

Reassignment of *Pagurus miyakei* Baba, 1986 to *Propagurus* McLaughlin & de Saint Laurent, 1998 (Decapoda: Anomura: Paguridae) and description of the male

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Abstract.—The male of a species described as *Pagurus miyakei* Baba, 1986 is described from a specimen collected from deep water off the northeast coast of Taiwan, a new geographical record for this species. Close examination of the gills revealed a quadriserial condition, and the presence of reduced and rudimentary pleurobranchs above the second and third pereopods respectively, requiring the reassignment of this species to the genus *Propagurus* McLaughlin & de Saint Laurent, 1998.

Introduction

Pagurus miyakei Baba, 1986, was described on the basis of a female specimen collected from Tosa Bay, Japan (Baba, 1986), although additional specimens of this taxon had first been reported as *Pagurus* sp. from Koshiki-jima, Kagoshima Prefecture, and the Kii Peninsula by Miyake & Imafuku (1980). The latter specimens, however, are no longer extant (M. Imafuku, and K. Baba, personal communications). A male specimen of this species was recently found amongst a small collection of hermit crabs presented to the National Museum of Natural History, Smithsonian Institution (USNM) by Dr. Tin-Yam Chan, National Taiwan Ocean University. While preparing a description of this male, the gills were found to be quadriserial (cf. McLaughlin & de Saint Laurent, 1998),

and a count revealed the presence of reduced and rudimentary pleurobranchs above the second and third pereopods respectively, thus requiring the reassignment of *Pagurus miyakei* to the genus *Propagurus* McLaughlin & de Saint Laurent, 1998, which now contains five species. McLaughlin & de Saint Laurent (1998) established *Propagurus* for four species formerly assigned to *Pagurus* Fabricius, 1775: *P. gaudichaudii* (H. Milne Edwards, 1836), *P. deprofundis* (Stebbing, 1924), *P. haigae* (McLaughlin, 1997), and *P. yokoyai* (Makarov, 1938). However, Komai & Yu (1999) transferred *Pagurus obtusifrons* (Ortmann, 1892) to *Propagurus*, and considered Ortmann's taxon a senior synonym of *P. yokoyai*. An indication of animal size is given by its shield length (sl), as measured from the midpoint of the rostral lobe to midpoint of the posterior margin of the shield.

Propagurus McLaughlin & de Saint Laurent, 1998

Eupagurus — Barnard, 1950: 458 (in part).
Not *Eupagurus* Brandt, 1851.

Pagurus — Makarov, 1938: 169; 1962: 181 (in part); Miyake, 1978: 78 (in part); McLaughlin, 1997: 525 (in part). Not *Pagurus* Fabricius, 1775.

Propagurus McLaughlin & de Saint Laurent, 1998: 159.

Type species.—*Pagurus gaudichaudii* H. Milne Edwards, 1836.

Propagurus miyakei (Baba, 1986)

new combination

Figs. 1, 2

Pagurus sp. — Miyake & Imafuku, 1980: 63, pl. 2, fig. 6.*Pagurus miyakei* Baba, 1986: 205, fig. 22, pl. 152; Miyake, 1991: 198, pl. L8.

Material examined.—1 ♂ (sl = 14.1 mm), Tai-shi, I-lan County, NE Taiwan, deep water, 27 Apr 1995, from commercial trawler, USNM 276178.

Description of male (Fig. 1).—Shield distinctly longer than broad. Rostrum roundly subtriangular, subacute, not produced beyond level of lateral projections; without terminal spine. Lateral projections triangular, each with prominent submarginal spine. Ocular peduncles (left missing) approximately half length of shield; cornea not dilated. Ocular acicle (left missing) ovately triangular, dorsal surface somewhat concave, with submarginal spinule. Antennular peduncles overreaching distal margin of cornea by nearly entire length of ultimate segment when fully extended; basal segment unarmed. Antennal peduncles overreaching distal margin of cornea by approximately 0.25 length of ultimate segment; third segment with prominent ventrodorsal spine; second segment with dorsolateral distal angle produced, reaching to distal margin of fourth peduncular segment, with simple or bifid terminal spine, mesial margin with 2-4 small spines, lateral margin with few tufts of setae, dorsomesial distal angle with small spine; first segment with pair of spines on distolateral margin ventrally. Antennal acicles reaching to or beyond mid-length of fifth segment, each with strong terminal spine and numerous tufts of long stiff setae on mesial face.

Right cheliped with convex dorsal surface of dactyl covered with closely-spaced rounded tubercles each encircled by densely plumose setae (cf. irregular type 7

of Drach & Jacques, 1980; Jacques, 1989); ventromesial margin with row of rounded tubercles and adjacent row of tufts of dense setae; ventral surface smooth, but with 2 irregular rows of tufts of short setae; cutting edge with row of calcareous teeth in proximal 0.75, distal-most largest, row of small corneous teeth in distal 0.25, terminating in small corneous claw. Palm with convex dorsal surface covered with rounded and/or flattened tubercles circumscribed partially or completely with densely plumose setae (Fig. 1), 1 short longitudinal and 1 longer slightly oblique deep groove mesiad of midline; fixed finger with similar covering of closely-spaced tubercles encircled with densely plumose setae; cutting edge with row of calcareous teeth; ventral surfaces of palm and fixed finger smooth, but with few irregular rows of tufts of short setae. Carpus with single row of prominent spines on dorsomesial margin, becoming triple row distally, dorsal surface with few small spines, spinulose tubercles, and numerous sparse tufts of stiff setae; mesial face with few tuberculate spines dorsally, distomesial margin spinulose; dorsolateral margin not distinctly delimited, but with few tubercles distally, lateral face with tufts of stiff setae, distolateral margin spinose; ventral surface smooth, with 1 small tubercle distally and scattered tufts of setae. Merus with 2 prominent spines on dorsodistal margin, dorsal margin with short transverse ridges and long setae; ventromesial margin with row of small spinules distally and tufts of long setae; ventrolateral margin with row of small spines distally and tufts of long setae; ventral surface with few small tubercles distally and scattered tufts of long setae.

Left cheliped reaching mid-length of dactyl of right. Dactyl with 1 tubercle at dorsoproximal margin, otherwise unarmed but with scattered tufts of moderately long setae. Palm with convex dorsal surface covered on lateral half with

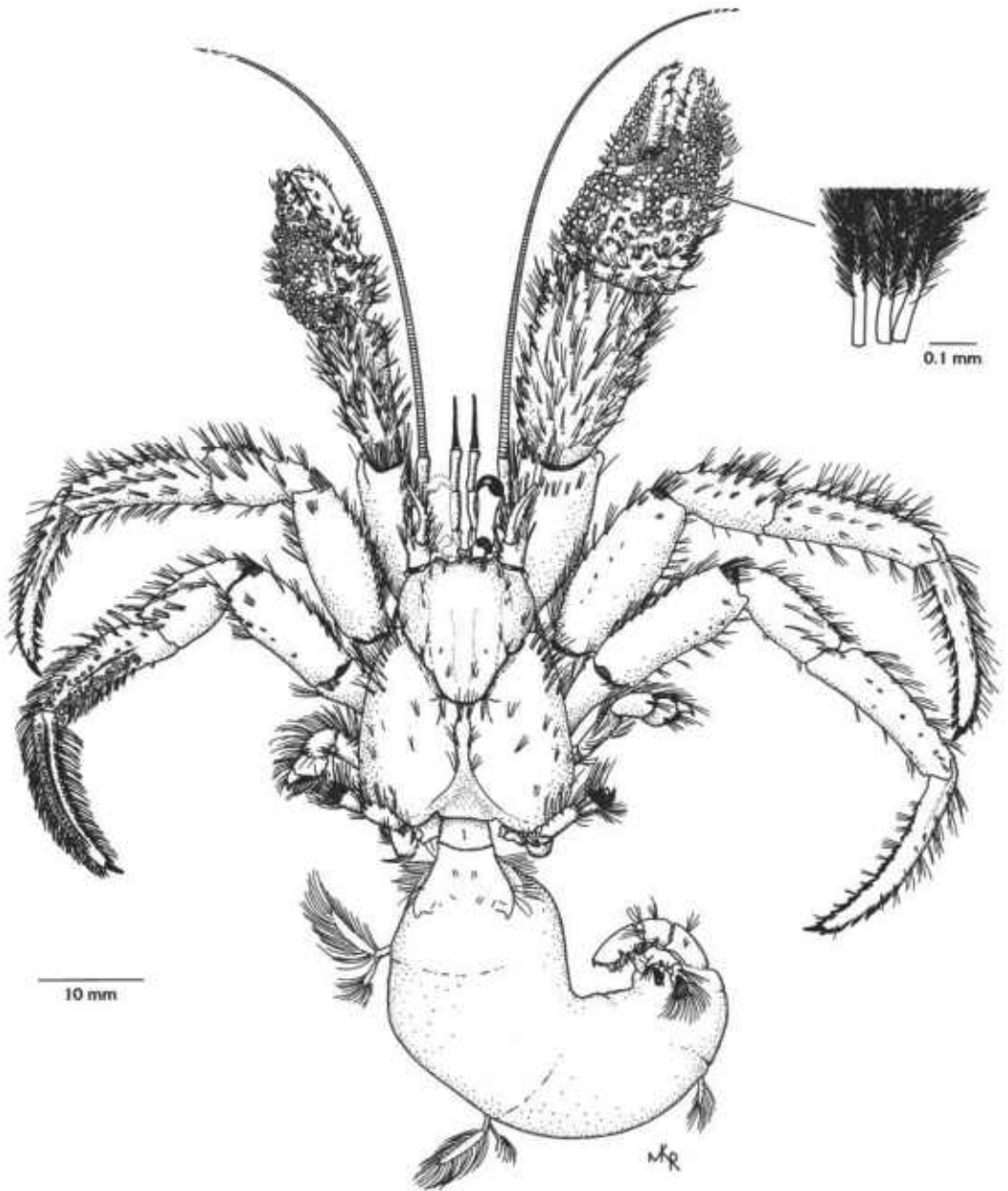


Fig. 1. *Propagurus miyakei* (Baba, 1986), male (sl = 14.1 mm), Tai-shi, I-lan County, NE Taiwan, USNM 276178: whole animal and detail of plumose setae (left eyestalk and ocular acicle missing, shown reconstructed using dotted line).

closely-spaced rounded and/or flattened tubercles extending nearly to tip of fixed finger, each circumscribed with densely plumose setae, dorsomesial surface with

few small tubercles and tufts of long setae, dorsomesial margin with 4 large, blunt tuberculate spines; ventral surfaces of palm and fixed finger smooth but with

irregular rows of tufts of long setae. Carpus subtriangular, with short row of spines and tufts of stiff setae on dorsolateral margin distally and shorter row of tuberculate spines on dorsomesial margin proximally, mesial and lateral faces each with numerous short transverse or oblique rows of long stiff setae; distomesial margin with few low tubercles partially obscured by long setae; distolateral margin with row of tuberculate spines. Merus with row of long stiff setae on dorsodistal margin, dorsal margin with transverse ridges and setae; ventromesial margin with few low tubercles partially obscured by long setae; ventrolateral margin with row of prominent spines in distal half.

Second and third pereopods overreaching chelipeds by approximately half length of dactyls; left slightly shorter than right; left and right similar except for lateral face of propodus and dactyl of left third pereopod (Fig. 2a). Dactyls moderately long and stout, approximately 1.25 length of propodi; in dorsal view slightly twisted; in lateral view slightly curved; dorsal surfaces each with row of stiff setae; lateral and mesial surfaces of left second and right second and third each with weak longitudinal sulcus in proximal half, lateral faces also with row of widely-spaced tufts of short stiff setae, mesial faces each with dorsal and ventral row of short corneous spines and stiff setae; ventral margins of second each with row of 7 (left) or 12 (right) and of third with 13 (left) or 17 (right) prominent corneous spines decreasing in size proximally. Propodi with tufts of long stiff setae dorsally and ventrally and few sparse tufts on mesial and lateral faces. Carpi each with row of strong spines on dorsal surface (second) or small dorsodistal spine and 1 (left) or 2 (right) smaller proximal spines (third); lateral surfaces each with longitudinal row of short setae, ventral surfaces with tuft of setae at distal margins, mesial faces nearly glabrous. Meri all with transverse rows of short stiff

setae dorsally, ventral margins of second pereopods each with row of very small spines, ventral margins of third unarmed. Dactyl of left third pereopod (Fig. 2a) with row of very long dense setae dorsally and ventrally, lateral face with longitudinal glabrous concavity flanked dorsally and ventrally by row of tubercles with tips, mesial face with shallow sulcus proximally, flanked by dorsal and ventral row of short corneous spines; propodus (Fig. 2a) also with dense dorsal and ventral row of long setae, lateral face somewhat flattened and with numerous tubercles similar to those on dactyl and forming 3 irregular rows in distal 0.65. Fourth pereopods with prominent preungual process at base of claw. Sternite of third pereopods with row of setae on roundly subcircular anterior lobe.

Male paired gonopores each partially masked by tuft of stiff setae; 3 unpaired, unequally biramous left pleopods (3-5).

Telson (Fig. 2b) with weakly asymmetrical posterior lobes separated by shallow median cleft; terminal margins each with row of very closely-spaced calcareous spines, not extending onto lateral margins.

Color.—Totally reddish brown. Chela dull yellow. Small light-colored spots on meri and carpi of chelipeds and ambulatory legs. Ocular peduncles with 3 irregular bands. Articles of antennal flagella alternating dull red and white (after Baba, 1986). In preservative only weak indications of ocular banding remain, no residual coloration on appendages.

Distribution.—Koshiki-jima west of Kyushu, Tosa Bay, Kumanonada off Kii Peninsula, and off northeast Taiwan (new record); 400 m.

Remarks.—*Propagurus miyakei* is immediately distinguished from the other four species assigned to the genus by the distinctive tuberculate armature of the chelae (Fig. 1) and dactyl and propodus of the third left pereopod (Fig. 2a).

As previously mentioned, the speci-

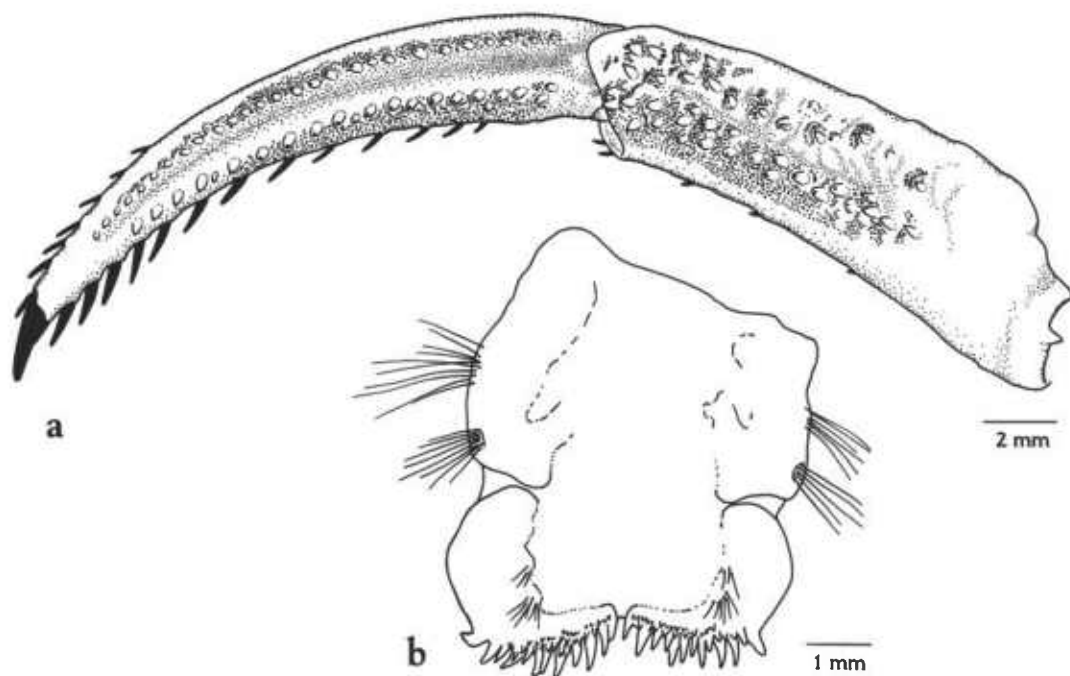


Fig. 2. *Propagurus miyakei* (Baba, 1986), male (sl = 14.1 mm), Tai-shi, I-lan County, NE Taiwan, USNM 276178: a, propodus and dactyl of left third pereopod, lateral view (long marginal setae omitted); b, telson, dorsal view.

mens reported by Miyake & Imafuku (1980) as *Pagurus* sp. are considered to represent *Propagurus miyakei* (M. Imafuku, personal communication). Miyake & Imafuku (1980) stated that several specimens were first collected by Ryo Imaoka from Koshiki-jima, Kagoshima Prefecture, and one male collected by Shingo Habu from the Kii Peninsula. Their photograph (pl. 2, fig. 6) is of an ovigerous female, probably from Koshiki-jima. Unfortunately Miyake & Imafuku's (1980) specimens are no longer extant (M. Imafuku, and K. Baba, personal communications).

Miyake & Imafuku (1980) suggested a relationship between *Propagurus miyakei* (as *Pagurus* sp.) and *Pagurus pergranulatus* (Henderson, 1896); whereas Baba (1986) considered its closest allied species to be *Pagurus undosus* (Benedict, 1892) and *P. trigonocheirus* (Stimpson, 1858).

Generic differences notwithstanding, the resemblances among these four species are superficial at best. All four do have stout ambulatory legs, with moderately short dactyls, and the lateral faces of the left third propodi are frequently provided with tubercles, at least in *Pagurus trigonocheirus* and *P. undosus* as they are in *Propagurus miyakei*. Additionally, the configuration of the left chela is triangular in cross section, although the midline is more prominently elevated into a crest in *Pagurus undosus* and *P. trigonocheirus* than in either *P. pergranulatus* or *Propagurus miyakei*. The armature of the chelipeds of *Pagurus pergranulatus* is tuberculate as is that of *P. undosus*, and the latter species does have sculpturing of the dorsal surface of the right palm that approaches that of *Propagurus miyakei*. In having three unpaired male pleopods, *P. miyakei* resembles *Pagurus trigonocheirus* and *P.*

undosus. Four unpaired male pleopods are present in *P. pergranulatus*; however, the phylogenetic significance of male pleopod numbers is still under investigation.

The very distinctive structure of the setae of *Propagurus miyakei* sets this species apart not only from the species of *Pagurus* it ostensibly is similar to, but from all other species of *Propagurus* as well. The densely plumose setae of the chelae presumably serve a generally protective function for the cuticle (cf. Drach & Jacques, 1980).

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