

A New Species of the Genus *Pinnixa* (Decapoda: Brachyura: Pinnotheridae) from Otsuchi Bay, Northeastern Japan

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Abstract A new pinnotherid crab of the genus *Pinnixa* is described and illustrated from Otsuchi Bay, northeastern Japan, based on two ovigerous female specimens. The new species, *Pinnixa lata*, is most similar to *P. tubicola* (Holmes, 1894) in the markedly wide carapace, but it can be easily distinguished by the wider carapace and the longer dactyli of the third and fourth walking legs. A key to the Japanese species of *Pinnixa* is provided.

Key words: Decapoda, Brachyura, Pinnotheridae, *Pinnixa*, new species, Japan.

The genus *Pinnixa* White, 1846 in the family Pinnotheridae hitherto consists of five species from East Asia (Sakai, 1934; Yamauchi and Konishi, 2005) and 49 species from both coasts of America excluding fossil species (Schmitt *et al.*, 1973; Ng *et al.*, 2008). Of the American species, *P. faba* (Dana, 1851) was recorded also from Australia by Haswell (1882), but the record is probably based on misidentification (Rathbun, 1918; Schmitt *et al.*, 1973; Davie, 2002). Species of the genus live in mantle cavities of bivalve mollusks, in tubes or holes of annelid worms, holothurians, and hemichordates, and also freely in muddy or shelly bottoms (Sakai, 1976). It is well known that one of the Japanese species, *P. rathbuni* Sakai, 1934, sometimes forms big swams in shallow water (Sekiguchi, 1983).

Faunal samplings at Otsuchi Bay, Iwate Prefecture, northeastern Japan, were held several times in 1970's by the researchers working on benthic invertebrates. Among the collections were two crab specimens belonging to an undescribed species of the genus *Pinnixa* (Horikoshi *et al.*, 1979; Takeda and Konishi, 1991). Unfortunately, both specimens are female, and therefore the second author has tried to get male specimen

of this species, but not yet succeeded. However, the present specimens have enough characters to be distinguished from its congeners. In this paper, we describe and illustrate the present specimens as a new species, *Pinnixa lata*. A key to the Japanese species of *Pinnixa* is also provided.

The type specimens of the new species were collected by Smith-McIntyre mud sampler at about 10 m deep off the small river mouth of the deepest place of Otsuchi Bay, without information about detailed habitat and habit. Measurements, given in millimeters (mm), are of the greatest carapace length (cl) and breadth (cb), respectively. Chelipeds and walking legs are measured along the outer margin from the ischium to the dactylus. The specimens examined are deposited in the National Museum of Nature and Science (NSMT). Other abbreviations used in the text is WL (walking legs).

Taxonomy

Family Pinnotheridae

Pinnixa lata sp. nov.

[New Japanese name: Yokonaga-mamegani]

(Figs. 1–2)

Pinnixa sp. –Horikoshi *et al.*, 1979: 50 (list); Takeda and Konishi, 1991: 35.

Material examined. Holotype: ovig. female (cl 1.6×cb 5.4 mm), NSMT-Cr 19811, Otsuchi Bay, Iwate Pref., northeastern Japan, Smith-McIntyre mud sampler, st. II-4A, 19 May 1978. Paratype: 1 ovig. female (cl 1.6×cb 5.4 mm), NSMT-Cr 19812, Otsuchi Bay, northeastern Japan, Smith-McIntyre mud sampler, st. 14B, fine sand, 15 May 1977.

Comparative material examined. *Pinnixa balanoglossana* Sakai, 1934: Coast of Osaka, Noto-cho, Ishikawa Prefecture, Japan, 23 August

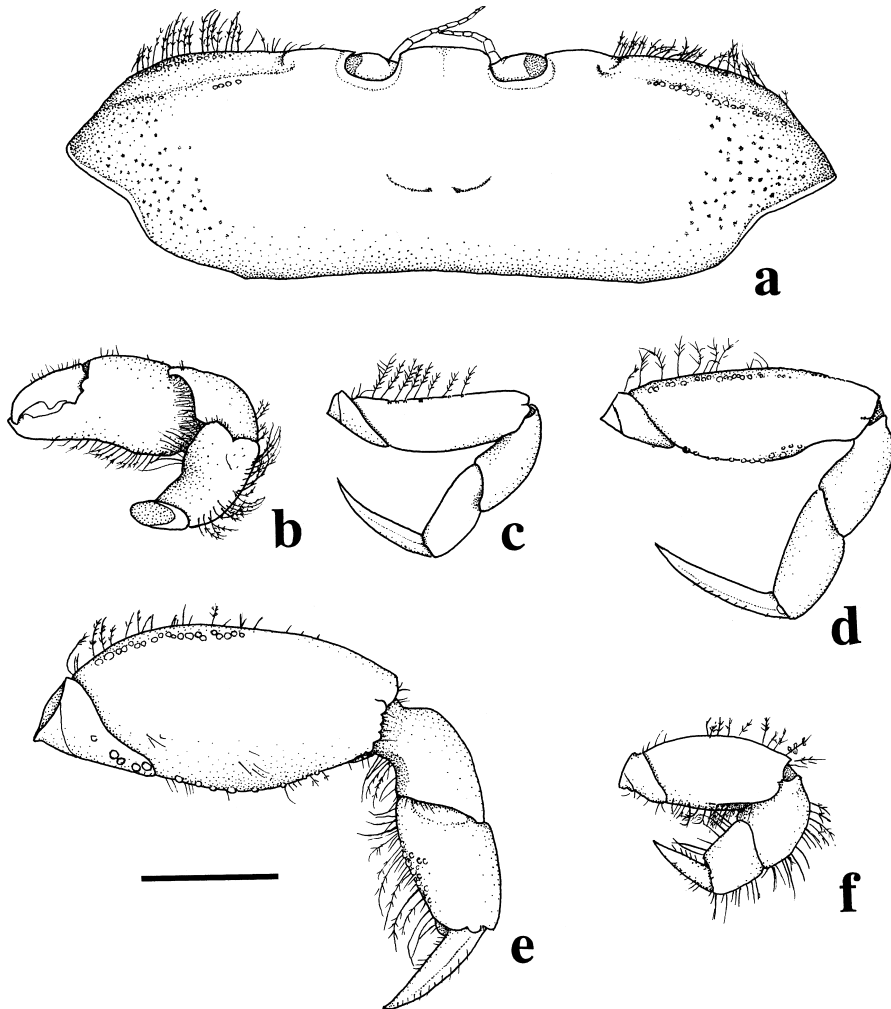


Fig. 1. *Pinnixa lata* sp. nov. Holotype, ovigerous female (cl 1.6×cb 5.4 mm), from Otsuchi Bay, northeastern Japan. a, carapace; b, right cheliped; c, right first walking leg; d, right second walking leg; e, right third walking leg (velvet setae on inner 0.3 of dorsal surface of merus omitted); f, right fourth walking leg. All in dorsal view. Scale bar: 1 mm.

2006, SCUBA, coll. H. Namikawa, commensal of *Balanogrossus* sp., 1 female (cl 6.8×cb 15.6 mm), NSMT-Cr 18021.

Pinnixa haematosticta Sakai, 1934: Off Ogi, Noto-cho, Ishikawa Prefecture, Japan, 8 m, 26 June, 1984, dredge, 1 male (cl 2.9×cb 6.4 mm), NSMT-Cr 1060; off Taniyama, Kagoshima Bay, Japan, 30–50 m, 7 May 1970, coll. Kagoshima University, 2 males (cl 3.0×cb 6.4 mm, cl 3.5×cb 7.4 mm), 4 females (cl 3.3×cb 7.0 to cl 3.6×cb 7.5 mm), NSMT-Cr 6470.

Pinnixa rathbuni Sakai, 1934: Iyo-nada Sea, Seto Inland Sea, Japan, 33°35.28'N, 132°12.39'E, 64 m, 21 May 2007, dredge, 1 male (cl 2.6×cb 4.5 mm), 1 young female (cl 3.3×cb 5.8 mm), NSMT uncatologued.

Pinnixa tumida Stimpson, 1858: Nemuro, Hokkaido, Japan, 2 m, fine sand, 28 May 1983, coll. Y. Moriya and I. Hayashi, 1 male (cl 6.0×cb 10.8 mm), 1 ovig. female (cl 7.2×cb 13.9 mm), NSMT-Cr 10026.

Description. Carapace (Fig. 1a) markedly wide, 3.4 times broader than long, subcylindrical,

regions ill-defined. Dorsal surface of carapace smooth, but with numerous small pores on lateral parts of carapace; central part with pair of short, transverse depressions, possibly representing trace of gastro-cardiac groove; hind part without distinct transverse ridge; anterior margin of hepatic region delineated with weakly ridged row of minute granules. Anterolateral margin of carapace transversely straight and rimmed with plumose setae on anterior 0.7, with submarginal row of fine granules on anterior 0.7, obliquely diverged and double-margined in posterior 0.3. Posterolateral margin forming rounded angle (but seemingly acute in dorsal view) with anterolateral margin, obliquely converged, double-margined. Posterior margin slightly concave, 0.5 times as broad as carapace. Frontal region slightly depressed medially; frontal margin transversely subtruncated, 0.1 times as broad as carapace. Pterygostomial region steeply fallen forward.

Eye stalk (Fig. 2a) very short, movable, transversely retracted in orbital fossa; orbital fossa transversely ovoid, double-margined; orbital hia-

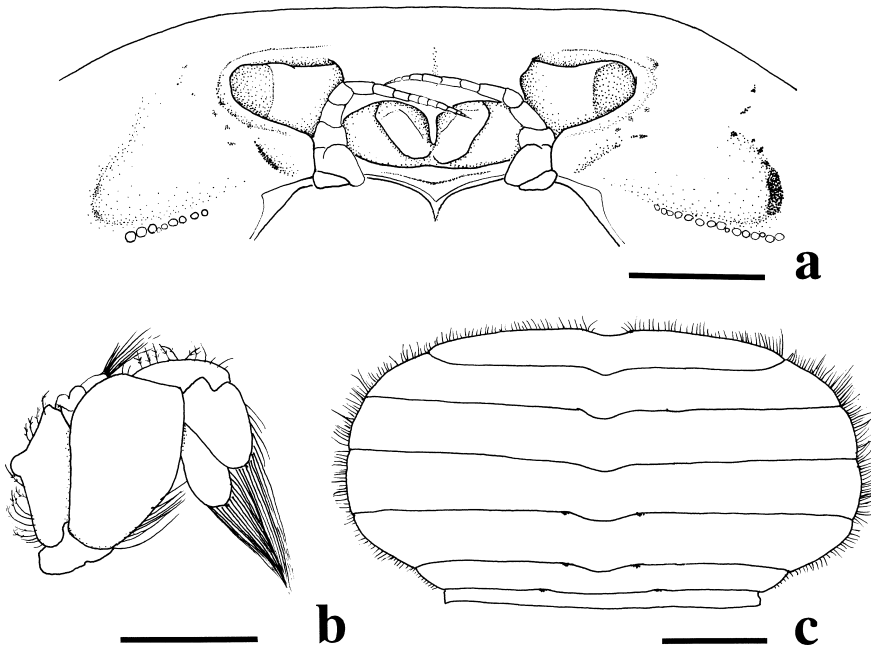


Fig. 2. *Pinnixa lata* sp. nov. Holotype, ovigerous female (cl 1.6×cb 5.4 mm), from Otsuchi Bay, northeastern Japan. a, carapace, frontal view; b, right third maxilliped, ventral view; c, abdomen, ventral view. Scale bars for a, b 0.5 mm; for c 1 mm.

tus closed with second and third segments of antennal peduncle.

Antennule (Fig. 2a) obliquely folded in antennular fossa, fossa rounded and smaller than orbital fossa; basal segment occupying ventrolateral 0.5 of fossa.

Antenna (Fig. 2a) with basal segment transversely ovoid; second and third segments subsquamate, fixed.

Third maxilliped (Fig. 2b) with short basis; ischium completely fused with merus; ischium-merus fused segment subsquamate, broadened in distal 0.5, with long setae on proximal 0.5 of inner margin; relative length measured along outer margin carpus > dactylus > propodus; propodus and dactylus with very long setae; dactylus articulated at base of propodus, flush against propodus, slightly exceeding tip of propodus; exopod with rounded tooth at midlength of outer margin and with short plumose setae; flagellum 2-segmented, with some long setae on tip.

Chelipeds (Fig. 1b) subequal, weak, 1.6 cl; merus short, trigonal in cross-section, with plumose setae on inner and outer margins; palm compressed, with plumose setae on ventral margin; fingers compressed, triangular, with oval gape between cutting edges; movable finger with short plumose setae along proximal 0.6 of outer margin, with median tooth on cutting edge in right chela of holotype, tooth lacking or absent in left chela of holotype and absent in both chela of paratype; immovable finger with 2 small teeth, these teeth subproximal and subdistal in position; tips crossing at just anterior to subdistal tooth of immovable finger.

Walking legs (Figs. 1c–f) dissimilar in shape and length, relative length $WL3 > WL2 > WL1 > WL4$. WL1 (Fig. 1c) slender, 2.2 cl, with plumose setae on outer margins of ischium and merus; merus subcylindrical, with acute, fine granules on outer margin; carpus and propodus compressed; dactylus compressed, with median keel on ventral surface.

WL2 (Fig. 1d) slender, compressed, 2.9 cl; merus with fine granules on inner and outer margins, with plumose setae on outer margin; carpus

equal in length to propodus; dactylus with row of short setae along midline of dorsal surface, with median keel on ventral surface.

WL3 (Fig. 1e) robust, compressed, 3.2 cl; merus broadened, covered with velvet-like setae on inner 0.3 of dorsal surface (setae omitted in figure), with fine granules on proximal 0.7 of outer margin of dorsal surface, with fine granules on inner and outer margins of ventral surface; inner surface of carpus and propodus with plumose setae; propodus with granules on inner margin; dactylus with row of short setae along midline of dorsal surface, with median keel on ventral surface.

WL4 (Fig. 1f) very short, 1.7 cl, broadened, compressed, hairy with plumose setae on both margins of merus and carpus, with simple setae on both margins of propodus and dactylus; dactylus slightly bent dorsally.

Thoracic sternum with medially interrupted sutures. Genital pore opening at fifth sternite, with medially directed roof.

Abdomen (Fig. 2c) ovate, fringed with short plumose setae; all segments free, transversely subrectangular; first segment short, 0.4 times as long as second segment, narrowest; second segment slightly broader than first segment; third to sixth segments subequal in length; telson transversely subrectangular, similar to abdominal segments, as broad as second segment.

Remarks. The markedly wide carapace and the noticeably robust third walking legs links *Pinnixa lata* sp. nov. to *P. tubicola* (Holmes, 1894) and *P. longipes* (Lockington, 1877), both known from the eastern Pacific. But the new species can be distinguished from *P. tubicola* by that the carapace is 3.4 times broader than long in females (vs. 2.5–3.0 times in females of *P. tubicola*); the dactylus is as long as the propodus in WL3 and WL4 (vs. 0.5 times as long as propodus in *P. tubicola*) (see Zmarzly, 1992: 709, fig. 16).

Pinnixa lata sp. nov. can be also distinguished from *P. longipes* by that the carpus of the third maxilliped is not projecting (vs. projecting beyond the basal margin of the propodus in *P.*

longipes); the outer surface of propodus of cheliped is unarmed (vs. with 4–6 corneous tubercles just above ventral margin in *P. longipes*); the ischium of WL4 has no denticle (vs. with 2 or 3 denticles in *P. longipes*) (see Rathbun, 1918: 137, figs. 80–81; Zmarzly, 1992: 695, fig. 10).

Among the Japanese species, *P. lata* sp. nov. can be easily recognized by the markedly wide carapace ($cw/cl > 3.0$) without transverse ridge.

Etymology. Named in reference to the very wide carapace.

Key to the Japanese Species of *Pinnixa*

1. Carapace with distinct transverse ridge on hind part; dactylus of third maxilliped projecting far beyond propodus, with dense long setae 2
 - Carapace without or with faint transverse ridge on hind part; dactylus of third maxilliped only slightly projecting beyond dactylus 3
2. Carapace width less than 2.0 of carapace length; junction of anterolateral and posterolateral borders of carapace somewhat produced *P. penultipedalis* Stimpson, 1858
 - Carapace width more than 2.4 of carapace length; junction of anterolateral and posterolateral borders of carapace sharply produced as shoulders *P. haematosticta* Sakai, 1934
3. Carapace width more than 3.0 of carapace length *P. lata* sp. nov.
 - Carapace width less than 2.5 of carapace length 4
4. Movable finger of cheliped not deflexed; cutting edges of fingers unarmed
 - *P. balanoglossana* Sakai, 1934
 - Movable finger of cheliped deflexed; cutting edge of either finger with distinct tooth 5
5. Movable finger of chela with tooth near middle of cutting edge *P. tumida* Stimpson, 1858
 - Immobile finger of chela with tooth near middle of cutting edge *P. rathbuni* Sakai, 1934

Acknowledgements

The authors wish to thank Drs. Ernesto Campos and Tomoyuki Komai, and an anonymous reviewer for reviewing the manuscript and offering valuable comments for improvements. The type specimens of the new species were collected by the second author during the surveys directed by the late Dr. Masuoki Horikoshi of the Ocean Research Institute, the University of Tokyo, and the late Dr. Sigeo Gamo of the Yokohama National University. The authors wish to thank both directors and colleagues of the survey teams for their kind cooperation during field sampling.

References

- Davie, P. J. F. 2002. Crustacea: Malacostraca: Eucarida (Part 2): Decapoda-Anomura, Brachyura. *Zoological Catalogue of Australia*. Vol. 19.3B. xiv+641 pp. CSIRO Publishing, Melbourne.
- Haswell, W. A. 1882. *Catalogue of Australian Stalk- and Sessile-Eyed Crustacea*. xxiv+324 pp., 4 pls. Australian Museum, Sydney.
- Horikoshi, M., E. Tsuchida, M. Imajima, M. Takeda, S. Gamo, and S. Ohta. 1979. Notes on some invertebrates (hydromedusae, tubellarians, decapod and some lower crustaceans, and ophiuroids) from Otsuchi Bay and its vicinity. *Otsuchi Marine Research Center Report*, (5): 37–85. (In Japanese.)
- Ng, P. K. L., D. Guinot, and P. J. F. Davie. 2008. Systema Brachyurorum: Part 1. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bulletin of Zoology*, Supplement (17): 1–286.
- Rathbun, M. J. 1918. The grapsoid crabs of America. *Bulletin of the United States National Museum*, **97**: i–xxii, 1–183, pls. 15–41.
- Sakai, T. 1934. Species of the genus *Pinnixa* (Pinnotherid crab) found in the Far East. *Science Reports of the Tokyo Bunrika Daigaku*, Section B, **2**: 37–43.
- Sakai, T. 1976. *Crabs of Japan and the Adjacent Seas*. xxix+773 pp. (English text), 16 pp. +251 pls. (plates), 461 pp. (Japanese text). Kodansha, Tokyo.
- Schmitt, W. L., J. C. McCain, and E. S. Davidson. 1973. Decapoda I: Brachyura I: Fam. Pinnotheridae. *Crustaceorum Catalogus*, **3**: 1–160.
- Sekiguchi, H. 1983. Distribution of larvae of *Pinnixa rathbuni* Sakai (Decapoda: Pinnotheridae) in Ise Bay

- and its neighbouring coastal waters, central Japan. Part 3. Aggregation of the benthic adult population with reference to the spatial distribution of the planktonic larvae. *Journal of the Oceanographical Society of Japan*, **39**: 119–128.
- Takeda, M. and K. Konishi. 1991. Pinnotherid crabs from Otsuchi Bay, Iwate Prefecture, northeastern Japan. *Otsuchi Marine Research Center Report*, (17): 29–39. (In Japanese with English abstract.)
- Yamauchi, T. and K. Konishi. 2005. Notes on rare *Pinnixa* crabs (Decapoda, Brachyura, Pinnotheridae) of Japan. *Crustaceana*, **77**: 1237–1243.
- Zmarzly, D. L. 1992. Taxonomic review of pea crabs in the genus *Pinnixa* (Decapoda: Brachyura: Pinnotheridae) occurring on the California shelf, with descriptions of two new species. *Journal of Crustacean Biology*, **12**: 677–713.

Manuscript received 2 May 2008; revised 25 December 2008; accepted 26 December 2008.

Associate Editor: T. Komai