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# On Three Species of the Pinnotherid Crabs from Hokkaido, Japan

By

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(With 3 Text-figures and 1 Plate)

About thirty species of the pinnotherid crabs (Crustacea, Decapoda, Pinnotheridae) have hitherto been recorded from Japan, through the successive works by Sakai (1936, 1939, 1955, 1965, 1969, 1976). Up to the present, only four species, referable to three genera have been reported from Hokkaido: *Pinnotheres sinensis* Shen, *P. pholadis* de Haan, *Pinnaxodes mutuensis* Sakai and *Pinnixa tumida* Stimpson. Besides these, occurrence of *Pinnaxodes major* Ortmann has been reported from both Shikotan and Kunashiri islands in the vicinity of eastern Hokkaido (Kobjakova, 1958).

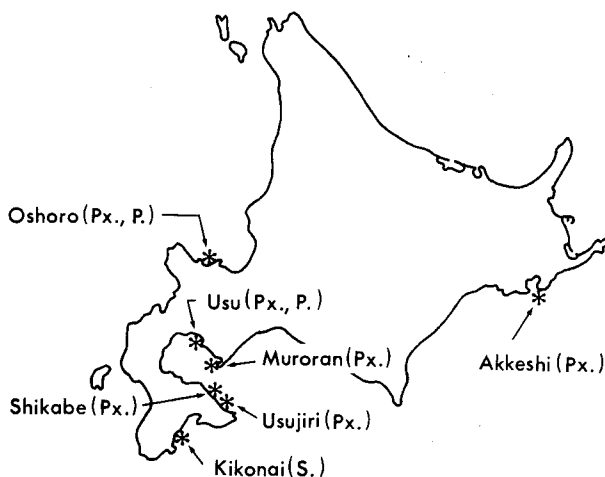
In the present study, the author examined two commensal species, *Pinnotheres sinensis* Shen and *Pinnaxodes mutuensis* Sakai, and one free-living species *Sakaina japonica* Serène. The last named species is the new addition to the fauna of Hokkaido. *Pinnotheres pholadis* de Haan, which has been listed in the carcinological fauna of Hokkaido by Igarashi (1970), has not been collected yet by the present author. The author has also been unsuccessful in collecting the specimen of *Pinnixa tumida* Stimpson, which had been recorded from Hakodate as the commensal of the holothurian *Paracaudina chilensis* (J. Müller). Seven localities in Text-fig. 1 indicate the places where the crabs were collected by the author.

Before going further, the author expresses his sincere gratitude to Prof. Fumio Iwata of the Hokkaido University for his guidance and critical reading of the manuscript. Cordial thanks are also expressed to Dr. Yasuhiko Kanoh, Director of the Akkeshi Marine Biological Station, and Dr. Tatsuji Ueno, Director of the Hokkaido Regional Fisheries Research Laboratory, by whose kind offer the present collection was prepared. The author is also indebted to Dr. Yuji Nishihama, Dr. Tatsunori Itô, Mr. Shin Kubota, Mr. Takatoshi Yamaguchi and Mr. Kazuro Shinta for their kindness in supplying the materials used in the present work. Special acknowledgement is also due to Dr. Tane Sakai, President of the Carcinological Society of Japan, for his criticism and encouragement.

## *Pinnotheres sinensis* Shen

*Pinnotheres sinensis* Shen, 1932; p. 131, text figs. 78, 79.

*Jour. Fac. Sci. Hokkaido Univ. Ser. VI, Zool. 20 (4), 1977.*



Text-fig. 1. Map of Hokkaido, showing the distribution of the pinnotherid crabs. P: *Pinnotheres sinensis*, Px: *Pinnaxodes mutuensis*, S: *Sakaina japonica*.

#### Descriptions

*Female*: The carapace is rounded trapezoidal in outline, broadened posteriorly; entire body soft; the front not protruding beyond the anterior border; the posterior border usually concave in the middle. The abdomen markedly enlarged, wider than the carapace in the mature form.

The third maxilliped slightly concave in the inner margin, the ischium and merus are completely fused together; the dactylus not exceeding the tip of the propodus.

The ambulatory legs are thin; the dactylus of the last pair is fringed with very short hairs around the whole surface in its distal half.

*Male*: Usually smaller than female in its size ( $1/2 - 1/3$  in adult form). The carapace is well-calcified and flattened; dark brown in life colour. The ambulatory legs have an oblique row of long hairs on the carpus of second and third pairs.

#### Material examined

Oshoro, 8♀♀, from *Mytilus coruscus*, Sept. 1975 (K. Shinta leg.).

Usu, 1♀, from *Mya (Arenomya) arenaria oonogai*, May 1975; 11♀♀, 1♂, from *Mytilus coruscus*, Jun. 1976.

*Remarks*: The present commensal crab *Pinnotheres sinensis* is commonly found on the coast of Japan. In Hokkaido it has been recorded from Oshoro, on the coast of the western Hokkaido facing the Sea of Japan (Igarashi, 1970), while in the present study, this species has also been found on the Pacific side of Hokkaido. The clam *Mya* is listed as a new host for this species in Japan (for the review on the host of pinnotherid crabs, see Schmitt *et al.*, 1973). The shells

of the infected host mussels collected at Usu were considerably thicker than those of non-infected ones; the mean value of the ratio of thickness to length were 0.402 and 0.340, respectively.

*Pinnaxodes mutuensis* Sakai

*Pinnaxodes mutuensis* Sakai, 1939; p. 595, text fig. 81.

Descriptions

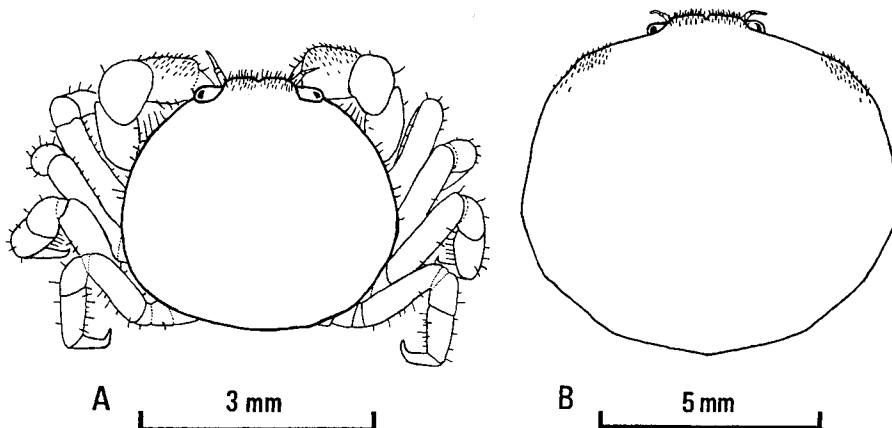
*Female*: The carapace is smooth, not at all pubescent as in *Pinnaxodes major* Ortmann; yellow or pale orange in life colour; moderately calcified; subquadrate in outline and its lateral borders obscurely angular in the middle; the front not protruding beyond the level of eyes (Pl. XXI, Fig. 1).

The third maxilliped is covered with short pubescence, the ischium-merus joint broad and there remains a vestige of suture between the two segments; the dactylus is widened distally and spatulate, with long pulvose hairs occurring on its margin.

The ambulatory legs are thin, anterior three pairs are subequal in length; the last pair somewhat reduced in size.

*Male*: The carapace is rounded, a little broader than long; dark orange in life colour; the front considerably protruding beyond the anterior border, bilobate; the eyes are visible in dorsal view (Pl. XXI, Fig. 2); the shell is well-calcified compared with the female, the surface is smooth as in the female and its shoulder area fringed with tomentum (Text-fig. 2, B). In the large (or adult) female, the same portion is not tomentose.

The dactylus of the third maxilliped is widened distally as in the female, but



Text-fig. 2. Dorsal view of the juvenile female of *Pinnaxodes mutuensis* (A) and the outline of the carapace in adult male, showing tomentum on the shoulder and front (B).

not exceeds the tip of the propodus (Text-fig. 3, A).

#### Material examined

Akkeshi, 1♀, 1♂, from *Modiolus modiolus difficilis*, Jul. 1975 (T. Itô and S. Kubota leg.).

Muroran, 1♂, on the seaweed, April 1976 (F. Iwata leg.).

Usu, 2♀♀, 5♂♂, from *Modiolus modiolus difficilis*, Jun. 1976.

Usujiri, 4♂♂, from *Mytilus coruscus*, April 1976.

Shikabe, 4♀♀, 1♂, from *Mytilus coruscus*, Aug. 1975 (Y. Nishihama leg.).

Oshoro, 1♂, from *Mytilus edulis*, Jul. 1972 (F. Iwata leg.).

*Remarks:* The present species, first described by Sakai from Mutsu Bay, is common in the Hokkaido area as in the case of *Pinnotheres sinensis*. Although Sakai (1939, 1976) described this crab as commensals of mussels *Modiolus* and *Crenomytilus*, it was found in the present study that the crab is also commensal to two other species of mussels, *Mytilus coruscus* and *M. edulis*.

All the seven specimens of the crab from Usu were obtained from the mussel *Modiolus* at lower tide, although the other mussel *Mytilus* was commonly seen in the same area.

It is interesting to note that mature males of this crab were found not only in the mantle cavity of the mussels but also on the eelgrass *Phyllospadix japonica*, and that a juvenile female (Text-fig. 2, A) and a hard-shelled female were found in the hosts. These facts suggest that the present species apparently has a life history like the members of *Pinnotheres* (see Stauber, 1945; Christensen, 1959; Christensen and McDermott, 1958; Pearce, 1964).

It is also noticeable that this species is highly infected by rhizocephalan (*Sacculina* sp.) or epicarids. Four out of five males collected at Usu were infected by *Sacculina* sp.. Wells and Wells (1961) examined 174 adult or semi-adult crabs in the description of *Pinnaaxodes floridensis*, but no parasitism among these crabs was mentioned by them. It was found that the infected male becomes larger in its size, changing its shape toward the female-type (Pl. XXI, Fig. 3, 4). Occurrence of an intersexual form due to parasites has been recorded in *Pinnotheres sinensis* and *P. cyclinus* by the previous authors (Shen, 1932; Simitu, 1944; Suzuki, 1967).

#### *Sakaina japonica* Serène

*Sakaina japonica* Serène, 1964: p. 273, fig. 22, pl. 24.

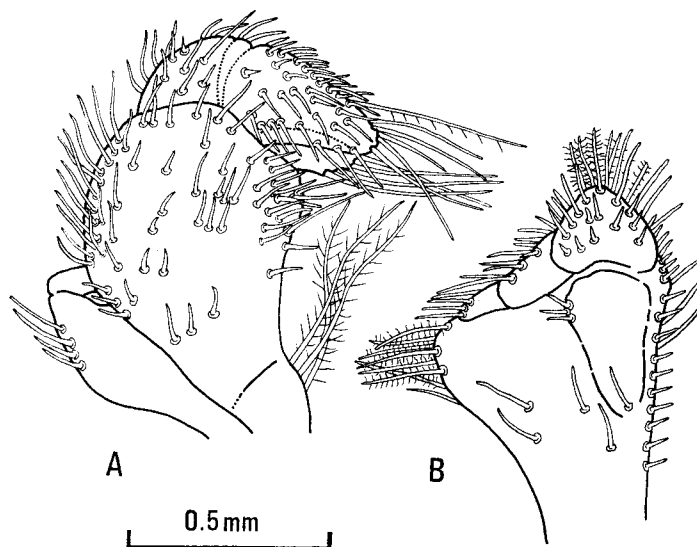
#### Description

The carapace is transversely suboval; well-calcified. The terminal segment of the male abdomen is distally truncate (Pl. XXI, Fig. 5, 6). The third maxilliped is triangular in shape. The dactylus and propodus of the third maxilliped are concealed beneath and are not visible in external view when they are folded (Text-fig. 3, B). The last pair of the ambulatory legs markedly reduced in size.

## Material examined

Kikonai, 1♂, from the pore of rock, Jun. 1975 (T. Yamaguchi leg.).

*Remarks:* The type locality of *Sakaina japonica* is Misaki, Sagami Bay; the occurrence of this crab at Kikonai appears to be the northernmost record in the distribution of this species.



Text-fig. 3. The third maxilliped in the male of *Pinna-xodes mutuensis* (A) and of *Sakaina japonica* (B).

## Summary

The present paper deals with three species of the crabs belonging to the family Pinnotheridae found on the coast of Hokkaido. *Sakaina japonica* Serène is newly added to the list of the pinnotherid crabs hitherto recorded from Hokkaido. The range of distribution of these crabs is discussed and some notes on their occurrence are mentioned.

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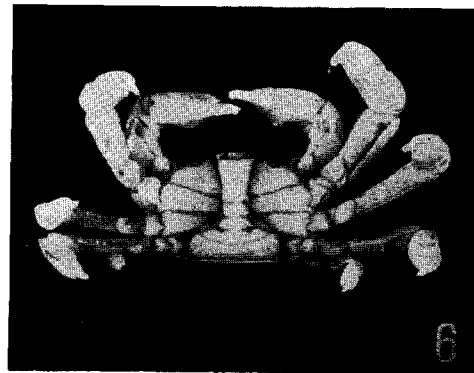
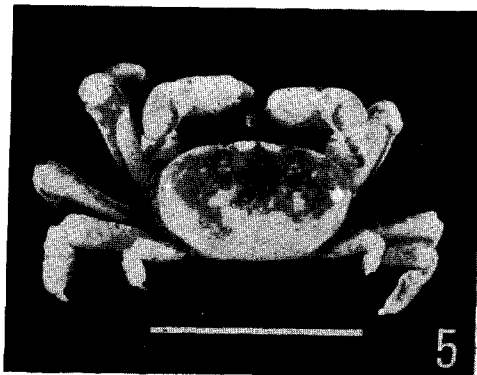
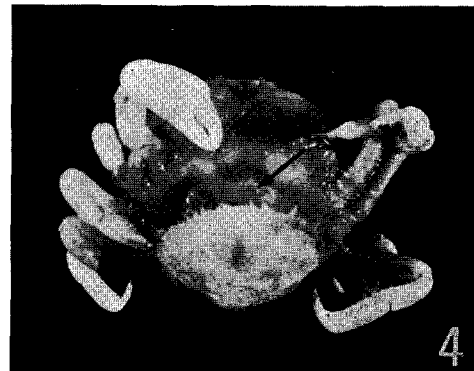
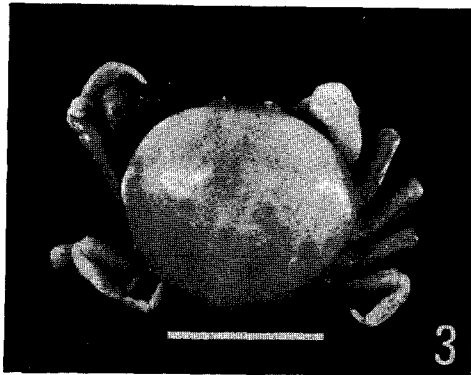
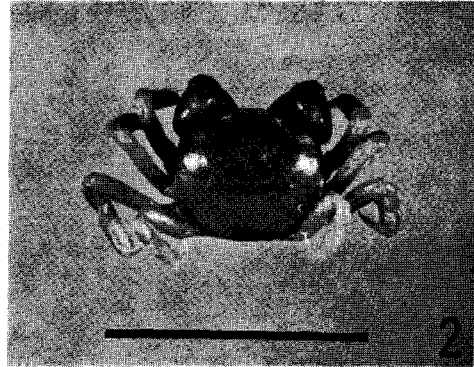
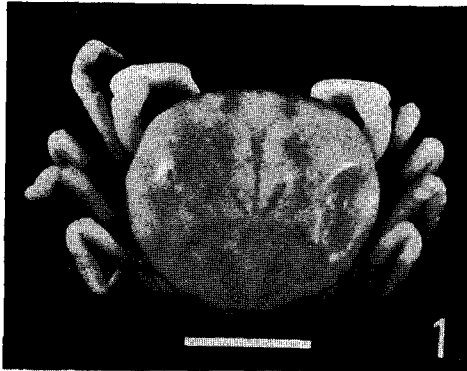
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### Explanation of Plate XXI

- Fig. 1. *Pinnaxodes mutuensis* Sakai. Female, dorsal view.
- Fig. 2. *Pinnaxodes mutuensis* Sakai. Male, dorsal view.
- Fig. 3. *Pinnaxodes mutuensis* Sakai. Intersexual male parasited by *Sacculina* sp., dorsal view.
- Fig. 4. *Pinnaxodes mutuensis* Sakai. Intersexual male parasited by *Sacculina* sp., ventral view. Arrow indicating the parasite.
- Fig. 5. *Sakaina japonica* Serène. Male, dorsal view.
- Fig. 6. *Sakaina japonica* Serène. Male, ventral view.
- (Bars indicating 10 mm.)



*K. Konishi: Pinnotherid Crabs from Hokkaido*