



## Biodiversity of Tunicate (Ascidiacea) in the waters of Badi Island, Pangkajene Regency of South Sulawesi

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### Abstract

Tunicates belongs to Urochordate that inhibit coral reefs ecosystem. The uniqueness of the tunic can be seen from the body shape like a tube with 2 siphons and the body is covered by a protective layer known as the tunic. The present study aims to observe marine tunicate at waters of Badi Island, Pangkajene Regency, South Sulawesi. This research using the Belt Transect method with a length of 20 m and a width of 4 m at a depth of 5 m with 4 station points according to the wind directions. All tunicate inside transect was noted and identified. Identification was based on morphological characteristics. The result shows that there were 18 species of tunicates present in the coral reefs ecosystem of Badi Island.

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### Keyword

Ascidian;  
Sangkarang;  
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### Introduction

Tunicate include animals that are in the primitive chordate phylum with  $\pm 3000$  species in it (Santhanam, 2020). Most have habitats in the sea by sessile or free life in the water column and live in colonies. The group of animals that have tunics, hence the name tunicates, is made of cellulose which is rarely found in animals (Shin, 2014). Urochordata is different from other chordates because there is a larval stage, urochordates have a neural tube and a notochord, but will disappear in the adult phase (Collin, 1995). Systematically the general classification of tunicates of the phylum Chordata, subphylum Urochordata with classes divided into 4, namely Ascidiacea, Thaliacea, Appendicularia, Sorberacea (Santhanam, 2020).

These animals usually inhabit littoral waters and in the intertidal to subtidal zones and mostly live sessile or attached to coral reefs (Tahir, 2016). According to Ali *et al* (2014), tunicates can also be attached to the hull which will increase the weight of the ship. The spread of tunicates from one place to another is quite fast and good adaptability is carried out by this group. The spread can be through ship transportation and also currents in the waters that carry larvae to other places (Saputri, 2019). Tunicate that lives on coral reefs are known to contain chemical compounds that are used as antibiotics, anti-tumor, anti-inflammatory, immunosuppressant, and anti-cancer (Litaay, 2018). One example of a species is *Didemnum molle* which is in symbiosis with bacteria that produce bioactive compounds (used as antifouling and antiviral) (Tahir, 2016). Tunicate has an ecological role, namely marine life that contributes to maintaining the stability of the marine ecosystem.

This benefit causes the existence of tunicates to be very important for the habitat of marine biota, so scientific information related to this biota is needed. Information on biodiversity in Sangkarang area is limited. On the other hand information on biodiversity is baseline data to support sustainability of marine resources. Therefore, the distribution of species and their habitats, especially on waters of Badi Island of Sangkarang Archipelago is required.

## Materials and Methods

The tools used in this research were stationery, camera, sample bottle, label paper, thermometer, pH meter, drift float, roll meter, BCD, mask, fins, salinity hand-refractometer, DO meter, calculator, GPS (*Global Positioning System*), diving knife, scissors, tunicate identification book. The materials used are 70% alcohol and tunicates. The research was carried out in October 2020-November 2021 on the waters of Badi Island, Pangkajene Regency, South Sulawesi.

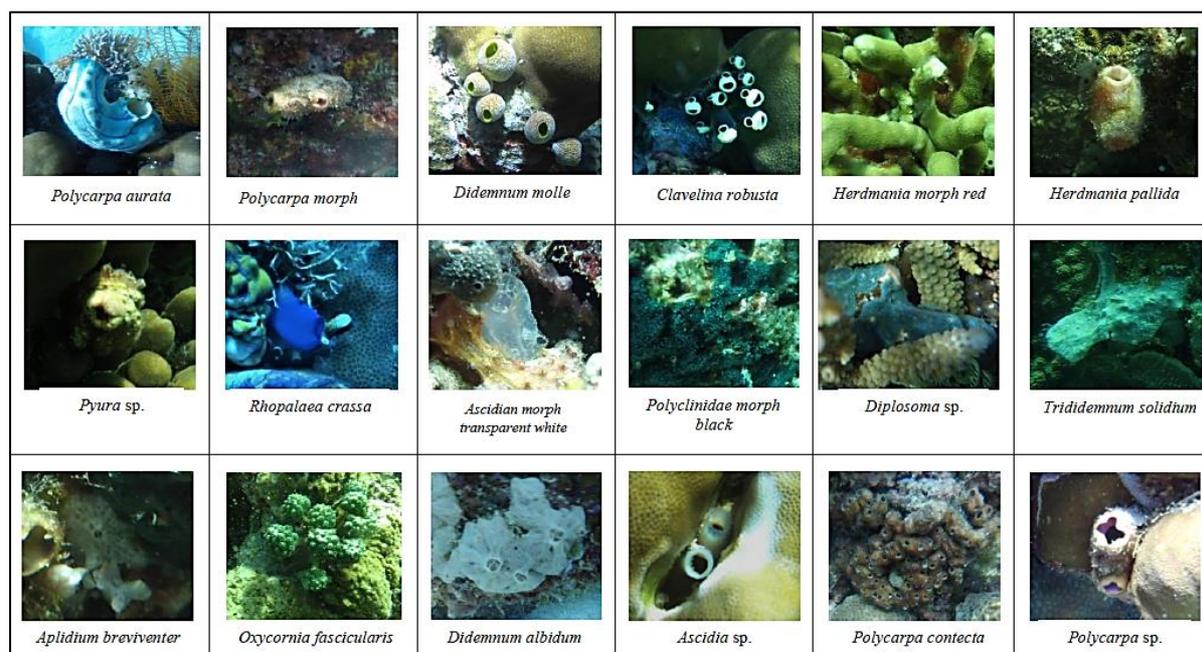
The method used is a 20 m long belt transect with a width of 4 m which was carried out at a depth of 5 m at four different stations according to the wind directions. All tunicate that found were noted, and proceeded for identification. Species identification was observed morphologically and documented. The tunicates that could not be identified directly at the observation site were taken and preserved using 70% alcohol and further identified in the laboratory.

## Results and Discussion

The results of observations that have been carried out in the waters of Badi Island show that there are 18 species of tunicates, especially the Ascidiacea class, which were obtained at the 4 stations, namely east, south, west, and north. At station I (east) there were 9 species of tunicates, station II (south) 6 species, station III (west) 9 species, at station IV (north) there 11 species of tunicates. Number of species in the present study is higher compare to the previous research by Hakim (2013), in which only 10 species of tunicates belonging to the ascidiacea class were found in Badi Island waters. In different study, Mawaleda (2014) found 33 species of tunicates from 7 family present in waters of Barranglompo Island, nearby Badi island. Litaay *et al.* (2018) found similar number of tunicate species (18) at waters of Samalona island, eventhough some species are different from the present study.

The distribution of tunicates in the waters of Badi Island is quite varied and there are several species that are only found at a some stations. This is related to the presence of several factors such as differences in environmental parameters that affect the distribution of the tunicate. In general, tunicates in the ascidiacea class have habitats on coral reefs, both live corals and dead corals, while on sandy, muddy, or broken coral substrates are usually only occupied by certain tunicates. One of the reasons why there are fewer tunicates on Badi Island compared to Barranglompo Island because the coral cover which is the habitat of the tunicates is greater on Barranglompo Island and research by Hakim (2013) is thought to be related to the influence of abiotic and biotic factors on Badi Island.

Of the 18 types of tunicates found on Badi Island (Figure 1), 3 species that have a wide distribution or can be found at all station location points are *Polycarpa aurata*, *Didemnum molle*, and *Polycarpa* sp., while the other species are only found in several stations and even only found in 1 species. at 1 station, namely *Aplidium breviventer* and *Ascidia* sp.



**Figure 1. Species of tunicates in the waters of Badi island**

- a. *Polycarpa aurata*, is the most common type of tunicate found in water areas with a body shape similar to a heart, having a yellow/white color with blue and purple stripes. The body size is larger than other tunicates, which is about 5-15 cm and lives attached to corals.
- b. *Polycarpa morph brown*, tunicates that live solitary with a body size of 5-15 cm. *P. morph brown* is pale brown in color with sediment that almost covers part of the tunic and has a fairly hard tunic. These tunicates usually live attached to corals.
- c. *Didemnum molle*, a tunicate species that has a high distribution with quite a lot of numbers in the waters. *D. molle* including solitary tunicates that are in groups and can grow to a range of 1-3 cm. on the part of the tunic is yellowish-white to greenish due to the presence of *Prochloron* sp. which is in symbiosis with *D. molle*. Found in flat areas of coral reefs or areas that are still exposed to sunlight.
- d. *Clavelins robusta*, one of the tunicates that have a black body which near the siphon is yellowish-white and this tunicate is a solitary tunicate. The size of *C. robusta* ranges from 1-3 cm.
- e. *Herdmania morph red*, including tunicates that live solitary and can be found attached to coral substrates. The body color of *H. morph red* is red and has a fairly long siphon where at the end of the siphon there is a vertical white pattern and the body size is about 5-10 cm.
- f. *Herdmania pallida*, is a solitary tunicate that lives permanently on corals. The body size is about 5-7 cm with the body covered by the substrate and has a pale red color.
- g. *Pyura* sp., is a tunicate that lives solitarily in waters. body size ranges from 5-10 cm and there is sediment that covers the body. This tunic has a tunic that is quite hard and looks like a thickening on the siphon.
- h. *Rhopalaea crassa*, a type of tunicate that has a blue body and a slightly darker siphon, so this species is easy to find. The body size of *R. crassa* is about 2-5 cm and is usually found attached to corals.

- i. *Ascidian morph transparent white*, this type of tunicate has an almost transparent white color with a size of 2-5 cm and there is a white vertical line on the siphon hole. Including solitary tunicates and live in the coral reefs.
- j. *Polyclinidae morph black*, is a tunicate that lives in colonies and lives attached to corals. Has a small body shape and a black tunic.
- k. *Diplosoma* sp., tunicates that live in groups or in colonies and live attached to coral areas, especially branching corals. *Diplosoma* sp. has a very small body shape and looks blue on each siphon.
- l. *Trididemnum solidium*, which lives in colonies and is attached to substrates such as corals. *T. solidium* has a light blue body color and the location of the siphons is not close to each other.
- m. *Applidium breviventer*, live solitary and attached to coral crevices. The body shape of *A. breviventer* is that it has small pores on the body. Body size is about 2-5 cm with a white body.
- n. *Oxycornia fascicularis*, tunicates that have a unique body shape, where there are small circles that are gathered on a single stalk resembling a tree. In each circle, there are 2 white siphons and count as 1 individual/species. This type of tunicates can be said to live in colonies with a size of 0.5-2 cm in each individual.
- o. *Didemnum albidum*, live in colonies and attach to substrates such as coral. *D. albidum* has a pale white body with small pores. The siphon hole is quite large and has a body size of about 2-5 cm.
- p. *Ascidia* sp., live solitary and can be found attached to coral crevices. It has a fairly long siphon and at the end of the siphon it is transparent and has a body size of about 5-8 cm.
- q. *Polucarpa contecta*, tunicates solitary but form groups or live in colonies. *P. contecta* is brown with a size of 1-3 cm and lives attached to substrates such as coral.
- r. *Polycarpa* sp., tunicates that live solitary and can be found on coral reefs, especially massive corals. This type has a body shape/tunic which is quite hard and firmly attached to the substrate. Its body size ranges from 5-10 cm and when opened the inside of the chiffon looks purplish pink.

### Environmental Parameters

Environmental parameters is described in the Table 1. As can be seen from the Table, pH value of 7.8-8.1 which indicates a relatively safe value for tunicates. According to Pancawati (2014) waters with a pH that tends to be stable are in the range of 7-8.5 and for marine biota, especially live tunicates, at a pH of 6.7-8.6 (Radhalakshmi, 2014). Salinity values are in the range of 29.6-30.6 ‰, this is in accordance with Kott, et al (2009) which states that tunicates can generally live at 29-32 ‰ salinity.

**Table 1. Environmental parameters in study area**

Station	pH	Salinity (‰)	Temperature ( °C )	DO	Current (m/s)	Clarity (m)
I (East)	7.8	30.6	26	5.8	0.9	8
II (South)	8.1	29.6	27	5.9	0.16	8.7
III (West)	7.9	30.3	26	5.8	0.1	10.7
IV (North)	8.1	29.6	27	5.7	0.12	9.7

The temperature value ranged from 26-27°C respectively, which according to MENKLH, 2004 regarding the normal temperature limit in the waters is 28-32°C, so it can be said that the temperature in the waters of Badi Island is still suitable for tunicate life. DO (Dissolved Oxygen) according to the MENKLH, 2004 seawater quality standard suitable for marine biota is >5. The results showed in Table 1, DO ranged 5.7-5.9 indicating a relatively safe value for tunicates. Current values at all stations are classified as moderate current speeds. This is supported by Padang (2020) that currents that are less than 0.1 m/s are classified as weak, while a value of 0.1-1 m/s are classified as moderate, and a value of 1 m/s are classified as a strong ocean current. The measurement of the clarity level showed in the table is at a value of 8-10.7 m. According to MENKLH (2004) the clarity of the waters for marine biota is 3-5 m, while the results obtained are above the average value so that it can be said that Badi Island has waters with a high clarity.

## Conclusions

We conclude that 18 tunicates species present at waters of Badi Island. Of these tunicates *Polycarpa aurata*, *Didemnum molle*, and *Polycarpa* sp. show a wide distribution in the study area.

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