



## A study on an exotic symbiotic relationship found between a typical Shellback crab and the sea anemone

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### ABSTRACT

Hermit crabs are decapod crustaceans of the superfamily Paguroidea but apart from hermits there several species which has similar features with hermit crabs. Hypoconchaarcuata a crab which carries a sea anemone on its carapace and maintains a symbiotic relationship. Similar to Hyperconchaarcuata a crab was found in the east coast of India, which some exotic unusual features. It has the ability to hold a dead clam shell on its carapace by its modified dactyl which is like a hook shape, one pair of legs are folded and present above the carapace under the clam shell which helps to run a mechanism of moving the dead clam shell and a bottle green colored sea anemone grows above it. This two creatures relationship along with a dead animal part reveals the definition of Commensalism and Mutualism. In this write up it is explained clearly how the crab and the sea anemone interacts.

## 1. INTRODUCTION

Commensalism means when one organism benefits and the other organism isn't harmed by the partnership. The hermit crabs are considered as one of the most interesting groups of organisms among the decapod crustaceans [3]. The association of certain sea anemones and hermit crabs is established in different ways according to the species involved.

All living organisms have complex interrelations, which, when referring to close associations between two species, are defined using the commonly term symbiosis [2]. One of the most common cases of symbiosis in aquatic ecosystems is between cnidarians and hermit crabs more than 100 species of cnidarians have been reported in such associations .Sea anemones (Anthozoa: *Actiniaria*), though, are the only cnidarian symbionts that are actively hosted by hermit crabs and not abruptly fixed on their gastropod shells during larval stage [1].

It is a known fact that many representatives of the crab family Dromiidae carry a camouflage cover on top of their carapace. This cover, consisting generally of sponges or compound ascidians [4].High diversity values of Decapods are usually recorded in tropical and subtropical regions compared to temperate and cold regions, where a significant decrease of species richness is verified by researchers [5].

Here the present study shows the morphology and the behavior of this unusual creature which was found at Puri sea beach of Bay of Bengal, Orissa, India. This crab has almost similar features with *Hypoconcha arcuata* but its not exactly same.

This particular crab which holds a dead clam shell on its carapace above which a sea anemone grows. This makes a symbiotic relationship between the crab and the anemone. The crab carries the anemone on its back to different places and the anemone helps to catch food for its own and for its partner crab.

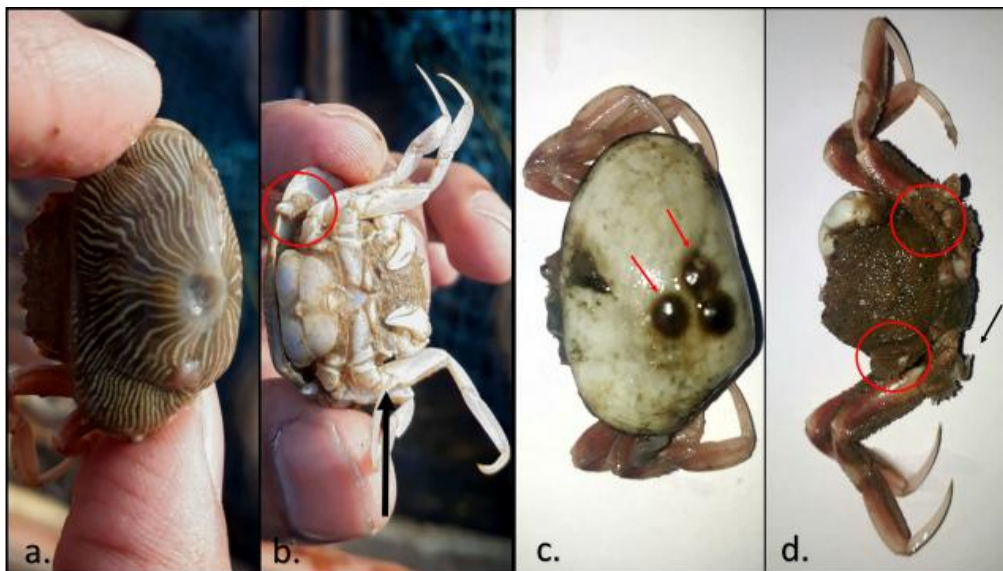
## 2. MATERIAL AND METHODS

### **Study Area**

Puri sea beach (19°49'N 85°50'E / 19.81°N 85.83°E), shore of Bay of Bengal Orissa, India [6].

### **Method of collecting samples**

Samples were collected from the sea, nylon fishing nets were used for catching these creatures. Maximum 5 cm size alive crabs were caught. Male and female crabs were differentiated. Two dead crabs were found and it has been preserved with 30% Formaldehyde solution.



**Figure 1** Relationship found between a typical Shellback crab and the sea anemone

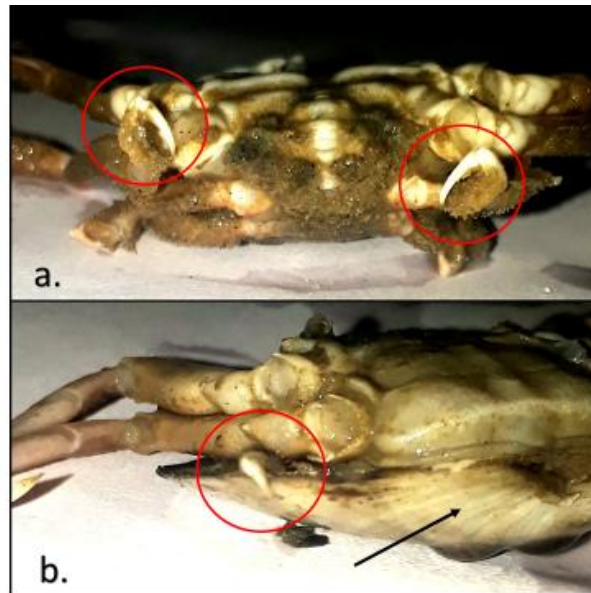
## 3. FINDINGS

### **Physical features of the crab**

Approximately 4 to 5 cm long crab is generally found in Bay of Bengal at Puri sea beach , Orissa. It has 2 pairs of walking legs which help for its locomotion. Dactyls are similar for both the legs. Chelipeds are almost similar in size. Both the eyes are present in the

anterior part of the crab. Abdomen part is divided into two segments for females and 4 segments for males forms a triangular appearance. Swimming legs are present on the posterior side and it is not meant for swimming for this crab as the dactyl is hooked C shape which helps the crab to hold a dead clam shell on its carapace. On pair of leg is present under the dead clam shell which helps the shell to lift up and down. This crab captures different sizes of clam shell on its own choice.

Figure 1a. Shows the top view of the crab along with the attached sea anemone on the dead clam shell which covered the carapace of the crab. Figure 1b. shows the bottom view of the female crab, red circle shows the dactyl which is C shaped hook by which it holds the dead clam shell. Figure 1c shows the attached sea anemone on the dead clam shell which guarded the crab. In this figure two red arrow shows Anemones became small as it has been taken out from the saline water over 6 hours. In Figure 1d, Red circle marks shows the two legs which are present over the carapace, generally it is guarded by the dead clam shell. These legs helps in mechanism of lifting the clam shell up and down along with the sea anemone.



**Figure 2**

Figure 2a Red circle marks shows the dactyl which is hook shaped. Figure.b. Arrow shows the clam shell which is grabbed by the crab with its C shaped hook marked by red circle.

#### 4. DISCUSSION

The study recorded at Puri Sea Beach, Orissa, India. In the month of December, 2017 these typical crabs were found at the ocean floor of Bay of Bengal. This crab carries the anemone on its carapace and move to different places in order to help the anemone to breed at different positions on the ocean floor and this process is done on the exchange of food, that is, the anemone catches the food such as planktons or small fishes and serves it to the crab which shows a perfect symbiotic relationship.

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