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Short Communication

Tube dwelling gastropod an indicator of coral reef status at the tropical reef of Palk Bay region, southeast coast of India

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Porites coral colonies at Olaikuda reef, Palk Bay region were observed with pink spot and covered with mucus. Close examination of these spots revealed the presence of polychaete tubeworm and vermitid snail. The polychaete worm made aberrant growth with pink spot and this would change the growth pattern or morphology of coral colonies. In addition to that, mucus produced by vermetid snail stressed the corals in the Palk Bay region by covering the corals with their sediment trapped mucus. This is the first report of stresses imposed by coral associates on coral colonies from the Indian waters. The presence of tube dwelling vermetid snail, the stressor factors could be an indication to understand the health status of coral reefs.

[**Keywords**: Coral associates, Coral stress, Olaikuda, Palk bay, Pink spot, Vermetid]

Introduction

Coral reefs are ecologically rich habitats that provide a range of ecosystem services including coastal fisheries, protection against coastal erosion, storms, tsunamis, and rising sea levels[1]. Many organisms live in close association with corals and create a distinct array of direct species interactions. These interactions have broad-ranging effects, sometimes resulting in competitive interactions among co-occurring populations, this at times, alter the growth and productivity of corals[2-4] as many of the coral associated organisms stress the corals to some extent[5,6].

Palk Bay area has fringing type coral reefs and is approximately expanded to a length of seven kilometres near the northern side of the Mandapam coast[7]. The corals of Palk Bay were severely degraded due to intensive fishing, algal turf and macroalgal colonization[8] and are generally under threat due to climate change. In the present study, we have reported the negative interaction of tube dwelling vermitid snail on coral colonies in Olikuda reef, Palk Bay region. The occurrence of vermitid snails in the coral reef ecosystem could be an indication to understand the health of the coral reef status.

Materials and Methods

Underwater survey was carried out as part of biodiversity assessment at Olaikuda reef (9°18'23.65" N, 79°20'02.91" E) Palk Bay, on 24th October 2019. During the survey, the *Porites* coral colonies were observed with bright pink spots. Bright pink pigmentation can appear on the surface of scleractinian coral colonies owing to the occurrence of a red fluorescent protein in compromised tissues involved in cytotoxic defense mechanism as result of immune response to various infections[9-11]. Pink spots on *Porites* colonies were recently reported from the Indian waters and it was considered as "*Porites trematodiasis*", the disease caused due to infection of digenetic trematodes[11-14]. In contrast to that, Benzoni *et al*.[15], recorded a similar pattern from south Yemen waters and a detailed examination revealed the pink spots with swollen coral tissue and a barnacle's cirri. This, however, confirmed that the pink spots are developed as a result of the immune response to the mechanical and chemical stress caused by the cirriped larva settling on the live *Porites* species. Similarly, in the present study, pink spots, and tissue aberrations (Fig. 1a) were recorded on the *Porites* colonies at Olaikuda reef region.

Results

The coral colonies were observed with tube-dwelling vermetid snail (*Dendropoma* sp.; Fig. 1b) and pink spots with stout cones at the centre. Polychaete tubes were occasionally observed at the apex of the cones, however, some had been overgrown by new corallites. This interprets the aberrant growth was perhaps formed by the polychaete worms on the *Porites* colonies. Similar growth form due to polychaete infestation on *Porites* and *Cyphastrea* colonies was earlier reported from Red Sea[16] and this acute stage of skeletal deformation would change coral growth pattern or morphology and make species

identification challenging. In addition to that, copious mucus threads were seen on the *Porites* coral colonies. *Dendropoma* sp. is sessile gastropods, produce rugged and sticky mucus nets and feed on the particle attached to it at regular intervals[17,18]. The *Porites* coral colonies at Palk Bay region were found covered by the mucus strands secreted by vermetid snails in which sediments were trapped (Fig. 1d & e).

Discussion

The detrimental impact of vermetids and sediment deposit on coral development was likely driven by an 'adhesion' mechanism, in which vermetid mucus merged with sediments to form a formidable web-like pattern[19]. The link between vermetids and growth of coral may vary geographically or temporally, due to the variation in vermetid population density, sedimentation, nutrients, water flow, or the local coral microbiome[6]. However, Shima *et al.*[20,21] reported the interaction among vermetids and corals and suggested a possibility of reduced coral cover and anomalies in coral morphology by impairing photochemical competence, lower growth rates of specific portions of a coral tissue and induce a smoothed colony morphology. Researchers further documented that the vermetids also have an impact on the growth of *Montopora* spp. and *Pocillopora* spp. next to *Porites* spp.[22,23]. Similarly, a spionid polychaete *Polydora villosa* is found building burrows inside the living corals in the Penghu archipelago, Taiwan[24]. The observations made in the present study and earlier experimental studies assume that the vermetid snails mostly harm coral performance[16] and they could be an indicator of coral reef status at the tropical reefs.

The SST data[25] of the National Environmental Satellite Data and Information Service (NESDIS)

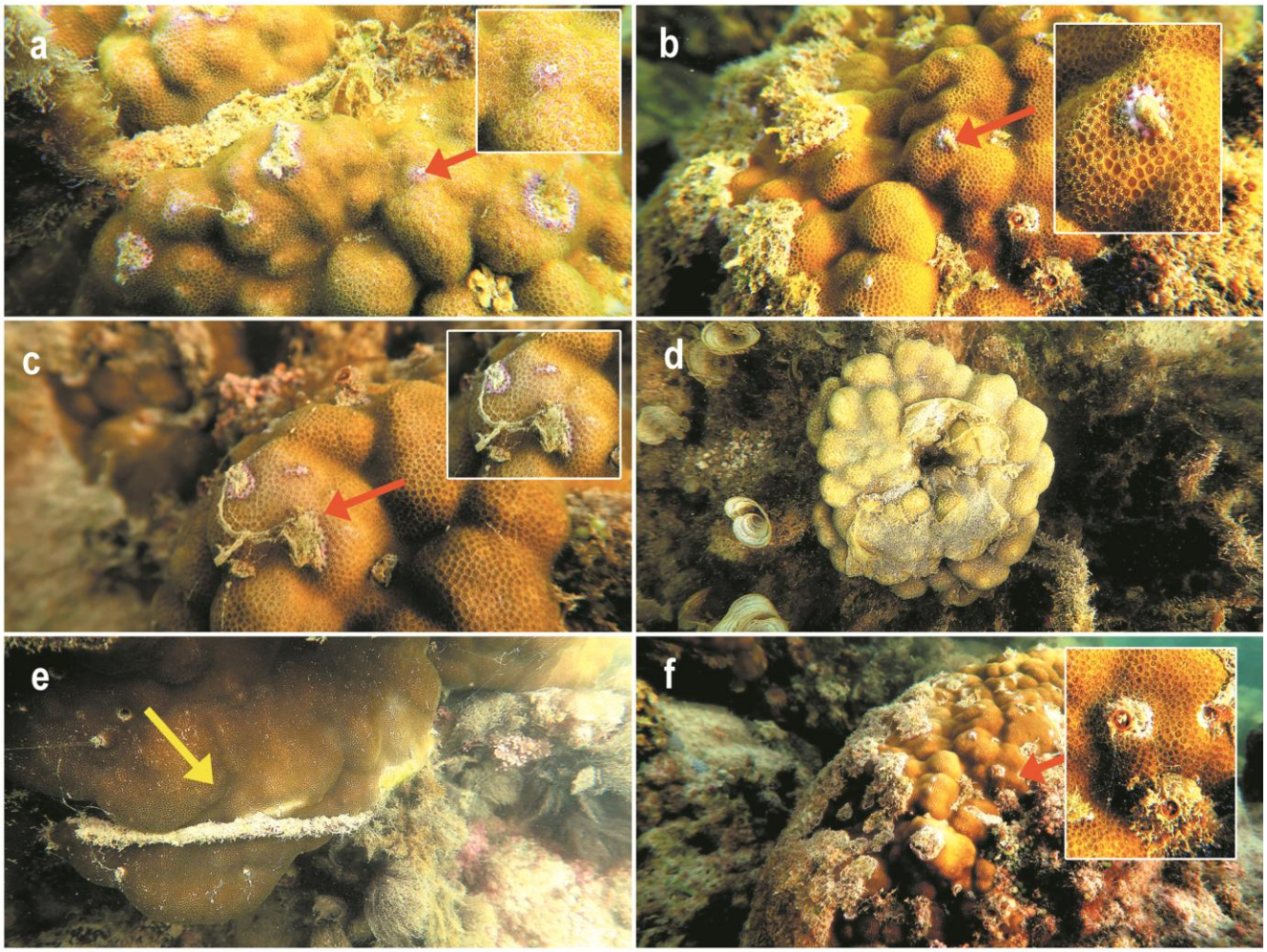

Fig. 1 — a) *Porites* colony with pink aberrant growth and stout polychaete cone; b) tube-dwelling vermetid snail; c) Mucus secreted by vermetid snail; d) The mucus of vermetid snail covered the top position of a *Porites* colony; e) Mucus thread with sediment; and f) Stressed coral with algal assemblage and vermetid snail tubes

revealed 1 – 2 ℃ increase above normal in the southeast coastal region of Indian waters during the past six months which also would induce the stress level of coral reefs at Palk bay region. The environmental factors may favor to have adverse interactive effects even when individual effects are not measurable. These signs indicate that the coral reef ecosystem in the bay region is under stress and if the situation is prolonged, there could be a phase shift in the Palk bay reef ecosystem. This study also suggests improving our understanding on the ecological role of vermetid gastropods, and the mechanisms and their relations with corals. This finding would also be a lead to quantify the interaction status of corals and their associates.

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Conflicts of Interest

The authors declare that there is no conflict of interest.

Author Contributions

All the authors have contributed during the fieldwork and manuscript writing.

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