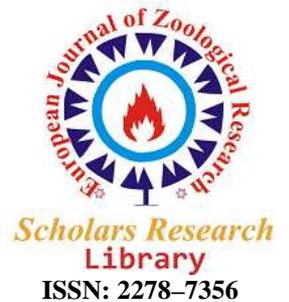




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Occurrence of Zoanthid genus *Isaurus* from Saurashtra coast, Gujarat, India

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ABSTRACT

The zoanthid genus *Isaurus* (Anthozoa: Hexacorallia) is a well-known species from the Indo-Pacific and Atlantic Oceans. Based on morphological and molecular data, this species has been examined recently. We identified the Genus *Isaurus* during a regular field visit. Identification was carried out using morphological data. On comparing the obtained morphological data with the few previously described genera *Isaurus* as well as with *Zoanthus* and *Palythoa*, *Isaurus* is found to be closely related to the genus *Zoanthus*. The polyp length, mesentery numbers, external coloration in the collected *Isaurus* specimens exhibited a lot of variation. Two *Isaurus* species are documented based on their morphological characters.

Keywords: *Isaurus*, Zoanthid, Saurashtra Coast

INTRODUCTION

Marine ecosystem is one of the vast and varied ecosystems having a huge plethora of organisms yet to be discovered and identified. The order Zoantharia belonging to the phylum Cnidarian is usually found in most environments from shallow tropical reefs [1] to cold seeps in the deep sea [2]. Some 60 species in five genera have been described from the tropical West Pacific Ocean and recent descriptions of Indo-Pacific zoanthids are from Hawaii [3] and Madagascar [4]. During 1979 and 1980, a collection of Zoanthidea was obtained from fringing reefs in the southwest of Viti Levu, the main island in the Fiji group, and from offshore reefs in the southeast. The collection was supplemented by further sampling in Fiji and Australia in 1982. However, the taxonomy of zoanthids have been problematic due to difficulty in correct identification, caused by larger amounts of intra specific variations [1,5], a lack of viable morphological characteristics that are easily examined and difficulty in internal examinations due to sand encrustation [6, 7]. The knowledge on their diversity and biogeography still exists at basic levels. Two species of *Isaurus* (*I. tuberculatus* and *I. maculatus*) have been found in Fiji but only in the wave break zone of the reef front or the outer sections of the passes.

The earliest record of zoanthids from Indian coast is from Okhamandal coast [8] of India. The coast of Gujarat is having a very long coastline mainly featuring the rocky areas which richly favours the growth of Zoanthids. The substratum and sedimentation in the Saurashtra region is also favourable for such Zoanthids and their growth has increased in past few decades [7, 9, 10, 11].

The research on the sub order Brachycnemina is done mostly which forms large colonies on intertidal and shallow reef crests [12, 13]. The Order Brachycnemina includes three families. The family Sphenopidae includes sand encrusted and colonial most commonly found zooxanthellate *Palythoa* and the solitary *Sphenopus* known only from a handful of areas, the family Neozoanthidae is monogeneric and monospecific and known only from Madagascar region and the third family Zoanthidae which does not show encrustation and is currently represented by three genera: *Zoanthus*, *Acrozoanthus*, and *Isaurus* [14]. *Palythoa* and *Zoanthus* are the most commonly found genera

common in the coral reefs and are very much studied for the research for the bioactive compounds found in them like Palytoxin from *Palythoa* [15] and fluorescent proteins and other bioactive compounds from *Zoanthus* [14, 15].

The genus *Isaurus* is generally found in intertidal zone from shallow subtropical and tropical waters. *Isaurus* spp. occurs in varied colours and forms and is found as individual polyps attached to the rocks. This genus is found mainly from Western Central Atlantic and Southwest Pacific regions [3, 5, 14] Three species of the genus *Isaurus* have been described. However, we have observed two species of it, viz., *Isaurus tuberculatus* and *Isaurus maculatus* (Gray, 1828). It is known to prefer a rocky shore habitat which faces open ocean and usually difficult to access. However, in the current study we found this genus in open rocky intertidal area. In India, however, there has been no record of this genus and we tried to work on its diversity and distribution based on morphological characteristics.

MATERIALS AND METHODS

The organisms were identified in the rocky intertidal coast of Veraval and Sutrapada during the study of the macro benthic diversity and density during February to August 2013. The organisms were photographed in situ using digital camera before collection and the images were used to characterize external morphological characters. Specimens of the organisms were collected and preserved using proper techniques for further studies. The photographs taken were also sent to a leading scientist for observation of the specimen. GPS locations were noted down using in built GPS device in the camera (Table - I).

RESULTS AND DISCUSSION

The status of *Isaurus* is separate from *Zoanthus* and somewhat confusing when examining past literature. Many researchers placed nominal *Isaurus* spp. samples in *Zoanthus* and even in more recent literature the extreme similarity in external morphology between *Zoanthus praelongus* and *I. maculatus* has been noted [14]. *Isaurus* has been defined to be different from *Zoanthus* by having recumbent, non-erect polyps (although *Z. praelongus* and *Isaurus* share this characteristic) and the presence of tubercles on the polyps (absence in *I. cliffoni*), but otherwise share many morphological characters e.g., not sand-encrusted, zooxanthellate, colonial, generally “liberae” polyps with *Zoanthus*, making phylogenetic placement of this genus as separate to *Zoanthus* open to speculation. Recent genetic studies investigating the genera *Zoanthus* and *Palythoa* [12] have demonstrated that relatedness in many zoanthids is difficult to judge based solely on morphology. This is largely due to zoanthids often being very plastic with regards to their external morphology (polyp and colony shape, etc.) [18]. Morphological identification is not sufficient for the complete taxonomic identification of Order Zoantharia so molecular studies are currently investigated [18, 19, 20].

Isaurus is morphologically different from other zoanthid species in exhibiting recumbent, non-erect polyps and presence of tubercles on the polyps with a few exceptions. *I. tuberculatus* specimens show coloration closely resembling the surrounding substratum providing camouflage and making the access difficult to the colonies. Based on these observations, it can be showed that the distribution of *Isaurus* spp. worldwide is widespread than presently believed.

Classification:

Class- Anthozoa

Sub class- Hexacorallia

Order- Zoanthinaria

Sub-order- Brachycnemina

Family- Zoanthidae

Genus- *Isaurus*

The study was conducted in the rocky intertidal areas in Veraval and Sutrapada. The site is more of rocky than sandy stretching very long up to several kilometres. This attention-grabbing finding took place in February 2013 in Veraval (20°49'N and 70°29'E) and in Sutrapada (20°54' N and 70°21'E).

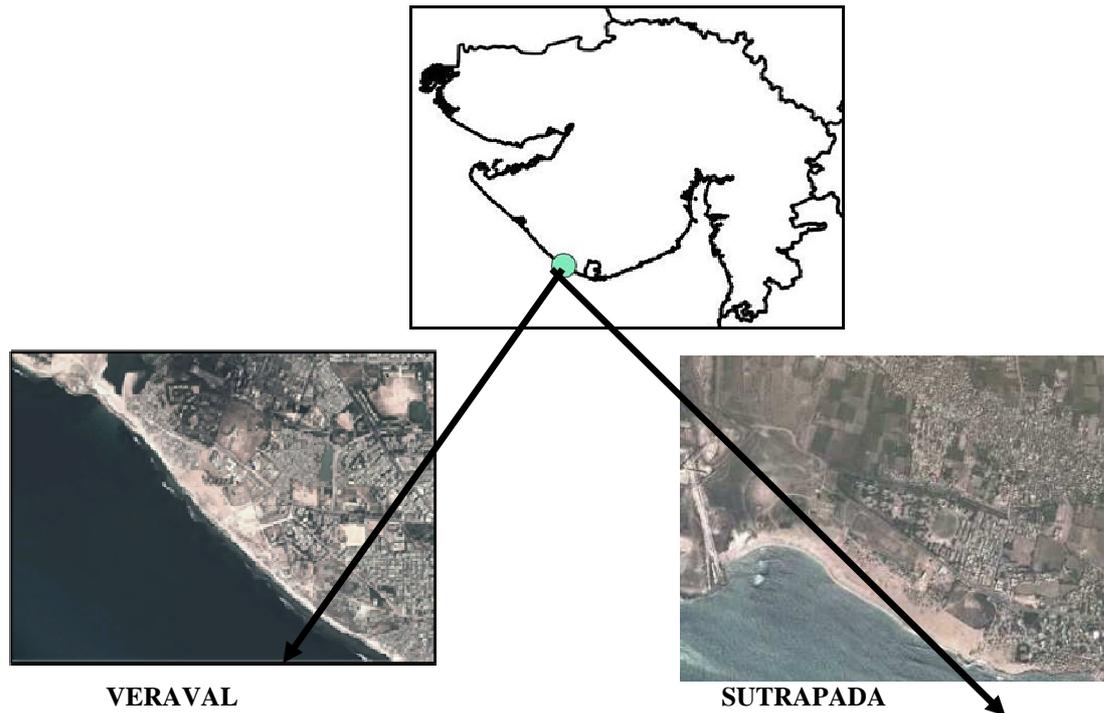


Fig. Satellite images of the sites of Veraval and Sutrapada

Morphological analysis:

Morphological analysis was carried out through examining the external characteristics. *Isaurus* specimens were collected and sectioned. Presence and arrangement of tubercles and also the state of capitalum and scapus was recorded (Table – 1, 2).

Table – 1(Location of sites and morphometry)

		Veraval	Sutrapada
GPS points	Latitude	20.49.54	20.54.37
	Longitude	70.29.15	70.21.3
Measurements of <i>Isaurus tuberculatus</i> ,	Length (cm)	2-5	2-4
	Mesenteries	36-42	36-42

Table- 2(Characteristic features)

Species	Tubercles	Arrangement of tubercles	Capitalum/Scapus
<i>Isaurus tuberculatus</i>	Large	Longitudinal series	Separated by crown tubercles
<i>Isaurus maculatus</i>	Small and numerous	Longitudinal and reticulate series	Not separated by crown tubercles

Isaurus sp. prefers habitats like rocky shores facing the open ocean frequently difficult to access, thus Veraval and Sutrapada is found to have the perfect required substratum. Polyps of *Isaurus* sp. were observed to be green and brown in colour. Small, rough tubercles on the exposed upper surface were observed on some of the polyps. Base of polyps are often white or pale yellow in colour. Polyps are very obscure in appearance, with colour pattern similar to the surrounding substrate. *Isaurus* has recumbent polyps which makes it dissimilar to *Zoanthus* species. The polyps are usually closed during the day time and become upright and open at night [14, 22]. Some polyps may lack tubercles.

Colony size is of approximately 30 cm with around 50-70 polyps in a single colony (Fig. 1), and around 25 feet from the shore up to 2 meters. Polyps average approximately 3-4 cm in length, though smaller and larger polyps are common. Fig. 2 shows *Isaurus tuberculatus* and Fig. 3 shows *Isaurus maculatus* showing the mentioned characteristic features.



Fig. 1 (Showing colony of *Isaurus* spp)



Fig. 2 (*Isaurus tuberculatus*)



Fig. 3 (*Isaurus maculatus*)

CONCLUSION

The morphological data strongly suggest all *Isaurus* specimens examined in this study are conspecific, *Isaurus tuberculatus* and *Isaurus maculatus*. Our results support the hypotheses previously suggested that *I. tuberculatus* and *I. maculatus* has considerable intra specific morphological variation (in particular external coloration) [14, 23]. Despite the apparent low species diversity of *Isaurus* specimens here, our results also highlight the morphologically variable and cryptic nature of *Isaurus* spp., and suggest that this genus may be more widespread than previously believed.

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