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A PARTHENOPID CRAB, *ZEBRIDA ADAMSII* WHITE, 1847 INHABITING INTERSPACES OF SPINES OF THE SEA URCHIN, *SALMACIS VIRGULATA* L. AGASSIZ, 1846

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ABSTRACT

Association of a parthenopid crab, ***Zebria adamsii*** White with the echinoid ***Salmacis virgulata*** L. Agassiz, ezisting at 18-20 metres depth along the Madras sea coast is reported. Systematics and distribution of the echinoid hosts and its crustacean associates are noted. ***Z. adamssi*** is recorded for the first time from the Bay of Bengal. Field and laboratory observations revealed that the movements of tha crab in between the spines of the echinoid host cause minor damages to the spines at base.

INTRODUCTION

Whilst collecting marine fauna in the inshore regions of the Madras coast, on board R. V. Chota Investigator during December 1975 to August 1977, an interesting relationship between the parthenopid crab, *Zebrida adamsii* and host sea urchin, *Salmacis virgulata* was observed. The details of this association together with some experimental laboratory observations on the associates, and previous records of this species of crab from sea urchins are presented in this paper.

MATERIAL

Salmacis virgulata were obtained by operating the bottom trawl net opposite to the Madras University area, where this species of sea urchin occurred in abundance. The host species were examined for the presence of the parthenopid crabs, *Z. adamsii* both in the field and in the laboratory. In the same trawling ground two other species of sea urchins i. e., *Salmacis bicolor* L. Agassiz 1846 and *Temnopleurus toreumaticus* Leske, 1778 also occurred rarely.

OBSERVATIONS

Field observations : Examination of 1171 specimens of the sea urchin, *S. virgulata* during the period December, 1975 to August, 1977 (Table 1) yielded five males and two females of the parthenopid crab, *Z. adamsii*. Among the two females, only one, examined in October, 1976 was found to be ovigerous. It was also noted that the two other species of the sea urchins namely, S. *bicolor* and *T toreumaticus* which were not common in the sea area sampled (9 specimens of the former and 6 specimens of the latter were collected during the entire period of 21 months) did not harbour any specimen of *Z. adamsii*.

TABLE 1. Months of collection with number of host urchins examined and details of the crustacean associate

S. No.	Year & month	No. of Host (*S.virgulata*) examined	No. of crabs (*Z. adamsii*) observed	Sex of the crustacean associate	Width of the carapace (in mm.)
1.	December, 1975	25	1	♂	8.5
2.	January, 1976	58	—	—	—
3.	February	42	—	—	—
4.	March	120	—	—	—
5.	April	220	2	♂ ♂	7.0
6.	May	85	—	—	—
7.	June	62	—	—	—
8.	July	93	2	♂ & ♀	4.0 & 7.0
9.	August	108	—	—	—
10.	September	76	—	—	—
10.	October	31	1	♀ (ovigerous)	11.0
12.	November	18	—	—	—
13.	December	28	—	—	—
14.	January, 1977	—	—	—	—
15.	February	34	—	—	—
16.	March	47	1	♂	6.0
17.	April	—	—	—	—
18.	May	—	—	—	—
19.	June	—	—	—	—
20.	July	—	—	—	—
21.	August	124	—	—	—
	Total	1171	7		

The presence of *Z. adamsii* on the test of *S. virgulata* was mainly towards the oral end. In one association, a visible damage could be observed on the spines of the host, suggesting that the crab which had settled on the test a few weeks earlier had cut the base of the spines (Plate IV-a).

Laboratory experiments : Two sets of animal associations obtained in July 1976 and March, 1977 were kept in separate aquarium tanks containing running sea water in the laboratory. At the bottom of the tank some sand and pieces of shells and rocks were arranged to simulate the conditions of the inshore region. The crab was carefully dislodged and released in the same container. Within one hour the crab had resettled in the same spot from which it was dislodged. It was also noted that no damage to the

spines of the host occurred during the two weeks of laboratory rearing of the associates in the tanks.

Systematic note and distribution of the crustacean associate :

A review of literature of the crabs of the genus *Zebrida* of Indo-west Pacific region reveals that there were two species, i. e., *Z. adamsii* White, 1847 and *Z. paucidentata* Flipse, 1930 (Serene, 1968). However, Suzuki and Takeda (1974) have questioned the validity of the species *Z. paucidentata*. From their point of view, it could be that *Z. paucidentata* which as recorded by Rauthbun (1910) could be juvenile form of *Z. adamsii*, and as such *Z. paucidentata* is to be considered as a synonym of *Z. adamsii*. The genus *Zebrida* is, therefore, a monotypical genus represented by *Z. adamsii*.

This Crustacean species is distinguished by the delicate madder pink of the body with darker (liver coloured) parallel longitudinal bands and alternating streaks on the carapace (Plate IV-b). The carapace is subrhomboidal with the flattened dorsum, the rostrum being formed by two large laminar teeth. The orbit is circular with the inner canthus filled by part of the antennal peduncle. The antennule is folded very obliquely. The chelipeds are stout, equal and short, being armed with laminar teeth. The ambulatory legs are strongly compressed and subchelate with the propodi and dactili. The male abdomen is composed of seven segments. The first male pleopod is shaped like the interrogation mark (Plate IV-c). The colour pattern and frontal and laminar teeth, and the first male pleopod are characteristic of this species.

Z. adamsii has so far been recorded from Japan, Borneo, Gulf of Siam, Torres Strait, Sri Lanka, Gulf of Mannar and coast of Travancore. Its recorded bathymetric range is from 10 to 55 metres (Suzuki and Takeda, 1974).

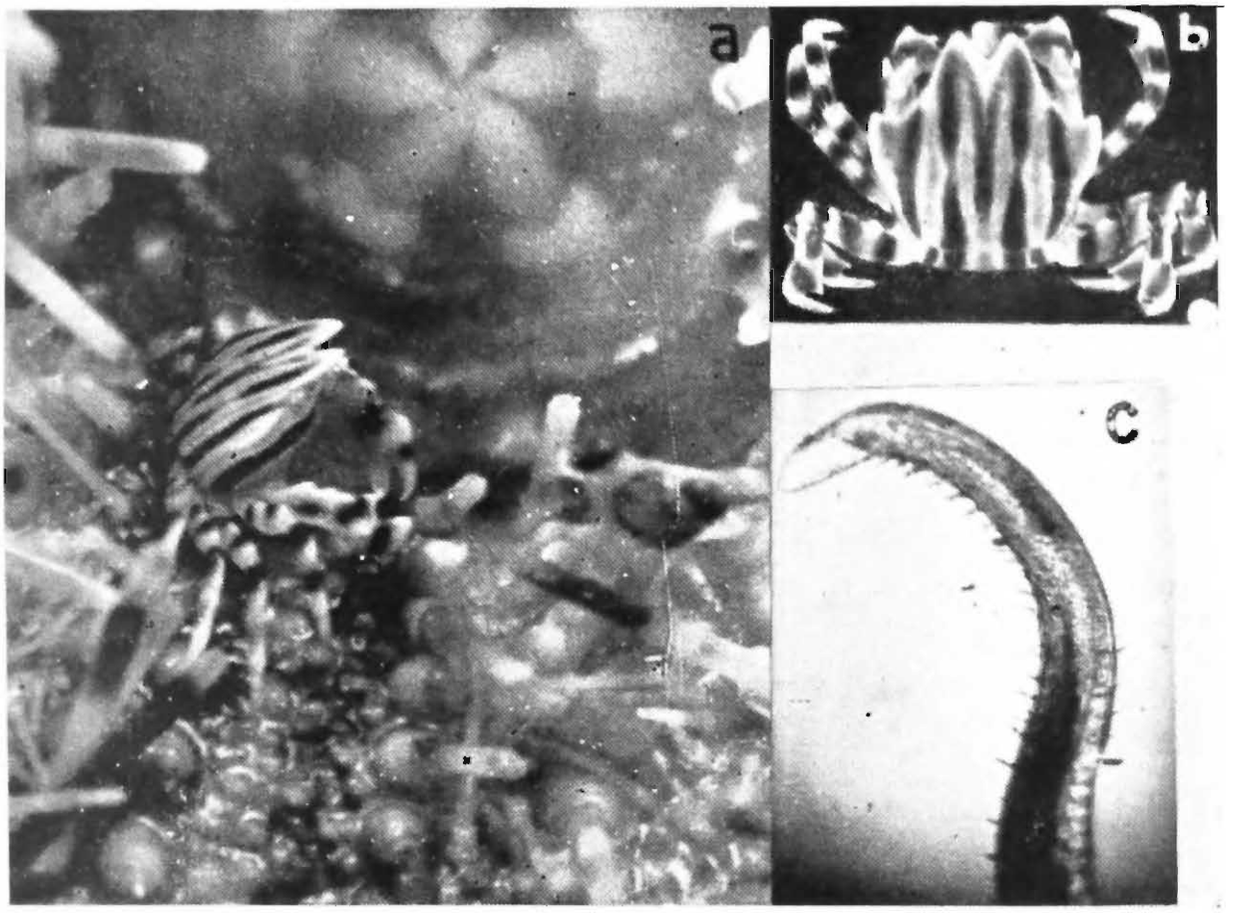
Systematic note and distribution of the echinoid host :

Of the two species of *Salmacis* i. e., *S. virgulata* and *S. bicolor* the former can be identified externally by their purple colour of the primary spines and the high test. Each ambulacral plate bears primary tubercle. The interambulacral plates are separated by distinct sutures. In *S. bicolor*, the primary spines are more or less bright red, with 4–7 narrow yellowish bands. The small spines are red. The primary tubercles occur on every second ambularcal plate. *T. tarumaticus* can be identified by their larger spines (compared to the diameter of the test), which are brown in colour with light to deep irregular bands. The coronal plate bears 1 to 3 primary tubercles.

S. virgulata has so far been recorded from the following shallow-water areas of the Indo-west Pacific regions : Ceylon area, Bay of Bengal, East Indies, Phillippine Island, China and Southern Japan (Clarke and Rowe, 1971).

S. bicolor has so far been recorded from the following shallow-water areas of the Indo-west Pacific regions : Isles of West Indian Ocean, Mascarene Island, East Africa and Madagascar, Red Sea, West India and Pakistan, Maldive area, Ceylon area, Bay of Bengal, East Indies, Phillippine Island, China and Southern Japan. *T. toreumaticus* has so far been recorded from the following shallow-water areas of the Indo-west Pacific regions ; East Africa and Madagascar, Red Sea, South East Arabia, Persian Gulf, West India and Pakistan, Maldive area, Ceylon area, Bay of Bengal, East Indies, North Australia, Phillippine Island, China and Southern Japan

DANIEL & KRISHNAN PLATE IV



a—*Zebrida adamsii* on the host sea urchin, ***Salmacis virgulata*** oral side, showing the damage to the bases of the spines.
b—***Zebrida adamsii*** dorsal view of female.
c—First male pleopod, abdominal view.

and South Pacific Island. (Clarke and Rowe 1971).

Present records :

The parthenopid crab, *Z. adamsii* is recorded for the first time from the Bay of Bengal. No record has been made of this crab in association with sea urchin from the Bay of Bengal. In the present study the animal associates (crab and echinoid) have been collected from 18-20 metres.

REMARKS

The occurrence of the parthenopid crab, *Z. adamsii* has been recorded earlier on other species of sea urchins like *Toxopneustes pileosus* and *Salmacis bicolor* Rathbun (1910), *Anthocidaris crassipina* (Urita, 1926), *Acanthocidaris* sp. (Blass, 1956), *Asthenosoma ijimai* (Doki. 1972), *Tripneustes gratilla* (Yamamoto, 1973, and Suzuki and Takeda, 1974). Yamamoto (1973) observed that *Z. adamsii* changed the host from *T. gratilla* to *Diadema setosum* in the aquarium. This view has been contradicted by Suzuki and Takeda (1974). In our observations on *S. virgulata* and the associate in the aquarium tank for more than two weeks, changing from one host to another, even among the same species was not observed.

Mortenson (1904) considered *Z. adamsii* causing damage to the tube feet of the host echinoid, as due to parasitism. Suzuki and Takeda (1974) decidedly concluded that this crab which is not a commensal of sea urchins was without doubt a parasitic species inflicting minor damages to the hosts. From our present observations it is concluded that the spines of the sea urchins get weakened due to the movement of the crab resulting in the minor damages to the spines at base. It is highly desirable to make further studies on the exact role played by *Z. adamsii* White in causing damages to the spines and tube feet of the sea urchins so as to elucidate the true relationship of the associates. Further the life-history of this crab has to be worked out in detail since this is not known. These two investigations are now in progress at this laboratory.

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