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REPORT
TO THE GOVERNMENT OF BARODA ON THE
MARINE ZOOLOGY OF
OKHAMANDAL IN KATTIAWAR

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WITH SUPPLEMENTARY REPORTS ON SPECIAL GROUPS BY OTHER ZOOLOGISTS

PART I

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DESCRIPTION
OF A
NEW SPECIES OF PINNOTERES FROM
PLACUNA PLACENTA,
WITH A NOTE ON THE GENUS,

BY
JAMES HORNELL, F.L.S.,
AND
T. SOUTHWELL, A.R.C.Sc., F.L.S.

[With One Plate.]

THE material upon which the following description is based was obtained during a biological survey of the coast of Okhamandal in Kattiawar. The bays on the north-east seaboard of this district have a bottom composed of extremely soft mud, constituting an agreeable habitat for the window-pane oyster (*Placuna placenta*), which exists there in extensive beds. During the dissection of numerous individuals of this mollusc, large pea-crabs were found in nearly all cases. The large individual size, greatly flattened appearance, and preponderance in number of the males at once arrested attention as being conspicuously different from any species previously met with by the observer. Later research confirmed the original impression that this form of *Pinnoteris* constitutes a new species; on account of the particular habitat wherein it is found the specific name *placunæ* has been considered appropriate.

The detailed description of the two sexes is as follows :—

***Pinnoteris placunæ*, n. sp.**

FEMALE.—Body soft and membraneous; carapace broader than long, circular in outline, smooth and greatly flattened dorso-ventrally; lateral margins entire; front broad, sharply truncated, and straight. Eyes, eye-stalks, and the whole of the orbit

hidden in a dorsal view. Eyes small. Orbits circular, eye-peduncles short. Antennæ minute and placed within the anterior hiatus of the orbit.

Chelipedes smooth, the movable fingers being slightly hairy, and as long as the palm.

Ambulatory legs slender and increasing in size posteriorly, except the fourth pair, which are smaller than the first pair.

Dactyli of the third and fourth pairs one and a half times as long as those of the first and second.

Dactyli of the last pair, hairy at the tips.

Abdomen seven-jointed, broadening considerably posteriorly.

Length of carapace 9 mm., breadth 11 mm.

Numerous females bearing eggs. Colour in formalin, dirty brownish red.

MALE.—Carapace smooth. Front broadly triangular, short, and raised. Posterior, broad and sharply truncate. The oblique cervical grooves well marked and terminating just external to the orbits. Eyes small and visible in a dorsal view. Eye-peduncles very short. Antennules extremely minute. Antennæ long with peduncles backwardly projecting.

Chelipedes similar, short, and equal in length to the breadth of the carapace. Merus slightly longer than broad, with a rounded entire crest on its distal external face. Carpus slightly longer than broad, and curiously curved. Propodite longer than carpus, dactylopodite almost as broad as long and somewhat flattened. Fingers curved with a hiatus between them when closed, and hairy on their opposing surfaces. Succeeding legs slender. First pair approximately equal in length to the chelipedes, second pair longer than the first pair by slightly more than a dactylus, third pair longer than second pair by a dactylus.

Abdomen narrow, permanently flexed under the body, and narrowing posteriorly. First pair of abdominal appendages modified into long, cylindrical, rod-like bodies which project from beneath the abdomen.

Length of carapace 7.5 mm., breadth 9.5 to 10 mm.

Apart from sexual characteristics, the male differs markedly from the female in (1) its much smaller size and (2) the form of the rostrum.

Pinnotheres placunæ is characterised by being extremely flattened dorso-ventrally, by having the front of the carapace straight and broad in the female, and by the somewhat squarish outline of the carapace.

Habitat.—Commensal within the mantle cavity of *Placuna placenta*, Balapur and Rann Bays in the Gulf of Kutch, India; abundant.

Rare in the same species of Lamellibranch in Tampalakam Bay, near Trincomalee, Ceylon, one to three fathoms.

Out of twenty adult *Placunæ* examined alive and hailing from Balapur Bay, Beyt Island, in the Gulf of Kutch, one shell only was without any pea-crab commensal.

Of the rest,

10	individuals	contained	1 female each ;
2	„	„	1 female and 2 males each ;
2	„	„	1 female and 1 male each ;
1	„	„	12 males ;
1	„	„	11 males ;
1	„	„	3 males ;
2	„	„	2 males each.

Besides these particular individuals, a large number of others of the same age were examined without note being taken of the exact numbers of pea-crabs respectively contained ; scarcely any were found without one or more of these guësts free within the mantle cavity. The majority were located in the neighbourhood of the anus.

Immature shells, as is natural, less frequently revealed the presence of commensal pea-crabs ; when they did occur the crabs were more or less immature. It would seem that the crabs grow towards maturity concurrently with their hosts.

Placunæ from Ceylon rarely contain this commensal. One large female was, however, taken by one of us some years ago from a large Placuna fished at Tampalakam Bay, proving the geographical range to extend from the Gulf of Kutch to Ceylon.

A large number of Placunæ obtained from Tuticorin in South India yielded no pea-crabs. It would be interesting to learn the reason why these crabs are so abundant in one locality, so rare in the others. Environment appears generally to be identical in all three localities.

Borrodaile, in his report on Marine Crustacea in "The Fauna and Geography of the Maldives and Laccadives," vol. i., p. 428, refers to the Pinnoteridæ as being "small symbiotic crabs with very small eyes and orbits. Body usually more or less rounded ; carpopodite of the third maxilliped does not articulate at or near the inner angle of the meropodite. Body usually square or squarish. Male openings sternal."

Laurie, describing a new species of *Pinnoteres* from the Gulf of Mannar ("Ceylon Pearl Oyster Reports," vol. v.), characterises the carapace of *Pinnoteres margaritifera* as "circular, calcified, smooth and polished. It is flattened a good deal, though a little convex."

A specimen of *Pinnoteres abyssicola*, Alcock and Henderson, was taken from a living individual of a large species of lamellibranch (*Lima indica*, E. A. Smith) dredged off the coast of Travancore at a depth of 439 fathoms. This specimen, which was a female with eggs, had "the carapace as long as broad, circular and smooth. The whole of the eyes and eye-stalks, and almost the whole of the orbits, visible in a dorsal view."

A specimen of *Pinnoteres villasulus*, Guérin Minivelle, found within the pearl oyster in Torres Straits and presented to the *Challenger* staff (*Challenger Reports*, vol. xvii.) had the front "deflexed and trilobate."

In the case of *Pinnoteres ostreum*, recorded from the East Coast of America, the female *only* is commensal with *Ostrea virginica*, whilst the male is free-swimming.

It is interesting to note from the preceding that only in the case of *Pinnoteres margaritifera* is the carapace referred to as being much flattened.

Specimens of *Pinnoteres placuna*, n. sp., are *particularly* characterised by being so compressed dorso-ventrally as to be *quite flat*. This, of course, is exactly what one would expect to find in a species commensal with a bivalve in which the valves of the shell are so closely approximated as in the case of *Placuna placenta*. In this connection it is interesting to note that *P. placuna* and *P. globosus* form two extremes in the form assumed by the body. As we have seen, *P. placuna* is remarkably flattened, whereas *P. globosus*, as the specific name implies, is globular in appearance. These facts serve to indicate the plasticity of the members of the genus and the readiness with which they adapt themselves to their surroundings.

It will be noticed that *P. pisum* is more or less cosmopolitan, having been recorded from England and from New Zealand; it would seem that other species of *Pinnoteres* are local variations of *P. pisum*. The specific and restricted distribution of certain of the species, such as *P. margaritifera* and *P. placuna*, appears to confirm this idea.

The following is a list of the species of *Pinnoteres* recorded up to date, as far as we have been able to ascertain, with their respective hosts and the localities where they occur:—

SPECIES.	HOST.	DISTRIBUTION.
<i>P. pisum</i> (Tennant)	<i>Modiola</i> , sp.	Mediterranean; New Zealand
<i>P. margaritifera</i> , Laurie	Ceylon Pearl Oyster (<i>M. vulgaris</i>)	Ceylon Pearl Banks
<i>P. placuna</i> , Hornell and Southwell	<i>Placuna placenta</i>	Gulf of Kutch
<i>P. rouxi</i> , M. Edwards	?	Indian Seas
<i>P. villosus</i> , Guir.	?	?
<i>P. parvulus</i> , Stimpson	<i>Pinna</i> , sp.	New Zealand
<i>P. globosus</i> , Hemb. Jaques (= <i>obesus</i> , Dana)	<i>Meroe quadrata</i> and <i>Cythrea</i> , sp.	China Seas
<i>P. velerum</i> , Bosc.	—	—
<i>P. abyssicola</i> , Alcock and Henderson	<i>Lima indica</i>	Off Travancore, 439 fms.
<i>P. villasulus</i> , Guerin Minivelle	Pearl Oyster	Torres Straits
<i>P. edwardsi</i> , De Man	<i>Ostrea</i> , sp.	King Island Bay
<i>P. pecteni</i>	<i>Pecten</i> , sp.	E. coast of North America
<i>P. ostreum</i>	<i>Ostrea virginica</i> (male free-swimming, female only in oyster)	Do.
<i>P. purpureus</i> , Alcock	<i>Ostrea</i> , sp.	Andaman Islands
<i>P. mactricola</i> , Alcock	<i>Mactra violacea</i>	Hoogly River, India

EXPLANATION OF PLATE.

- Fig. 1. Adult male *Pinnoterres placunæ*, n. sp. Dorsal view. $\times 5\frac{1}{2}$.
„ 2. Ventral view of same. $\times 5\frac{1}{2}$.
„ 3. Fourth walking leg of a male, right side. $\times 9$.
„ 4. Dactylus of same, more highly enlarged.
„ 5. Dorsal view of an adult female carrying ova. $\times 8$.
„ 6. Ventral view of same. $\times 7$.
„ 7. Third walking leg from right side of a female. $\times 9$.
„ 8. Dactylus of third walking leg of a female. $\times 17$.
„ 9. Fourth walking leg from right side of a female. $\times 9$.
„ 10. Dactylus of same. $\times 17$.

