 individuals, and Portunidae 1 individual. At station 3 Sumur Tiga only has 3 families which were found with a total number of individuals obtained as many as 44 individuals including Xanthidae 35 individuals, Majoidea 4 individuals, and Trapeziidae 5 individuals.

3.2 Identification of Brachyura on Dead Coral

The type of biota Brachyura found as dead corals in Sabang waters consists of five families, namely: Xanthidae, Portunidae, Pilumnidae, Majoidea, and Trapeziidae. The five types of the family have different characteristics in terms of morphology. These crabs live in symbiosis with branched-rock corals by occupying crevices or branches of coral reefs which are a refuge and become a source of food for the mucus secreted by corals [3,13].

Family Xanthidae
The Xanthidae family is one of the Brachyura biotas that inhabit the dead coral of the Pocillopora genus as a habitat for cryptic organisms. The type of Xanthidae has a perfect body morphology that is equipped with the characteristics of the hexagonal carapace, strong chelipeds, and generally, this type of crab is poisonous. Holthuis [14] make a statement that the poisonous crab from the Xanthidae family has special characteristics on its body, specifically the carapace and its claws. Carapace usually has striking colors, while the claws are generally with black or brown fingers. This is in accordance with [15] statement that the main source of poisons in the body of this biota has a distinctive color in the carapace, which is colored brownish faded green.

Family Portunidae
This type of crab also belongs to the type of crab that lives in the crevices of coral reefs and which uses mucus on dead corals for their food. The Portunidae family has different characteristics from other crabs including crab Portunidae which also has a circular hexagonal carapace, there are swimming legs on the 5th pereopod and this type of family of Portunidae which is similar to the common crab which found in the fish market.

The Portunidae family is a family of Brachyura who has five pairs of legs [16]. The fifth leg pair is cheek shaped and widened on the last segment, has a cheek carapace called a hexagonal or rather square convex fork, an elongated or rounded ovoid size shape, but anterolateral with five to nine fruit teeth. The wide forehead is separated from the intra-orbital angle, with two to six teeth, a small groove that is located transversely or dragging. The last leg pair is flat like a paddle. Especially the last section, and has three pairs of road legs.

Family Pilumnidae
The Pilumnidae Brachyura family that inhabits the dead coral is also one of the cryptic biotas that utilize the gaps in dead corals as their habitat. One characteristic of the Pilumnidae family is the hexagonal or oval hexagonal form has the feather and is also similar to the Xanthidae family. The body parts of the crab are also equipped with feathers and hair as the recipient's senses [17]. Feathers are found almost all over the body but most are clustered at the foot of the road. To find food, crabs use the stimulation of chemicals produced by organs. While the Antenna has a sense of smell that can stimulate crabs to find food. When the detectors on the feet make direct contact with food, chelipeds quickly pinch the food and put it directly into the mouth. The mouth of the crab also has a signal receiver that is very sensitive to detect chemicals. Crab relies on a combination of taste organs to find food, partners and save themselves from predators.

Family Majoidea
The Majoidea family has a more unique form than other families with different body morphology. Namely the shape of the carapace like a circular pear to suboval, a long and slender body shape. The Majoidea family also uses dead coral as a place to find food and its habitat. The Majoidea family also has special features such as a slimmer body and has a little interesting color on the carapace. Having 5 pairs of legs consisting of 1 pair of legs (claws) functions as a holder and puts food into his mouth.

Family Trapeziidae
Trapeziidae crabs generally also live on dead corals and have several different features from other crabs. The Trapeziidae family has a round, finer carapace, patterned with many colors and also lives on dead corals as a medium to adapt to prey and at the same time as a habitat for these cryptic biota organisms.
3.3 The relationship between Brachyura and Dead Coral

The comparison of Brachyura with dead corals has different values in each sample of dead coral found. From the station of Seulako Island, Rubiah Island and Sumur Tiga, among them have a volume of dead coral which ranges from 1.2 liters - 3.2 liters. The value generated can be seen in Figure 3.

**Figure 2.** Brachyura family found in Sabang
The results showed that the value of the relationship between Brachyura and dead corals obtained at 3 stations (Seulako Island, Rubiah Island and Sumur Tiga) had different values in each study location with a range of values of dead coral volume between 1.2 liters - 3.2 liters. At Station of Seulako Island the value of biota Brachyura obtained was 50 individuals with a volume of 3.2 liters of dead coral, while at station Rubiah Island the value obtained was 48 Individual biota Brachyura with a value of 1.5 liters dead coral, and Sumur Tiga station showing a value of 44 individuals biota Brachyura with a dead coral volume of 1.2 liters. The higher the value of the volume of dead coral at a station, the more the composition of individual Brachyura in dead corals in the location of these waters.

The results obtained were the highest number of Brachyura biota at the Seulako Island station 50 Individual and the lowest was found at the Sumur Tiga stations 44 Individual. While the highest value of the dead coral volume is found at the station of Seulako Island (3.2 liters) and the lowest value is found at Sumur Tiga station (1.2 liters).

4. Conclusion

Cryptic fauna found in three study sites only had differences at the family level and the number of individuals. The total individuals found in this study reached 142 individuals of Brachyura cryptic fauna including Xanthidae, Pilumnidae, Trapeziidae, Majoidea and Portunidae families. Brachyura is most commonly found at the Station of Seulako Island with a total of 50 individuals from 5 families and the lowest at Sumur Tiga station with 44 individuals from 3 families. The volume of dead corals obtained from the three research sites ranged from 1.2 liters - 3.2 liters.

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