

## **Research Article**

### **A report on some symbiotic shrimps (Crustacea: Decapoda) from the Andaman and Nicobar Islands, India**

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**Abstract:** Symbiotic shrimps (crustacean) were searched for on invertebrates such as sea anemones (Actiniaria), Hard corals (Sclerectinia), horny coral (Gorgonaria), black coral (Antipatharia), *Coriocella nigra* (Mollusca), Star fish and sea urchins (Echinodermata) in the Andaman and Nicobar Islands. Fourteen species of invertebrate associated shrimps belonging to 10 genera and 6 families were recorded from this region and two invertebrate hosts (*Coriocella nigra* Blainville, 1824 and *Actinodendron glomeratum* Haddon, 1898) were also newly observed in the Andaman and Nicobar Islands as well as in India.

**Keywords:** Decapoda, symbiosis, Invertebrate, Andaman and Nicobar Islands.

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#### **INTRODUCTION**

A symbiotic life style is one of the greatest environmental adaptations of marine crustaceans [1]. Although most symbiotic decapods inhabit their host as solitary individuals or as a mated pair [2], there are also records of the occurrence of aggregations of individuals in a single host [3]. The symbiotic decapods are small and strikingly colourful. Caridean shrimps are common with a variety of other animals. For example, *Lysmata*, *Periclimenes* and *Stenopus* species are described as cleaners of fish parasites [4- 6]. They are also associated with invertebrates such as sea anemones, black coral, horny coral, bivalves, and sea urchins in tropical and subtropical waters [7- 10]. Decapods associated with other invertebrates may seek protection, food, a reproductive mate or all of these features [3]. The present work involved the examination of decapod crustaceans that are associated with invertebrate hosts in the islands of Andaman and Nicobar Archipelago and such associations were searched for during the expedition from January 2012 to November 2014.

#### **MATERIALS AND METHOD**

Observations were made while SCUBA diving in the area of Andaman and Nicobar Islands at a depth

ranges of 5 – 40 m. The geographic locations of the sampling sites are represented in table – 1. The shrimps were observed along with Echinodermata, Mollusca, Actiniaria, Sclerectinia and Antipatharia of the sub tidal region. The shrimp was collected with the help of a small hand held aquarium net. They were fixed in 10% formalin, diluted with seawater and later transferred to 70% ethanol. Underwater photographs were made with a Canon G15 digital camera. The specimens were deposited in the Natural Zoological Collection of ZSI-ANRC.

#### **RESULTS**

In the present study, 14 species (*Periclimenes soror*; *Periclimenes brevicarpalis*; *Periclimenes imperator*; *Periclimenes tenuipes*; *Rhynchocinetes durbanensis*; *Stenopus hispidus*; *Urocardidella antonbruunii*; *Saron marmoratus*; *Pontonides unciger*; *Thor amboinensis*; *Ancylomenes holthuisi*; *Vir philippinensis*; *Periclimenes psamathe*; *Synalpheus stimpsoni*) of associated shrimps belonging to 6 families and 10 genera were recorded from Andaman and Nicobar Islands, India (Table 1 and Plate 1-3). Details of the relationship between the shrimps and other organisms are given below.

Table -1: Observed and registered symbiotic shrimps with geographical coordinates (Plate 1-3)

S.No	Species	GPS Co ordination		Name of the Place
1	<i>Ancylomenes holthuisi</i> (Bruce, 1969a)	N 13 <sup>0</sup> 18.532'	E 93 <sup>0</sup> 04.314'	Smith Island
2	<i>Periclimenes brevicarpalis</i> (Schenkel, 1902)	N 13 <sup>0</sup> 18.532'	E 93 <sup>0</sup> 04.314'	Smith Island
		N 12 <sup>0</sup> 13.068'	E 93 <sup>0</sup> 01.507'	South Button Island
3	<i>Periclimenes imperator</i> Bruce, 1967	N 11 <sup>0</sup> 35.413'	E 92 <sup>0</sup> 35.715'	Grub Island
4	<i>Periclimenes psamathe</i> Man, 1902	N 11 <sup>0</sup> 34.496'	E 92 <sup>0</sup> 35.655'	Red Skin Island
5	<i>Periclimenes soror</i> Nobili, 1904	N 08 <sup>0</sup> 00.002'	E 93 <sup>0</sup> 24.362'	Katchal Island
6	<i>Periclimenes tenuipes</i> Borradaile, 1898	N 12 <sup>0</sup> 56.172'	E 92 <sup>0</sup> 58.127'	Sound Island
		N 12 <sup>0</sup> 52.673'	E 92 <sup>0</sup> 57.052'	Avis Island
7	<i>Pontonides unciger</i> Calman, 1939	N 11 <sup>0</sup> 34.496'	E 92 <sup>0</sup> 35.655'	Red Skin Island
8	<i>Rhynchocinetes durbanensis</i> Gordon, 1936	N 12 <sup>0</sup> 52.673'	E 92 <sup>0</sup> 57.052'	Avis Island
9	<i>Saron marmoratus</i> Olivier 1811	N 12 <sup>0</sup> 55.511'	E 92 <sup>0</sup> 53.491'	Karlo Island
10	<i>Saron neglectus</i> Man, 1902	N 11 <sup>0</sup> 47.433'	E 93 <sup>0</sup> 05.045'	Sir Huge Rose Island
11	<i>Stenopus hispidus</i> (Oliver, 1811)	N 12 <sup>0</sup> 52.673'	E 92 <sup>0</sup> 57.052'	Avis Island
12	<i>Synalpheus stimpsoni</i> de Man, 1888b	N 12 <sup>0</sup> 00.574'	E 92 <sup>0</sup> 56.809'	John Lawrence
13	<i>Thor amboinensis</i> de Man, 1888	N 12 <sup>0</sup> 13.068'	E 93 <sup>0</sup> 01.507'	South Button Island
14	<i>Urocardidella antonbruunii</i> (Bruce, 1967)	N 12 <sup>0</sup> 13.068'	E 93 <sup>0</sup> 01.507'	South Button Island
		N 11 <sup>0</sup> 34.496'	E 92 <sup>0</sup> 35.655'	Red Skin Island
		N 12 <sup>0</sup> 52.673'	E 92 <sup>0</sup> 57.052'	Avis Island
15	<i>Actinodendron glomeratum</i> Haddon, 1898	N 12 <sup>0</sup> 07.608'	E 92 <sup>0</sup> 57.617'	Wilson Island
16	<i>Coriocella nigra</i> Blainville, 1824	N 12 <sup>0</sup> 13.068'	E 93 <sup>0</sup> 01.507'	South Button Island
17	<i>Antipathella subpinnata</i> (Ellis and Solander, 1786)	N 11 <sup>0</sup> 34.496'	E 92 <sup>0</sup> 35.655'	Red Skin Island
18	<i>Pleurogyra sinulosa</i> (Dana, 1846)	N 12 <sup>0</sup> 52.673'	E 92 <sup>0</sup> 57.052'	Avis Island



PLATE-1



PLATE-2

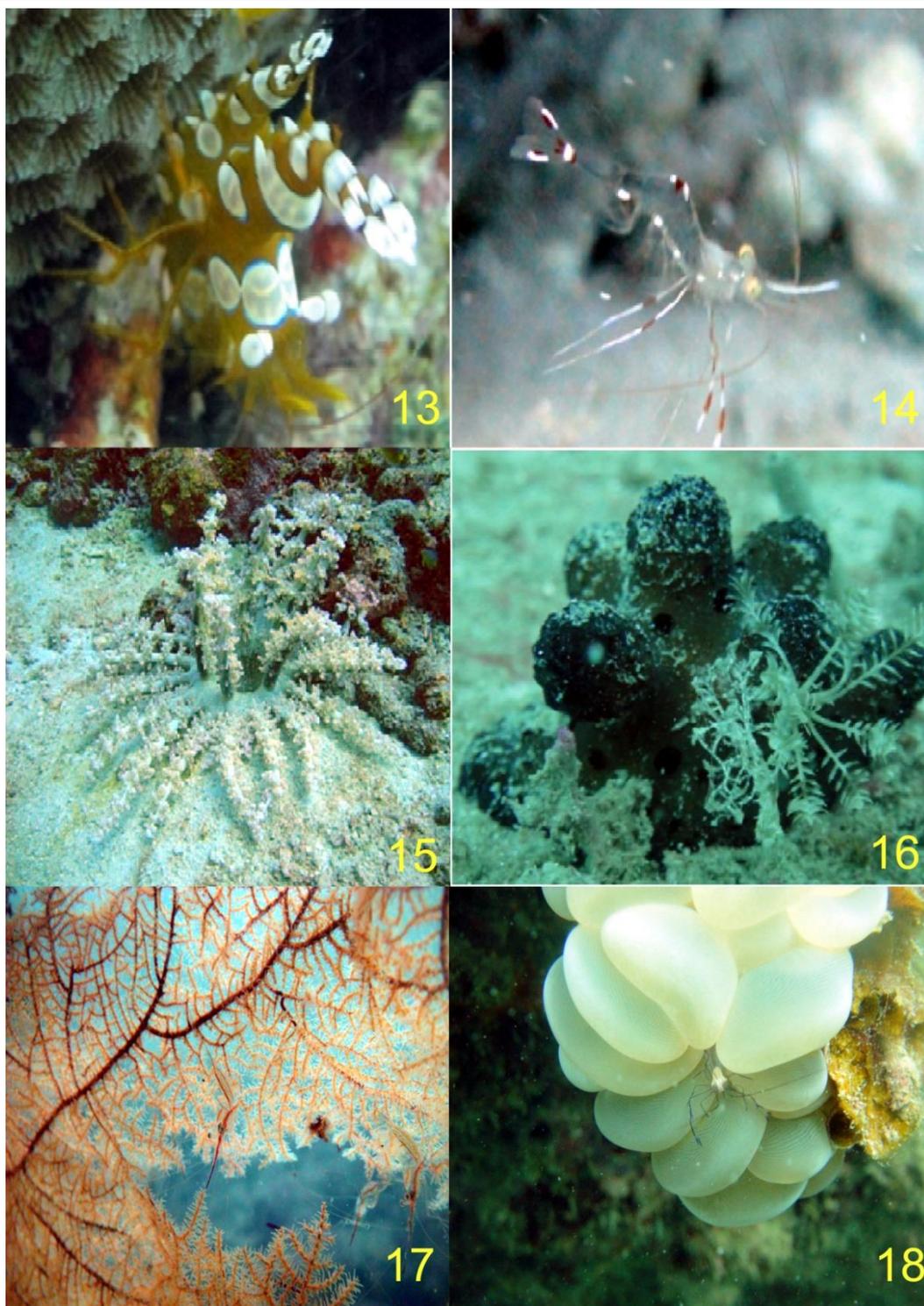


PLATE-3

#### Association with Echinodermata

*Periclimenes soror* was commonly found on the cushion star (*Culcita novaeguineae*) at 2 m to 20 m depth. The body is thinner, but the colouration is similar to *Periclimenes imperator*. The body colour varies with that of the host, tan to deep purple. The rostrum is large with 10 – 11 teeth along the upper edge.

*Synalpheus stimpsoni* reported on the sea urchin *Astrophyga radiata* in South Button Island was found at 20 m depth as a pair living and hiding on the host.

#### Association with Mollusca

*Periclimenes imperator* was found on *Coriocella nigra* in Grub Island at 12 m depth. The head has a flattened, broad duck bill appearance,

created by the very wide lamina of the antennal scale. The tiny rostral spine (30-36) gives a smooth appearance. The colour varies widely depending on the host. Most have a broad creamy white dorsal stripe extending from rostrum to tail. The chelipeds are tipped in purple. The ornamental colouration on the body, whether dispersed evenly over the body as on specimens living on cucumber hosts. This species is commonly found on several hosts including the nudibranchs, sea cucumbers and sea stars.

#### Association with Actiniaria (Anemone)

*Actinodendron glomeratum* a large sea anemone was occasionally encountered at South Button Island, from 20 m depth. The shrimps *Thor amboinensis*; *Periclimenes tenuipes* and *Periclimenes brevicarpalis* were observed to be associated with this host anemone.

*Thor amboinensis* a small yellow, brown shrimp, it has a saddle of large opalescent spots on its thorax and abdomen. These spots are encircled by a thin purple outline. Similarly colored spots occur at the base of and on the tail, on the abdominal plates and on the eye stalks. Individuals hold their tails almost vertically. Usually observed in pairs, but we find more than six individuals on a single host of anemones and corals.

*Periclimenes tenuipes* is a transparent species with a very long rostrum and long chelipeds. The rostrum bears 8-10 spines on its upper edge and 6-9 spines below. There is a white line connecting the eyes. The chelipeds are tipped in orange. Generally observed all the places and free living species, living in holes and crevices, sometime found in sea anemones. *Periclimenes brevicarpalis* found in association with sea anemones. Distinguished by large white spots, the spot on the head, giving the appearance of a wart or hunchback. The tail has five large black spots with orange centers.

#### Association with Sclerectinia (Hard Corals)

*Rhynchocinetes durbanensis*, lives deep in crevices and holes of coral reef. It usually occurs in large numbers together in the reef area. The rostrum is longer one comber with *Rhynchocinetes uritai*, the rostrum bears spines along the entire upper edge, culminating with 9 -10 tightly spaced spines at its tip and 16-18 spines along the underside. The species also differs by the bold red and white patterns on the body. The white inner line of the red stripe is not broken and very bold, as wide as the red lines.

*Stenopus hispidus* is found to depths of 15m in crevices. The third pair of thoracic legs forms very large chelipeds, and the body is covered with spines. The red and white bands on the body and chelipeds are distinctive.

*Saron marmoratus* is a nocturnal species, usually found in protected lagoons of fringe reefs at 10 m depth. Also very cryptic in coloration, the body is brown with numerous green spots over the body. These spots contain varying number and intensities of white specks. Beginning at the base of the large spiny rostrum there is a series of tufts of long cirri down the back. The antennae, legs and chelipeds are banded with two – tone brown and white speckled bands.

*Ancylomenes holthuisi* is found on a bubble coral (*Physogyra lichtensteini*), also in sea anemones and the upside down jellyfish *Cassiopea*. It is transparent with deep blue spots which contain varying degrees of white at the center. Eye bright red, the legs are transparent. The chelipeds are banded blue purple and red streaks on the abdominal hump.

*Urocardidella antonbruunii* is also found in the holes and coves of coral reefs, where it seems to float motionlessly in the water column. It is a transparent shrimp with a long slender rostrum, which exceeds the length of the antennal scale by about ½ its length. The body is covered with white bands.

*Vir philippinensis* are associated with live bubble coral of *Plerogyra sinuosa*. This transparent species is easily identified by its purple antennae and the purple line down each leg and cheliped and down the center of the body as well as its exclusive occurrence on bubble corals at 2 to 20 m depth.

#### Associated with Antipatharia (Black Corals)

*Periclimenes psamathe* were encountered on *Antipathes elegans* and also gorgonians at 15 to 30 m depth. This very transparent species bears a red spot on the hump in the abdomen. There are six spines on the dorsal surface of the rostrum.

*Pontonides unciger* Calman, 1939 is associated with whip corals, especially *Sticopathes solorensis* at 15 to 30 m depth. This is easily identified by its unique color pattern, which the polyp of the black coral on which it lives. This species has a well developed rostrum bearing 8-10 spines and lacks the large humps on the thorax and abdomen. The body is usually ochre with lighter patterns. Females are reported to be lighter in colour.

#### DISCUSSION

The nature of the relationship between symbiotic shrimp (Decapod) and other Invertebrates is poorly studied. The shrimp is perhaps more closely associated with invertebrates. The shrimps probably benefit from the relationship by seeking shelter among the host invertebrates, which mostly likely provide an efficient defensive shield from most potential predators. The shrimp and invertebrate relationship is clearly facultative rather than obligatory commensalism. The association between the host species depends on the

size and density of the host species that determines the social structure of the symbiont [11- 13]. Very few species of symbiotic shrimps (Decapod) on different host invertebrates like Hydrozoa, Antipatharia, Alcyonaria, Gorgonian, Actiniaria, Scleractinia, Corallimorpharia, Mollusca, Crinoidea, Echinoidea, Asteroidea, Holothuroidea and Ascidacea [14- 20] have been reported.

During the study period, 14 species under 10 genera and 6 family of symbiotic shrimp were recorded from different invertebrate host of Andaman and Nicobar Islands, India. *Periclimenes soror* is mostly associated with cushion star (*Culcita novaeguineae*), *Synalpheus stimpsoni* with Sea urchin (*Astrophyga radiata*), *Periclimenes imperator* is associated with *Coriocella nigra* (Mollusca), *Thor amboinensis*; *Periclimenes tenuipes*; *Periclimenes brevicarpalis* are mostly observed on sea anemone, some times it is observed on different host invertebrates including live coral. In the coral reef environment we observed few species (*Rhynchocinetes durbanensis*, *Stenopus hispidus*, *Saron marmoratus*, *Ancylomenes holthuisi*, *Urocardidella antonbruunii* and *Vir philippinensis*) on crevices, holes and bobble corals. The species of *Periclimenes psamathe* and *Pontonides unciger* are mostly observed on black corals (*Antipathes elegans*, *Sticopathes solorensis*). More extensive surveys in deeper waters of Andaman and Nicobar Islands may reveal more symbiotic shrimp species.

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