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Predatory association of *Aeolidiopsis* sp. on *Palythoa mutuki* (Haddon and Shackleton, 1891) along Gujarat coast, India

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Short communication

Abstract

A predatory relationship between the nudibranch belonging to the Family Aeolidiidae, *Aeolidiopsis* sp. and a zoanthid - *Palythoa mutuki* was recorded from coastal waters of Veraval, Gujarat, India. This is the first record of nudibranch predation on Zoantharians along Indian waters. The *Aeolidiopsis* sp. of nudibranch was found alive, attached and feeding on the colonies of *P. mutuki* in coastal waters. Observations in controlled environment also revealed metabolic dependence of the nudibranch on the host. The nudibranch was seen completing its life cycle in the host, as its eggs were observed, laid in concentric ring pattern and the presence of the juveniles. These observations and the existing knowledge of them harbouring zooxanthellae make the *Aeolidiopsis* sp. to be categorised as a facultative ectoparasite instead of a predator.

Keywords: Predation, parasitism, ectoparasite, nudibranch, zoanthid

Introduction

Zooxanthellate zoantharians (Anthozoa: Hexacorallia: Zoantharia) are a group of marine benthic cnidarians, which are known to play an important ecological role in many marine ecosystems (Santos *et al.*, 2016). Mainly inhabiting the intertidal rocky shores along with the corals and other benthic biota, they are less studied due to their intraspecific morphological variations and high level of morphoplasticity, causing difficulty in their taxonomic characterization (Burnett *et al.*, 1997; Reimer *et al.*, 2004; Ong *et al.*, 2013). However, despite being a neglected taxon, its ecological importance and the association with other organisms cannot be ignored (Harris, 1973; Swain and Wulff, 2007; Sun *et al.*, 2014). Studies by Belford and Philip (2011) and Kumari *et al.* (2015) highlighted the hardiness of the species under present climatic variability over their famous scleractinian cousins. Yang *et al.* (2013) demonstrated the rapid and aggressive growth of *Palythoa tuberculosa* under stressed conditions, while the consequence of reef phase shifts from corals to zoanthid dominant communities has been documented by Cruz *et al.* (2015). These studies indicate the need for further in-depth analysis on the diversified role played by zoanthids in maintaining and managing coral reef ecosystems. The present study highlights one such ecological concern, where the zoanthid

species *Palythoa mutuki* was seen infested by *Aeolidiopsis* sp. The study forms the first record of predatory association by the nudibranch on zoanthid species along Indian subcontinent.

Material and methods

Samples of zoanthid specimens were collected from the intertidal rocky shores of Veraval (20.910°N, 70.351°E) during regular field visits (Fig. 1). A colony size consisting of 10-15 polyps, were separated and kept under observation. The colonies were closely observed on a daily basis for a period of one month. Identification of zoanthid and nudibranch was carried out based on taxonomic characters following Rudman (1982), Häussermann (2004), Reimer *et al.* (2007, 2008, 2009 and 2010) and Gosliner *et al.* (2015).

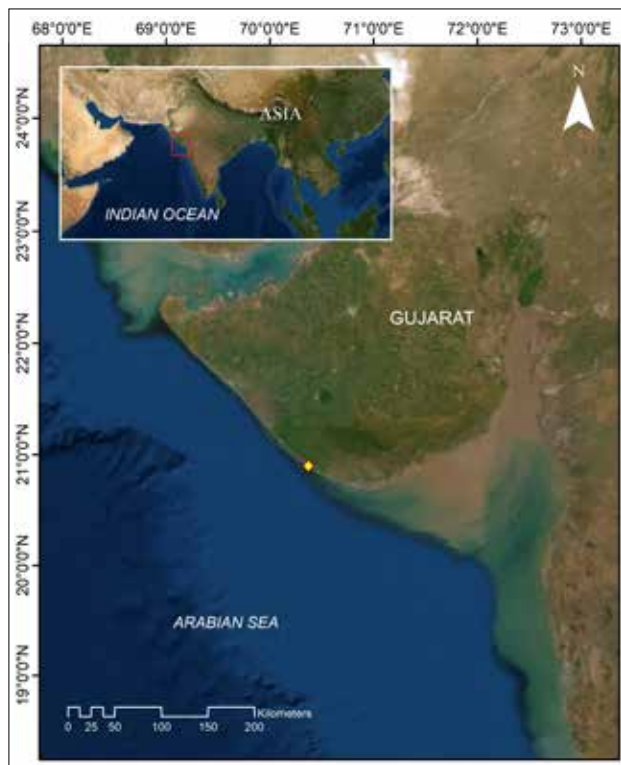


Fig. 1. Map showing the location of sample collection (source: ArcGIS 10)

Results and discussion

Based on the identification keys, the zoanthid species was identified as *Palythoa mutuki*. The observations suggested an association which displayed both ectoparasitic as well as predatory nature of the nudibranch *Aeolidiopsis* sp. with the *Palythoa mutuki*. The *Aeolidiopsis* sp. was found to inhabit the polyp stem (Fig. 2). Further observations revealed the occurrence of *Aeolidiopsis* eggs on the *Palythoa* polyps. Eggs were laid in concentric ring pattern across the head region, a character unique to the nudibranchs. Newly formed juvenile *Aeolidiopsis*

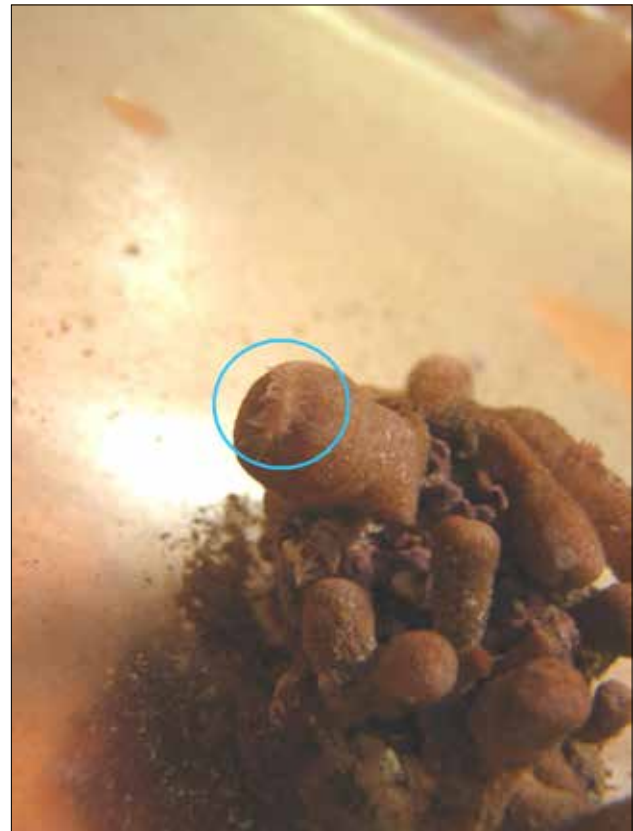


Fig. 2. Photograph of the nudibranch feeding on the *P. mutuki* colony

were also noticed on the colonies, which were feeding on the host pointing to a parasitic relationship (Fig. 3). The polyps infected by the nudibranchs were found to constrict their body as a response. However, in some instances an increasing numbers of nudibranchs attacked the closed polyps leading to an inability of the polyps to open up for days, eventually causing death.

Nudibranchs of the phylum Mollusca are shell-less organisms that are famous for their vibrant body color (Karuso and Scheuer, 2002) and enjoys a cosmopolitan distribution (Debelius and Kuitert, 2007). Family Aeolidiidae, with around 11 known genera, is under the Subclade Nudibranchia of Class Gastropoda. Members of Nudibranchia are characterized by an elongated and tapering body with no distinct gills. Eventhough gills are absent, they possess specialized appendages called cerata on their dorsal region for respiration. Nudibranchs are well known for their predation on ascidians, bryozoans and cnidarians (McDonald and Nybakken, 1978). Most of these slugs mimic the color of their prey, some even the shape of the polyps of the prey (McDonald and Nybakken, 1999; Avila *et al.*, 1999; Smith and Gosliner, 2003, 2005; Wyeth *et al.*, 2006; Debelius and Kuitert, 2007).

According to the published records, nudibranchs enjoy a wide variety of prey species but many depend on one major



Fig. 3. *Aeolidiopsis* eggs on the anterior polyp stem

species (Todd *et al.*, 2001). Their diet includes anemones, corals, octocorals, zoanths (McDonald and Nybakken, 1991; Carmona *et al.*, 2013). The nudibranchs also have added benefit as they are acquiring energy from the organic matter produced by the zooxanthellae which shares a symbiotic relationship with the main prey species (McFarland and Muller-Parker, 1993). Therefore, it can be suggested that the *Aeolidiopsis* sp. might be a facultative ectoparasite on *P. mutuki*.

The ability to consume nematocysts while preying on cnidarians and storing the nematocyst in specialized structures called cnidosacs makes the nudibranchs as one of the dominant predator against cnidarians, which have their own natural defence mechanism (Greenwood and Mariscal, 1984; Conklin and Mariscal, 1977). Reports on the damage caused by nocturnal nudibranchs feeding on Caribbean corals have been well reported by Vermeij (2010), while reports on consumption of a zoanthid anthozoan by tritoniid nudibranch have been recorded by Bertsch *et al.* (2009). Perez *et al.* (2005) have reported the presence of juveniles of nudibranchs under the mats of *Palythoa caribaeorum* off Brazil waters. Studies by Chakravarty *et al.* (2016) has reported the association of nudibranchs with the zoanthid species of *P. mutuki* and *Zoanthus sansibaricus* along rocky shores of Visakhapatnam, India, however, the nature of

the relationship was not explained by the authors. The present study surmises the existence of a parasitic relationship between the *Aeolidiopsis* sp. and *Palythoa* sp. Studying the host-parasite interaction, mode, mechanism and effects of interaction between the two, is out of the scope of the present study, however further phylogenetic and ecological research in the same direction will be beneficial in establishing the host-specific relationship.

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