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Brachycnemic Zooxanthellate Zoanthids (Cnidaria: Zoantharia) of Saurashtra Coast: A Preliminary Survey

Pandya Khushali M. and Mankodi Pradeep C.*
Division of Marine Biology, Dept. of Zoology, Faculty of Science, The M.S. University of Baroda, Vadodara, Gujarat, INDIA

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Abstract

A survey for zoanthids was carried out along the Saurashtra coast of Gujarat. However, their identification is not documented critically and only till generic level has been reported. Brachycnemic zoanthids are described by the 5th mesentery being incomplete. Here in this paper we present the species level identification based on authentic identification key[7]. We have found variants in Zoanthus sansibaricus. Along with that, documentation of Zoanthus vietnamensis and 2 species of Palythoa i.e. Palythoa tuberculosa and Palythoa mutuki are described.

Keywords: Zoanthids, Zoanthus, Palythoa, Saurashtra coast.

Introduction

Marine biodiversity encompasses an enormous variety of marine and coastal species. It consists of the highest records of diversity and also in terms of the number of organisms. Several other marine invertebrates are still not in the record list and their complete account is also not recorded[1,2,3,]. Zoanthids, benthic Anthozoans are found in nearly all marine environments. Zoanthids are divided into Macrocnemina and Brachycnemina based on the mesenteries being complete or incomplete[4,5]. These zoanthids were taxonomically neglected group because the non-distinct morphological characteristics for species level identification, high level of intra-specific variation. They are found to have encrustations of sand and detritus in their mesoglea causing internal examination complicated[6,7,8]. Precise reporting of zoanthids is progressively getting more important for mapping their distributions and for the continued development of sustainable coastal and intertidal ecosystem. They have been studied in India mainly for the bioactive compounds found in them like palytoxin and Zoanthamine alkaloids. Recent records of zoanthids from the Saurashtra Coast have been mentioned only by their generic name or their work on the biochemical estimations[9,10]. However, until now there has been no investigation into the diversity of zoanthids from the coastal areas of Gujarat representing a gap towards this cnidarians community distribution. The first record of these zoanthids was as *Palythoa tuberculosis,* described in the report by Hornell[11]. After that, Nayruti et. al.,[12] reported the presence of *Palythoa sp.* from Dwarka coast. As the original descriptions were found often very short, incomplete and include few characteristics of these organisms[13], identification of the species in the field was nearly impossible until the key produced by James Reimer[5].

These Anthozoans consist of a skeleton made from detritus and sand particles which is not hard enough to sustain the currents, but it definitely helps in forming huge colonies in areas with high sediment rates. The zoanthids form a major constituent of the rocky intertidal macro benthos at places with absence of extensive coral growth[14,15] and in tropical and temperate subtidal rocky areas[13]. The area of concern at this stage is to find out their diversity and distribution pattern.

Material and Methods

Study site: The area surveyed for the present information (from Okha to Veraval) can be geographically divided into two regions. The mouth of the Gulf of Kachchh - Okha and some part of Dwarka, features the sediment load and sedimentation effect due to the flow of the Indus River, while the region from Porbandar to Mahua directly faces open ocean waves. Both regions are strongly influenced by the current from the Indus River and other rivers flowing through the Saurashtra region.

Samples: The Zoanthid diversity was noted for a year from January 2012 to December 2012 at sites mentioned, of the Gujarat Coast. Photographs were taken on the field. Further analysis of oral disk color, tentacle number, colony size etc. was carried out in situ. No samples were collected for further studies; however the necessary morphometry was measured at the place itself.

Identification: The identification of species was done using morphological characteristics key[5].

Results and Discussion

Herein, is a species list and a morphological description of all Zooxanthellae zoanthids observed, and some of their ecological characteristics have also been described. Figure 1 represents the features of the two zoanthids and their colonies and figure 2 depicts the key features of the species observed from the study site.

Figure-1
Colony of Zoanthus and Palythoa

Family Zoanthidae: The polyps of the Zoanthus sp. are erect and smooth and often open in daytime. It is the only family of the Order: Zoantharia found without encrustation of sand. Zoanthidae family consists of three genera and all are Zooxanthellae, found worldwide in shallow tropical waters.

Genus Zoanthus: This is the only genus which does not uptake any detritus or sand particles. Zoanthus polyps are uniformly smooth on the outer surface. Zoanthus sp. is found to have brightly coloured oral disks with green and brown forms similar to Palythoa. The outer part of the polyp is mainly dark purple or grey and sometimes green is also observed. The zoanthids are attached to hard substrata, generally rocks. Two species *Z. sansibaricus* and *Z. vietnamensis* have been found in the study area. However the latter has been recorded only from Veraval and Sutrapada.

***Zoanthus sansibaricus* (Carlgren)[8] Figure 2(A):** *Z. sansibaricus* was observed to form large colonies with "liberae" polyps being clear and free of the coenenchyme[16]. Two rows of tentacles with approximately 30 tentacles in each row. The number of mesenteries is almost same as the number of tentacles. Oral disk color varies from green, brown, blue, orange, red, purple, white, yellow and sometimes fluorescent. The morph types observed in this study mainly comprised of green, brown, orange or blue oral disks. In all areas surveyed, *Z. sansibaricus* has been found to be the most abundant amongst the Zoanthus species and found at all the four intertidal areas. A single colony comprised of approximately 30-100 polyps but may vary from location to location depending upon the substratum.

Z. vietnamensis (Pax & Müller)[8] Figure 2(B): As described by Reimer et al.[16], Z. vietnamensis comprises of small colonies of about 80 polyps. Similar to Z. sansibaricus, there is no encrustation found and polyps of "liberae" type are found. Oral disk always pale to dark pink, or purple and often with white oral opening. The tentacles are white, green or light pink. However, in the present study, the tentacles were green in colour but having brown tips.

Family Sphenopidae: The specific feature of this family is the encrustation of sand or detritus in the mesoglea. The representative genus in this family is Palythoa.

Palythoa sp.: The characteristic feature of this genus is that it takes up sand and other detritus material for its structure formation. Usually either green or brown coloration of the oral disk and the outer part of the colony is mostly brown or pale brown.

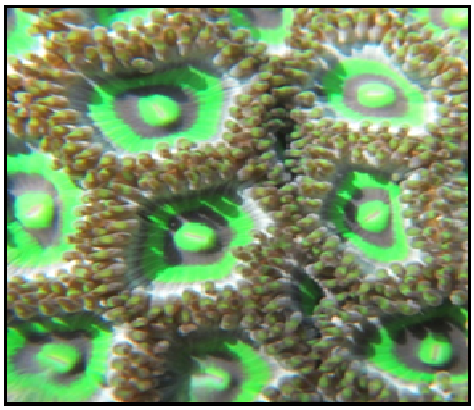
***Palythoa tuberculosa* (Delage and Herouard)[8] Figure 2(C):** Polyps "immersae", scarcely extending above the well-developed coenenchyme. Oral disks often closed in day time with coenenchyme white to dark brown and generally uniform in color. *P. tuberculosa* appears to have two major growth forms viz. "massive encrusting" and other being "small rounded". The massive encrusting form is found to take up huge areas of rocky

intertidal zone and the small rounded colonies are approximately 30cm in diameter. The "small rounded" colonies were found at all places but in a greater amount at Dwarka coast and massive encrusting was found mainly at Veraval and Sutrapada.

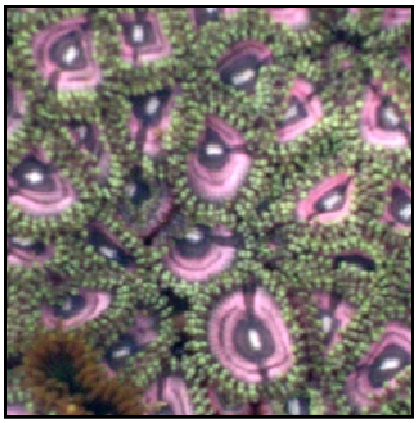
***Palythoa mutuki,* (Carlgren)[8] Figure 2(D):** Polyps "liberae" in form, with upto 30 mm in length. Oral disk color green or brown. Single polyps were found with sporadic distribution. This species was found to be abundant at all sites but mostly at Dwarka, huge colonies were found in almost an entire patch of 100m. The polyps were found to be different as sometimes they were found in close cluster and at times single polyps were found with sporadic distribution. The external coloration was usually brown, with green or brown oral disks.

Conclusion

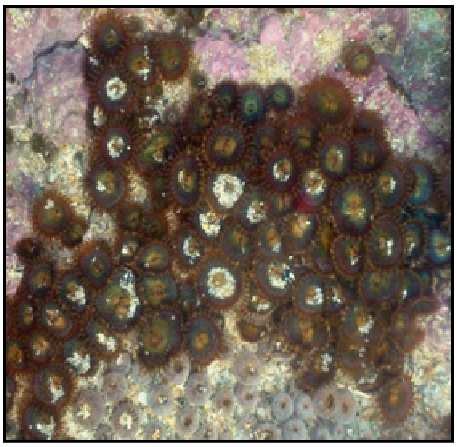
The main purpose of this survey was to document the Zoanthid species of the Saurashtra coast. The study site being distinct due to the substratum specificity and the current of water and also the water flow, it changes the dynamics of the sediment load. These investigations clearly indicate the differences in the distribution of the zoanthids along the coastal area. The areas surveyed extensively. The colour variations in the zoanthids mainly depend on the symbiotic Zooxanthellae algae which imparts colour to the zoanthids. The water temperature and sedimentation load is much favourable at these areas for the increase in zoanthids. There have been differences found at the areas due to variation in the intertidal regime. Distinct zonation patterns have been observed at all sites but specifically at Veraval and Sutrapada. Mainly three species have been found in all the areas, however, only one species i.e. *Z. vietnamensis* was found only at Veraval and Sutrapada during this study. We need to survey the areas more for knowing their diversity and distribution pattern as there is lot of variation found in the same genus and species. Interspecific hybridization has been observed and therefore molecular studies have been taken place. *Z. sansibaricus*, *P. mutuki* and *P. tuberculosa* are common reef zoanthids. One specific observation made was that the *P. tuberculosa* was abundant in the Dwarka coast, whereas it was in equal distribution with other genus at other places. *Z. vietnamensis* has been observed with low abundance at Veraval and Sutrapada but this is a novel finding as it has not been reported till date from our coast. *Z. sansibaricus* as described by Reimer[6] is the most tolerant species amongst the genus Zoanthus and therefore its abundance is more.



(A) *Z. sansibaricus*



(B) *Z. vietnamensis*



(C) *P. mutuki (Brown)*

(D) P. mutuki (Green)

(E) P. tuberculosa

Figure-2
Representative zoanthids

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