

A Preliminary Description of *Fabia hickmani*, sp.nov.
(Pinnotheridae)

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Pea crabs are very frequently found inhabiting mussels in the large beds of these Lamellibranchs in the estuary of the River Derwent and other places in Southern Tasmania. The mussel from which the specimens on which the present description is based is *Mytilus planulatus* Lam. The mussel beds are found at or about the tide level for 'low high' water. Most of the specimens were collected at Blackman's Bay but some came from the other side of the estuary at Bellerive, Ralph's Bay and South Arm while specimens were collected outside the estuary at Dodge's Ferry and Dunalley. All these latter specimens were used for comparative purposes only.

The species exhibits the sexual dimorphism common to the family, the adult male being considerably smaller than the adult female. The female shows five growth stages of which the first is similar in size and appearance to the male. The later stages exhibit progressively increasing difference from the male in both size and appearance. These stages correspond closely to those for *Pinnotheres pisum* (Pennant) as described by Atkins (1926).

Females of this species have been kept alive easily by placing them in a well aerated aquarium tank with a supply of colonial diatoms of a *Euschizonema-Melosira* association. The crabs fed on the diatoms using the chelae in the normal feeding method of crabs.

One specimen of *Halicarcinus ovatus* (Stimpson) was found inside a mussel. This was probably accidental as crabs of this species are common in the mussel beds.

Genus **Fabia** Dana

'Carapace smooth, membranous, subquadrate with longitudinal sulci leading leading back from upper margin of orbits and enclosing median area. Outer maxilliped with ischium rudimentary and merus large, last joint of palp attached to preceding one on inner margin. Legs slender; 2nd walking leg longest.'

The specimens fall into this generic description with the exception of the longitudinal sulci. In some specimens these may be absent or very rudimentary.

MALE

The male crabs have a hard, rounded stone-like carapace. The average width of the carapace is 4.5 mm. though some individuals may measure 5.0 mm. across the carapace. There is a slight ridge of hairs round the outer margin of the carapace. The colour in life is a flat creamish white. The animal is opaque. In spirit the older individuals assume a purplish or blue colour on the anterior

region of the carapace, whereas the younger individuals are brown or red-brown in colour. There is a small, flat anterior rostrum and posteriorly, in most individuals, there are two lateral notches above the last pair of walking legs. The ventral thoracic surface is slightly convex and bears the abdomen tightly folded into a median groove. (Fig. 1.) The posterior ventral surface of each thoracic segment bears a pointed projection which extends laterally a short distance behind each walking leg.

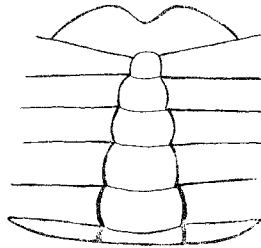


FIG. 1.—Diagram showing width of abdomen of Stage 1 female of *Fabia hickmani*. $\times 9$.

The walking legs are well developed and the chelae are strong and of normal dimensions for a crab of this size. All the walking legs bear a dorsal and ventral fringe of setae on all segments. The setae are more numerous and strongly developed on legs 2, 3 and 4. The biting surfaces of the chelae bear strong setae.

The abdominal appendages are small with the exception of the intromittent organ.

FEMALE

Crabs of this species show the five stages described for *Pinnotheres pisum* (Pennant) by Atkins (1926).

Stage 1

This is similar to the first stage described by Orton (1920) and Atkins (1926) for *P. pisum*. Similar stages have been described for *P. maculatus*, *P. margarita*, *P. taylora* and *P. concharum* by Rathbun. The female at this stage is virtually indistinguishable from the male and it is only by careful examination of the abdominal appendages that the sex may be determined.

Carapace width between 2.25 mm. and 4.0 mm. This is slightly smaller than the corresponding sizes for *P. pisum* (Atkins loc. cit.). In this stage and Stage 2 there is considerable variation in the shape of the carapace which varies between round and oval. In the latter case the long axis forms the width of the carapace. A similar condition is to be seen in the male. There may or may not be notches in the posterior lateral border of the carapace in the position noted in the description of the male.

All the individuals of this stage examined were of very similar appearance to the male with the exception of one specimen in which the fringes of setae on the dorsal and ventral surfaces of the walking legs were poorly developed. The fringe around the margin of the carapace was normal in this individual.

The abdomen is very similar to that of the male. In both sexes the penultimate segment is convex on the lateral margins and the preceding segments are slightly concave. The spermathecae in all individuals of this stage were empty.

This stage comprised about five per cent of the total number of females collected.

Stage 2

Carapace width from 2.5 mm. to 5.25 mm. In external appearance the crab still resembles the male but the carapace is soft and the spermathecae are in various degrees of impregnation. Atkins (1926) has pointed out the difficulties of the male achieving impregnation of both spermathecae but in several of the specimens examined both spermathecae were full. It is not possible to say whether this was the result of one or two copulatory acts by one or more males. The abdomen is broader than in the male and Stage 1, and is intermediate between the latter conditions and Stage 3. (Fig. 2.)

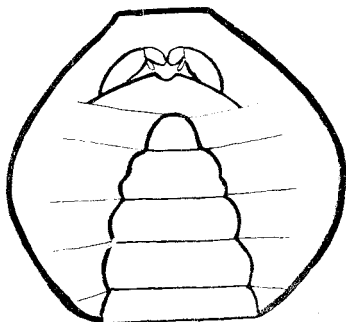


FIG. 2.—Stage 2 female of *F. hickmani*. $\times 6$.

The colour of the eyes is reddish with the pigmented area somewhat reduced. The colour of the crab is a translucent white.

Stage 3

Carapace width from 4.5 mm. to 7.5 mm. The two varieties of this stage as described by Atkins (1926) for *P. pisum* have not yet been distinguished for this species. The condition (*b*) in *P. pisum* in which the abdomen is slightly wider than in Stage 2 and reaching further forward has not been found.

The spermathecae were found either full or empty in different individuals. The abdomen is broad being nearly equal in width to the sternum. (Fig. 3.) The abdominal appendages are more fully developed and are hairy.

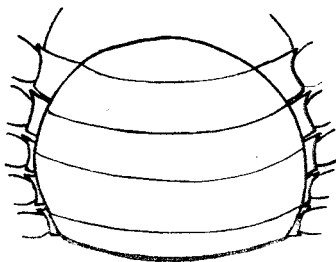


FIG. 3.—Stage 3 female of *F. hickmani*. $\times 5$.

A noticeable feature of this stage was the great reduction of the fringes of setae on the limbs and around the edges of the carapace. The fringe of setae across the anterior ventral margin of the thorax is first distinguishable at this stage. This fringe runs across the ventral surface immediately anterior to the posterior of the abdomen. The function of this fringe appears to be the retention of ova within the fold of the abdomen. In this it is assisted by the fringe along the posterior of the abdomen.

This stage is very rare, less than one per cent of all the small crabs being taken in this stage. This rarity supports Atkin's observation that the female probably passes through the early stages very rapidly. It seems likely that the stages after impregnation are passed through more rapidly than the first stage.

Stage 4

Carapace width from 5.5 mm. to 9.5 mm. This is the earliest stage at which a female has been taken in berry. The carapace is not as firm as in Stage 5 though it is more firm than in Stage 3. Through the carapace the ovary may be seen in various stages of development. The fringes of setae around the carapace are well developed. Some individuals have red chromatophores scattered on the dorsal surface of the carapace, while in others these cells are absent or poorly developed.

The thoracic setae all bear dorsal and ventral fringes of setae. The chelae are small. The abdominal limbs are well developed.

Stage 5

This is the adult female. Carapace width from 6.5 mm. to 13 mm. The abdomen overlaps the mouth and the basipodite of the walking legs. This may not be apparent when ova are being carried as the abdomen is then distended.

The body is firmer than in Stage 4 but it is still soft and membranous. The carapace is sub-circular in form and the width of the abdomen is five-fourths of the width of the carapace. The abdomen is very rounded. Except on the walking legs, lateral abdominal surface and the ventral thoracic surface, the animal is devoid of setae. The first walking leg bears a weak, calcified chela. The fringe of setae on the first walking leg is found on the ventral surface only. The setae on the dactylopodite and propodite are more numerous and extend all along the inner border of the claw. The cutting surfaces of the claws bear strong setae. The second walking leg has setae on the ventral surface of all segments except the propodite and carpopodite. The setae are not very strong and are few in number. The third walking leg bears a few fine setae ventrally on all segments except the carpopodite. The meropodite bears a fringe of strong setae on the dorsal surface. The fourth walking leg is similar to the third except that the dactylus is not as heavily covered with setae on its ventral surface. The fifth walking leg bears very few setae except on the dorsal surface of the meropodite which carries a row of strong setae.

The carapace is convex and smooth with a very small rostrum which does not project in front of the eyes. The carapace is soft compared with that of the male but is slightly stiffer than in Stages 3 and 4. It is sub-rectangular in shape the long axis of the rectangle being at right angles to the antero-posterior axis of the body.

On the ventral thoracic surface is a row of setae anterior to the abdomen. These were noted in Stage 3. The abdomen bears a slight median keel.

The eyes exhibit considerable variation in the amount of pigment they possess. Some of the individuals collected had very little pigment whereas others showed pigmentation over almost the whole surface of the eye. The pigment may be either black or dark red. The eyes are reduced.

The mandibles are strong and bear a large tooth and three smaller teeth in a row on the cutting edge. The external ramus has a number of setae on the lower border and three long sub-terminal setae. In general form this appendage closely resembles that of *Pinnotheres pisum* (Pennant), the principal difference being in the number of teeth. (Fig. 4.)

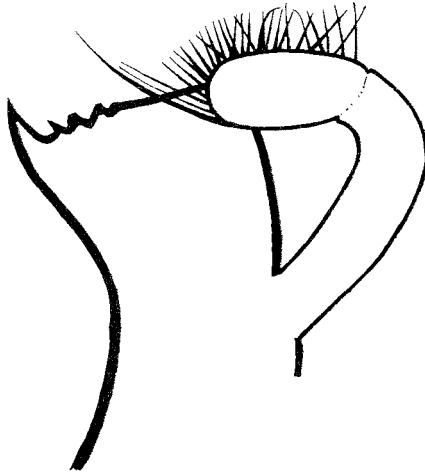


FIG. 4.—Mandible of *F. hickmani*. $\times 35$.

The first maxilla bears setae on both the exopodite and the endopodite. The second maxilla is similar in form to the first but bears serrated spinous setae on the outer lateral border.

The maxillipeds are all flattened. The third maxilliped has a very large meropodite with a very much reduced ischiopodite. The endopodite bears a long, strong apical seta.

The colour of this stage is a dirty cream with the ovary and the hepatic region showing through the carapace as patches of either purplish or red colour. If ova are being carried the abdomen is of a dark red colour. If no eggs are being carried the alimentary canal stands out as a dark line. The number of ova carried varies considerably. The summer average is about 8500. The species appears to breed all the year round with spring and autumn maxima. In winter fewer eggs are carried.

INFECTIONS OF MUSSELS

It is hoped to carry out work on the relation between the size of crab and the size of the host mussel. The percentage infection is very high. In some old mussels at Blackman's Bay and others dredged in Ralph's Bay the figure is 100 per cent.

It was noted by Atkins (1926) in the European species *P. pisum* that two females have never been found in the mussel. In the present species two females were found in one mussel. One of the females was Stage 4 and the other was Stage 5. It is fairly common to find an adult female in a mussel with a Stage 1 or 2 female. It is also common to find male and female together in the same mussel. The highest frequency of occurrence of two females occurs in mussels of 7 cm. size.

The percentage of males is high compared with the European species. Of all the young specimens about 75 per cent of individuals were males.

In the course of fairly extensive collecting in the mussel beds at Blackman's Bay I have never encountered a free living male. The mussel beds can be fairly thoroughly searched at 'low low water'. This absence of the free living male points to the fact that in this species the male habitually lives in a mussel and only changes his abode to search out another female. Many mussels have been taken with only a male inside them. The evidence is not conclusive as collecting when the beds are covered by water is a hit-or-miss business and although no free males have been taken at that stage of the tide it is possible that they do exist.

In view of the confirmed record of *Pinnotheres pisum* from New Zealand (Richardson, 1949) it is of interest to note that the species has not yet been found in Tasmania.

SUMMARY

The male crab is described and the five stages of the female are also described. The stages correspond closely to those described by Atkins (1926) for *P. pisum*. The number of mussels infested by crabs is very high reaching 100 per cent in some places. Males form a large proportion of the small crabs caught. Two females have been taken in one mussel but the male has never been found anywhere other than in a mussel. *Pinnotheres pisum* (Pennant) has not been found in Southern Tasmania.

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