above the middle and free for a short distance. This may explain why the outer finger crosses the middle finger in the preserved specimens. In more advanced birds, the outer finger is greatly reduced.

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Green mussel *Perna viridis*, a new host for the pea crab *Pinnotheres placunae* along the Malabar coast, Kerala

The pea crab *Pinnotheres placunae*, parasitizing the green mussel *Perna viridis*, along the Malabar coast is reported. The infested mussels suffered significant reductions in shell size and live weight.

Along the Elathoor beach, 10 km away (north) from Calicut city, green mussels, commonly called *Mytilus* (*Perna viridis*), were collected by local fishermen. The presence of one small crab within the mantle cavity of the mussel was recorded. The crab was less than a centimetre in size; some of them carried a number of eggs. With help from Central Marine Fisheries Research Institute, Calicut, it was identified as pea crab, *Pinnotheres placunae* (Figure 1).

There are many species of pea crabs, all grouped together by taxonomists to the family Pinnotheridae. The pea crab has a carapace width ranging from 10 to 12 mm. The genus is recognized by the third pair of walking legs, which is longer than the other pairs, and the dactyli of 3rd and 4th walking legs being larger than 1st and 2nd walking legs.

The occurrence of the pea crab *Pinnotheres* in oysters, clams, ascidians, holothurians and brachiopods has been reported from different parts of the world[1–3]. Silas and Alagarswami[4] studied their occurrence and effects of their infestation on the backwater clam, *Metrix casta* from the southwest coast of India.

Elathoor beach possesses extensive rocky area particularly laterite stones, which form a suitable substratum for the growth of host species *P. viridis*.

From July 2003 to June 2004, 100 mussels were collected regularly every month from local fishermen, and the shells were opened and checked for the presence of pea crab. When the pea crab was present, its measurements were taken. The mussels were preserved in 5% formalin (diluted using sea water). Weight of each mussel was noted to the nearest milligram. The preserved mussels were opened; both the location and number of pea crabs on either side of the viscera were recorded, along with damages, if any, caused to the soft parts of the host and the wet weight of the mussel (excluding the shell) was also taken after pressing it gently with blotting paper to remove excess moisture. The length and breadth of the carapace of crabs were also taken. Once removed from the host, the crabs were preserved in 70% alcohol.

A total number of 1200 mussels were examined and it was found that 74 were infested with crabs of a single species *P. placunae*. Majority were found near the exhalent siphon within the mantle cavity.

A male crab can be distinguished from the female from the dimensions (mm) of carapace and cheliped (Table 1).

In females, carapace and chelipeds are larger than those of males. In a mature

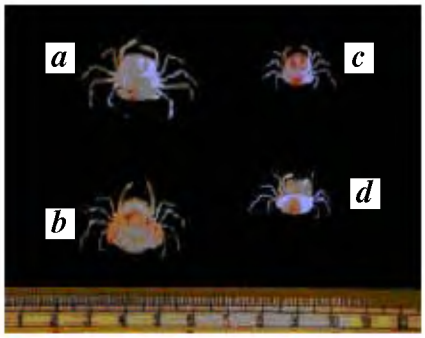

Figure 1. *Pinnotheres placunae*. ***a***, Female – dorsal view; ***b***, Ovigerous female – ventral view; ***c***, Male – dorsal view; ***d***, Male – ventral view.

Table 1. Distinguishing features between male and female crabs

Body part	Male	Female
Carapace		
Length of carapace (mm)	6.25	8
Breadth of carapace (mm)	7.25	11.25
Length divided by breadth of carapace	0.86	0.70
Cheliped		
Length of dactylus (mm)	1.625	2
Length of upper boarder of palm (mm)	2.5	3.125
Greatest width of palm (mm)	1.625	1.75
Ratio of length of dactylus : length of upper boarder of palm	0.65	0.64
Ratio of length of dactylus : width of palm	1	1.14

Table 2. Frequency of occurrence of *Pinnotheres placunae* in *Perna viridis*. Values obtained for length (cm) and weight (g) of infested and non-infested mussels are also given

Month	Frequency of occurrence (%)	Length of infested shells	Length of non-infested shells	Wet weight of infested mussel	Wet weight of of non-infested mussel
July	0	0	8.3 (0.40)	0	8.8 (0.19)
August	0	0	7.8 (0.30)	0	9.1 (0.30)
September	10	6.7 (0.22)	8.6 (0.21)	4 (0.24)	10.5 (0.22)
October	12	7.2 (0.27)	8.2 (0.39)	3.2 (0.29)	9.3 (0.24)
November	9	6.6 (0.24)	7.3 (0.27)	2.7 (0.23)	11.2 (0.23)
December	10	6.6 (0.26)	6.8 (0.33)	3.5 (0.17)	11.9 (0.15)
January	9	6.5 (0.28)	6.7 (0.29)	2.7 (0.21)	12.1 (0.22)
February	7	6.9 (0.42)	7.1 (0.31)	3.4 (0.20)	12.4 (0.31)
March	0	0	7.2 (0.29)	0	6.9 (0.36)
April	0	0	8.2 (0.26)	0	10.9 (0.22)
May	0	0	7.3 (0.22)	0	8.1 (0.30)
June	17	7.4 (0.27)	7.5 (0.17)	3.3 (0.26)	7.9 (0.27)
Mean		6.8	7.5	3.2	9.9

Analysis presented as mean and standard deviation (in parenthesis).

Figure 2. Internal view of (*a*) non-infested mussel and (*b*) infested mussel with eroded gills.

female, the body is soft and membranous, the carapace is broader, circular, smooth and flat, and the 3rd pair of walking legs are the longest and the 1st pair of walking legs are the shortest. From the above data, it is clear that the females are larger than the males.

As shown in Table 2, the mean shell length of mussels infested with *P. placunae* was 6.8 cm, whereas that of non-infested mussels was 7.5 cm. Hence, it appears that infected mussels suffered stunted growth, both in shell length and wet weight. Infested mussels measured 6.8 cm in length and 3.2 g in weight, as against 7.5 cm and 9.9 g in the case of non-infested mussels. These reductions were significant ($P < 0.05$ for length and weight).

At the time of removal of the crabs from the mussels, it was found that certain types of damages were present in the soft parts of the mussels such as gills, palps and mantle.

The gills appear to be the most affected by the crabs and various types of gill erosion and malformation were observed (Figure 2). The lower margin of the gill laminae in many of the specimens was distorted and unevenly curled. Though Hornell and Southwell[5] found *P. placunae* living as commensals within the mantle cavity of the window pane oyster *P. plalcenta* in Bombay, our observation confirms the parasitic nature of *P. placunae*, and *P. viridis* was found to be a new host for *P. placunae* along the Malabar coast.

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