

Pea crab *Arcotheres alcocki* (Rathbun, 1909) as endoparasite of the backwater clam *Meretrix casta* (Chemnitz, 1782)

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Occurrence of *Arcotheres alcocki* (Rathbun, 1909) (synonymous with *Pinnotheres alcocki*) in the mantle cavity of the backwater clam *Meretrix casta* (Chemnitz, 1782) of Bahuda and Rushikulya estuaries (Odisha), east coast of India is reported in this paper. It is the first record of *A. alcocki* occurring as parasite in *M. casta* from Indian coasts and also the first report on the occurrence of pea crab from Odisha coast. Visible damage to the body tissue of the infested clams was noticed which suggests that the clam fishery of this region is susceptible for parasitic attack by *A. alcocki*.

[**Key words:** *Arcotheres alcocki*, *Meretrix casta*, endoparasite, Bahuda estuary, Rushikulya estuary, Odisha]

Introduction

Pea crabs (Class: Decapoda; Order: Brachyura; Family: Pinnotheridae) are small crustaceans represented by several species. Genus *Pinnotheres* (Linnaeus, 1758) is the most dominant genera among the pea crabs exhibiting wide range of distribution. They lead a cryptic mode of life cycle, wherein the adult females remain as obligatory symbiont in many invertebrates¹, while the adult males, taking advantage of their small size, use to leave the hosts and move freely in water as plankton. Juveniles of both the sexes however remain as plankton. Adult *Pinnotheres* females are commonly found as endosymbiont in the mantle cavity many bivalves^{2,3}, branchial chamber of tunicates⁴ and anal cavities of sea cucumbers⁵. They could also occur ectosymbiotically on burrowing shrimps⁶, polychaete worms⁷, echinurans⁸, sand dollars⁹ and sea urchins¹⁰. The association between pea crab and their hosts was initially considered as commensalism¹¹, but later it was recognized as parasitism. It could be so because they use to harm the hosts in many ways.

Studies pertaining to the occurrence, biology and taxonomy of pea crabs in India began in 1950s¹². Silas and Algarswami (1967)¹³ have given an account of parasitic *Pinnotheres* in backwater clam *M. casta* of the Malpe region. George and Noble (1968)¹⁴ have noticed that *Pinnotheres gracilis* and *Pinnotheres modiolicolus* occurred as parasites on the edible clams *Katelysia opima* and *Macrta violacea* of the Karwar coast. Occurrence of *P. alcocki* (now *A. alcocki*) was first reported from Kakinada Bay of east coast of India with

blood clam *Anadara granosa*¹⁵. Despite the fact that Odisha coast harbours large quantities of commercially important bivalves like clams, mussels and oysters where as the presence of pea crabs was never reported earlier. The present paper reports the occurrence of *A. alcocki* as endoparasite on the backwater clam *Meretrix casta* in Bahuda and Rushikulya estuaries of South Odisha coast.

Materials and Methods

The 60 km long coastline of Ganjam district is endowed with two important estuaries namely Bahuda estuary (Lat. 19° 10' N and Long. 84° 20' E) that opens in to the Bay of Bengal near Patisunapur fishing village and Rushikulya estuary (Lat. 19° 22' N and Long. 85° 05' E) near Gokharkuda village. Both these estuaries sustain rich biodiversity and constitute important fishing grounds providing livelihood to the local fisher folk families. Harvests of *M. casta* constitute an important marine living resource of both these estuaries. While the flesh of *M. casta* is used as food by local fisher folk community, the shells are used for lime production.

A survey was conducted to prepare a check list of marine and estuarine mollusks of the south Odisha coast during August 2012–June 2013. During this survey, we encountered the occurrence of the pea crab *A. alcocki* as endoparasite living in the mantle cavity of *M. casta* of both Bahuda and Rushikulya estuaries. It was more abundant during January-February, 2013. 100 live *M. casta* shells were collected from both the estuaries each time and brought to the

Table 1. Size range and distribution of pea crabs in clams of the Bahuda and Rushikulya estuaries

Parameters	Bahuda Estuary			Rushikulya Estuary		
	Min	Max	Mean±SD	Min	Max	Mean±SD
Clam length (cm)	3.6	6.8	4.8±0.9	3.0	4.9	4.0±0.5
Female pea crabs	13			20		
Length (cm)	0.7	1.1	0.9±0.1	0.7	1.1	1.0±0.1
Width (cm)	0.8	1.4	1.1±0.2	0.9	1.3	1.2±0.1
Male pea crabs	1			10		
Length (cm)	-	-	0.5*	0.3	0.6	0.5±0.1
Width (cm)	-	-	0.6*	0.4	0.7	0.6±0.1

*Only one male crab was found in the sample

laboratory for further study. They were opened to locate the presence of pea crabs inside their body cavity (Fig.1). The crabs were removed carefully from the mantle cavity; morphological attributes were examined; size range of each organism was measured, photographed and preserved with 5% neutralized formaldehyde. Based on the detail morphological features such as body colour, shape and size variation of carapace, walking legs and dactylus and propodus length of females and males, identification was made.

Results and Discussion

The female specimens were characterized by their smooth and translucent dorsal carapaces

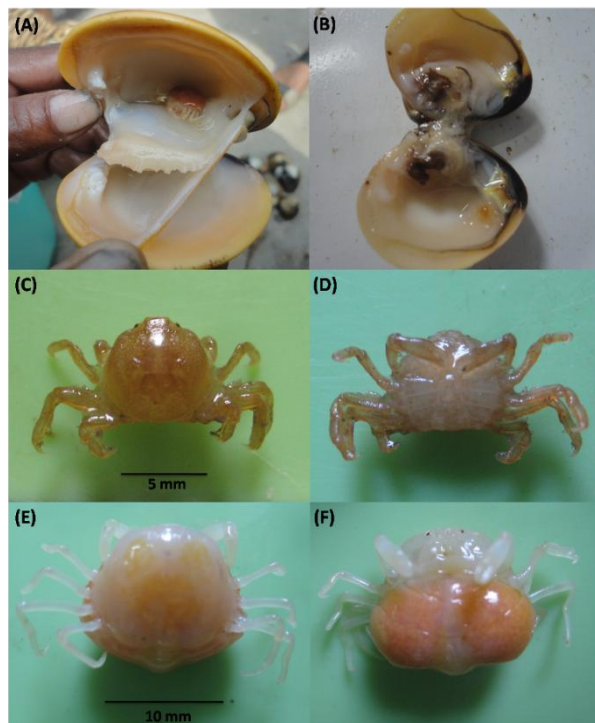


Figure 1. Photograph of pea crab *A. alcocki*: (A & B) A pea crab inside the clam (C) Dorsal view of male crab (D) Ventral view of male crab (E) Dorsal view of female crab (F) Ventral view of female crab with egg mass

through which the inner pink coloured reproductive organs were visible. The males on the other hand possessed yellowish brown colour having hard and circular carapace. Most of the females were found to be egg bearing (Fig.1). The crab was identified as a species of genus *Arcotheres* because of its sub hexagonal carapace, the third pair of walking legs remained longer than other leg pairs and the dactyli of 3rd and 4th walking legs were longer than those of the 1st and 2nd walking legs¹⁶. It was finally identified as *A. alcocki* (Rathbun, 1910) owing to the fact that the ratio of fourth to third dactylus was at 5:3; dactylus of chela was 4/5th of the dorsal border of palm and propodus of third maxillipede has contracted distally as reported by Gordon (1936)¹⁷.

The size range of *M. casta* along with the population size of *A. alcocki* in host shells and size range of organisms are given in Table-1 and the photographs of male and female specimens are shown in Fig 1. Marked heterogeneity was noticed as regards to the distribution and size range of male and female crabs. While 13 clams out of 100 in Bahuda estuary were found infested with adult females of *A. alcocki*; in Rushikulya estuary, 20 were found infested. Again, only one male was encountered in 100 clams of Bahuda against 10 males in same number of clams in Rushikulya estuary. The average length and width of female *A. alcocki* in Bahuda samples were 0.9±0.1 cm and 1.1±0.2 cm there in Rushikulya samples were 1.0±0.1 cm and 1.2±0.1 cm (Table 1). Lalitha Devi (1981)¹⁵ has reported 16% infestation of *Anadara granosa* by *Pinnotheres alcocki* (now *Arcotheres alcocki*) in Kakinada bay that closely coincides with the present observation.

Parasitic crabs obtain nutrition by scraping mucous food strings of the gills of the host

organisms^{2,18,19}. Fibrous masses could also form on other soft body tissues due to the activity of these crabs^{2,20,21}. Gill damages with lowered water filtration²² and oxygen consumption²³ have also been reported with infested hosts compared to non infested one. Bierbaum and Ferson (1986)²⁴ have reported that *Pinnotheres maculatus* living in the mantle cavity of bivalves use to steal their planktonic foods during passage through the gills and reduces the growth rate of hosts. Presence of parasitic crabs significantly reducing the growth and reproductive output was noticed in several host bivalves²⁵⁻²⁸. During the present study the clams of both the estuaries have shown visible damages when infested with *A. alcocki* indicating the negative impacts on *M. casta*. The backwater clam *M. casta* being abundantly available along the south Odisha coast and constitute an important component of molluskan fisheries, pea crab infestation can be considered as potential threat to *M. casta* fishery of the region.

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