

***Pagurus spina*, a new species of hermit crab
(Decapoda: Anomura: Paguridae) from Japan**

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Abstract. — A new intertidal species of hermit crab of the genus *Pagurus*, *P. spina* is described and illustrated on the basis of one male and two female specimens from Miyako, on the Pacific coast of northeastern Honshu, Japan. The new species apparently resembles *P. lanuginosus* De Haan, 1849, also from Japan, but shows differences in the morphology of the chelipeds, armature of the anterior lobe of sternite of the third pereopods, and coloration.

The systematics of the hermit crabs from northern Japan still has not been studied in detail, although some faunal list or new records have recently been published (Igarashi, 1970; Miyake, 1982; Takeda & Hayashi, 1990; Takeda & Miyauchi, 1992; Komai *et al.*, 1992; Komai, 1993; 1994a, 1994b; Takeda, 1993). Hermit crabs of the genus *Pagurus*, such as *P. filholi* (De Man, 1887) (formerly known as *P. geminus* McLaughlin, 1976; Sandberg & McLaughlin, 1993), *P. middendorffii* (Brandt, 1851), and *P. lanuginosus* De Haan, 1849, are common inhabitants of the rocky intertidal zone of this region. The examination of an intertidal decapod collection from the Miyako Bay (39°40'N, 141°58'E), on the Pacific coast of northeastern Honshu, Japan, revealed the existence of an undescribed species, herein described as *P. spina*, closely related to *P. lanuginosus*, but clearly distinguishable by several morphological characters.

The holotype and one of the paratypes are deposited in the Natural History Museum and Institute, Chiba (CBM), and another paratype will be deposited in the National Science Museum, Tokyo (NSMT). The abbreviation SL indicates shield length measured from the tip of the rostrum to the midpoint of the posterior margin of the shield. Terminology follows McLaughlin (1974).

***Pagurus spina* new species**

Figs. 1-3

Type Material. — Holotype: CBM-ZC 376, 1 ♂ (SL 5.6 mm); Jodogahama, Miyako, Iwate Prefecture, northeastern Honshu, Japan; rocky intertidal; 23 July 1986; coll. T. Komai. Paratypes: NSMT-Cr 11387, 1 ♀ (SL 3.5 mm); Kanbayashi, Miyako; 2-3 m deep; trap; 2 Oct. 1986; coll. T. Komai. CBM-ZC 377, 1 ovig. ♀ (SL 5.3 mm); Jodogahama, Miyako; rocky intertidal; 14 June 1987; coll. T. Komai.

Description. — Relatively small, hairy species.

Shield (Fig. 1A) almost as long as broad; anterolateral margins sloping or slightly terraced; anterior margin between rostrum and lateral projections almost straight; lateral margins convex; posterior margin rounded; dorsal surface with numerous tufts of long stiff setae. Rostrum very strongly produced, far overreaching lateral projections, triangular, terminating in acute spine; partially obscured by tuft of moderately long setae. Lateral projections obsolete, with small

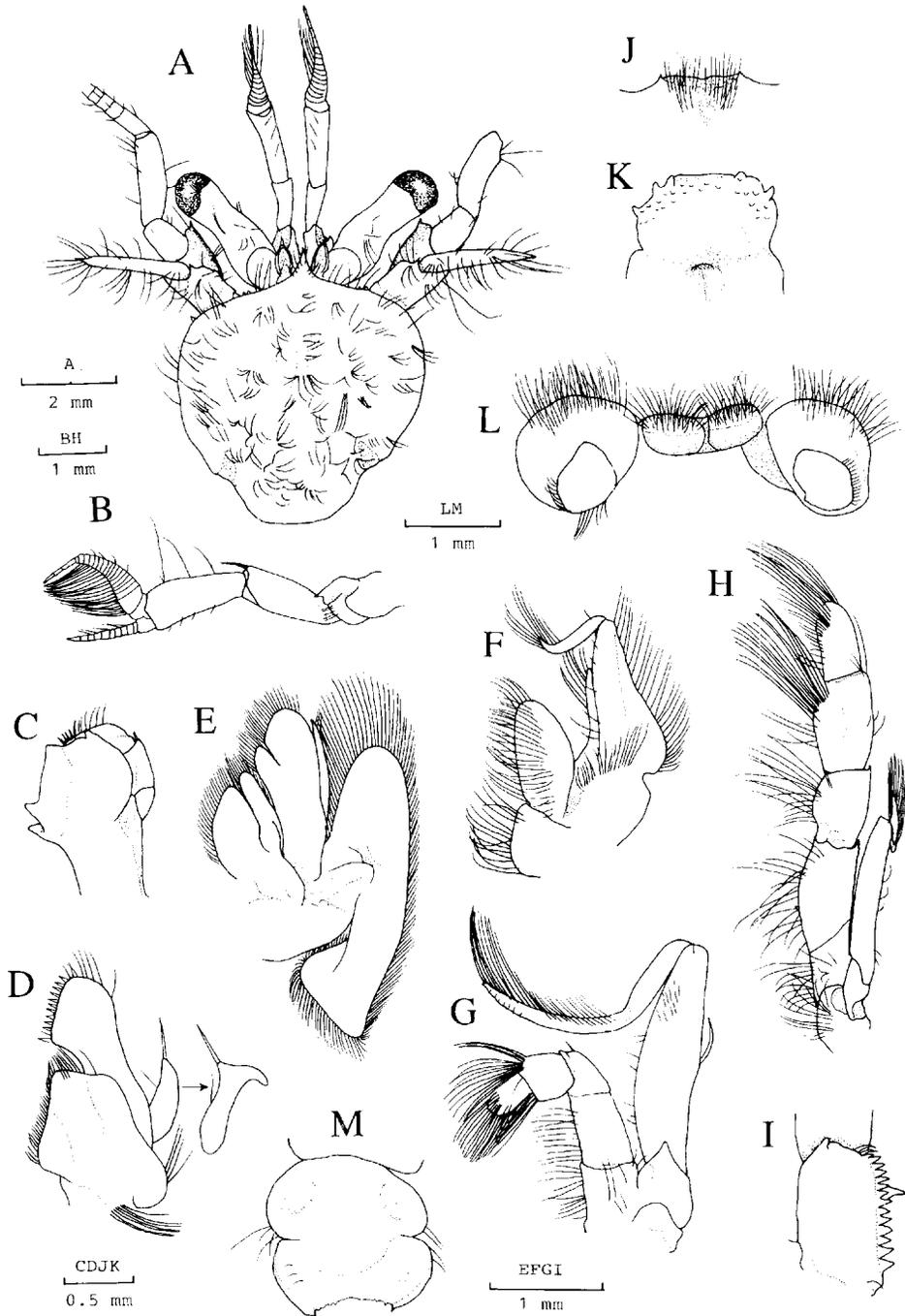


Fig. 1. *Pagurus spina* new species. Holotype male (SL 5.6 mm), all appendages from left side. A, shield and cephalic appendages, dorsal; B, antennule, lateral; C, mandible, external; D, maxillule, external, inset, endopod, lateral; E, maxilla, external; F, first maxilliped, external; G, second maxilliped, external; H, third maxilliped, lateral; I, ischium of third maxilliped, dorsal; J, sternite of third maxilliped, ventral; K, sternite of third pereopods, ventral; L, coxae and sternite of fifth pereopods; M, telson, dorsal.

marginal spine and 1 or 2 additional marginal tubercles mesial to lateral projections. Posterior carapace poorly calcified except for somewhat calcified cardiac region, with numerous tufts of long setae.

Ocular peduncles (Fig. 1A) relatively short, 0.6 times as long as shield, somewhat inflated basally, with cornea very slightly dilated; dorsal face with irregular longitudinal row of tufts of moderately long setae and prominent tuft of setae at base of cornea. Ocular acicles moderately slender, subovate, terminating acutely with strong submarginal spine.

Antennular peduncles (Fig. 1A, B) moderately long, exceeding ocular peduncles by half length of ultimate segment. Ultimate segment 0.25 times as long as shield, with scattered long setae on dorsal surface and row of short setae on ventral surface. Basal segment with statocyst bluntly pointed, separated by narrow incision; lateral margin unarmed.

Antennal peduncle (Fig. 1A) moderately long, exceeding ocular peduncles by half length of fifth segment. Fifth and fourth segments unarmed, with scattered tufts of short setae. Third segment with ventromesial distal angle bearing acute spine. Second segment partially obscured by long stiff setae, with dorsolateral distal angle strongly produced, terminating in bifid spine; mesial margin unarmed, dorsomesial distal angle with strong spine. First segment with spine on lateral face distally; ventromesial margin with row of spinules distally. Antennal acicle moderately long, reaching level of mid-length of fifth segment of antennal peduncle, somewhat arcuate, terminating in acute spine; dorsal surface with tufts of stiff setae; mesial margin unarmed. Antennal flagellum long, overreaching tip of right cheliped, each article usually with several minute bristles and with 1 or 2 additional short setae.

Mandible (Fig. 1C) without distinguishing characters. Maxillule (Fig. 1D) with proximal endite not tapering; endo-

pod with 1 seta on slightly produced inner lobe, outer lobe very well developed, slightly recurved. Maxilla (Fig. 1E) with endopod inflated basally, overreaching anterior margin of scaphognathite. First maxilliped (Fig. 1F) with endopod approximately two-thirds length of exopod; exopod strongly expanded proximally. Second maxilliped (Fig. 1G) with basis-ischium fusion incomplete. Third maxilliped (Fig. 1H, I) with ischium bearing well developed crista dentata and 1 accessory tooth; merus with dorsodistal and ventral spines; carpus with dorsodistal spine. Sternite of third maxilliped (Fig. 1J) with anterior margin very slightly concave, partially obscured with tufts of setae, each anterolateral corner with small spine.

Right cheliped (Fig. 2A, B) considerably stronger than left in male and only somewhat stronger than left in females, moderately long and slender. Chela 1.7 times as long as broad and 1.5 times as long as carpus. Dactyl moderately long, distinctly longer than palm measured along mesial margin; cutting edge with row of strong calcareous teeth in proximal three-fifths, short row of corneous teeth distally, terminating in small corneous claw; dorsal surface elevated in midline with row of moderately strong spines, few scattered small spines mesial to midline and tufts of long stiff setae, dorsomesial margin with row of relatively small spines and tufts of stiff setae; lateral and ventral surfaces unarmed, but with tufts of long stiff setae. Cutting edge of fixed finger with strong calcareous tooth proximally and small corneous teeth near apex, terminating in small corneous claw. Palm moderately inflated dorsoventrally; dorsal surface convex, with irregular rows of moderately strong or strong spines (spines in females stronger than in male) and tufts of long stiff setae, dorsomesial margin poorly delimited, dorsolateral margin with single row of moderately strong spines decreasing in size proxi-

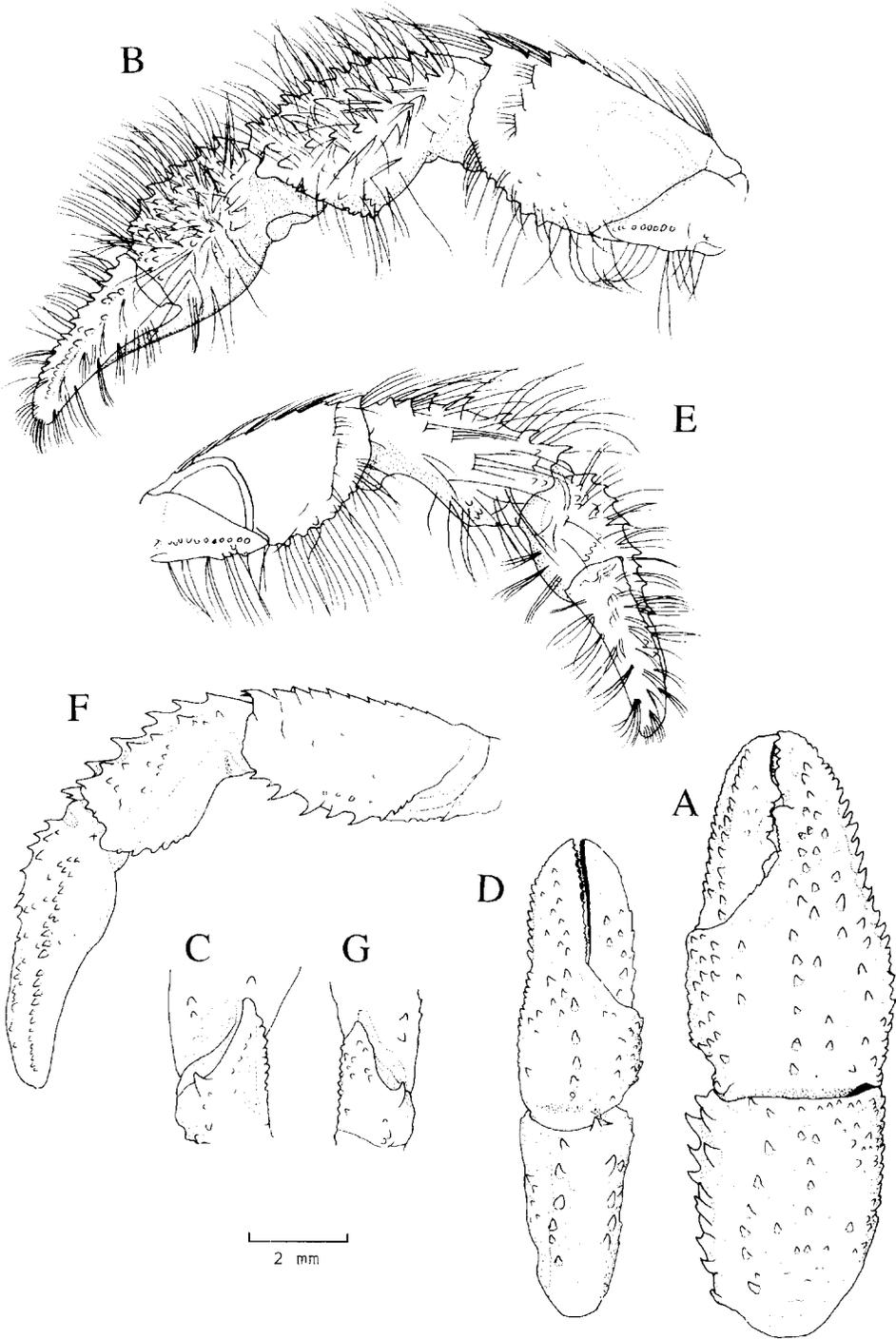


Fig. 2. *Pagurus spina* new species. Holotype male (SL 5.6 mm). Chelipeds (A, D, C, G, setae omitted). A, right chela and carpus, dorsal; B, entire right cheliped, mesial; C, ischium of right cheliped, ventral; D, left chela and carpus, dorsal; E, entire left cheliped, mesial; F, same, lateral; G, ischium of left cheliped, ventral.

mally and distally, and tufts of long stiff setae; lateral surface with scattered small spines or tubercles and tufts of long stiff setae; ventral face without spines or tubercles, but with tufts of long stiff setae; mesial surface with few spinulose tubercles and tufts of long stiff setae. Carpus moderately long, almost as long as merus measured along dorsal margin, moderately inflated ventrally; dorsomesial margin with row of strong spines and tufts of long stiff setae, dorsomesial distal angle slightly produced, with 2 or 3 strong spines; dorsal surface with scattered small or moderately strong spines, distal spines submarginal, and tufts of long stiff setae; dorsolateral margin poorly delimited; mesial surface with short row of moderately strong spines along dorsomesial margin, with numerous tufts of long stiff setae, distal margin with few moderately strong or small spines; lateral face with scattered small spinulose tubercles and long stiff setae, distal margin tuberculate; ventral surface with tufts of long stiff setae. Merus subtriangular; dorsal surface distally with transverse ridges bearing long stiff setae, distal margin with 3 or 4 strong spines; lateral face unarmed, with scattered short setae, ventrolateral margin with irregular row of strong spines; ventral surface with scattered tubercles and tufts of long stiff setae; mesial surface with vertical or transverse ridges bearing long stiff setae and with scattered very short setae, ventromesial margin with moderately strong spines and tufts of long stiff setae, distal margin unarmed. Ischium (Fig. 2C) with row of small spines on ventromesial margin, ventrolateral margin with tubercles, ventrolateral distal angle produced as moderately strong spine. Coxa with ventrolateral margin bearing small tubercles, ventrodiscal margin with dense tufts of long stiff setae.

Left cheliped (Fig. 2D-F) moderately long, exceeding base of dactyl of right, slender. Chela 2.3 times as long as broad,

1.6 times as long as carpus measured along median line. Dactyl long, 1.8 times as long as palm measured along mesial margin; cutting edge with regular row of small corneous teeth, terminating in corneous claw; dorsal, lateral and ventral surfaces with tufts of moderately long or long stiff setae; dorsal surface not markedly elevated, with scattered small spines, dorsomesial margin not delimited. Palm armed on dorsal surface with scattered moderately strong spines and tufts of long stiff setae, slightly elevated in midline with row of spines extending onto fixed finger, dorsomesial margin not delimited, dorsolateral margin with single row of rather small spines or spinulose tubercles decreasing in size distally and proximally; ventral surface with short transverse rows of long stiff setae; cutting edge of fixed finger with row of small corneous teeth interspersed with small acute calcareous teeth. Carpus slightly shorter than merus; dorsolateral and dorsomesial margins each with row of strong spines and tufts of long stiff setae, distal margin with few small spines laterally and 1 strong spine at dorsomesial angle, dorsal face unarmed, with tufts of long stiff setae; mesial face with short vertical row of long stiff setae, distal margin with few tubercles; ventral surface with scattered long setae; lateral surface with scattered small spines, ventrolateral margin with row of moderately strong spines. Merus subtriangular, somewhat compressed laterally; dorsal surface with transverse ridges bearing long stiff setae, distal margin with 1 or 2 strong spines; lateral surface not spinulose, with few short setae, ventrolateral margin with single row of strong spines and long stiff setae or tufts of long stiff setae; mesial face nearly naked, ventromesial margin with row of moderately strong spines or small rounded tubercles and tufts of long stiff setae; ventral surface almost naked. Ischium (Fig. 2G) with row of spinulose tubercles on ventromesial margin; ventral

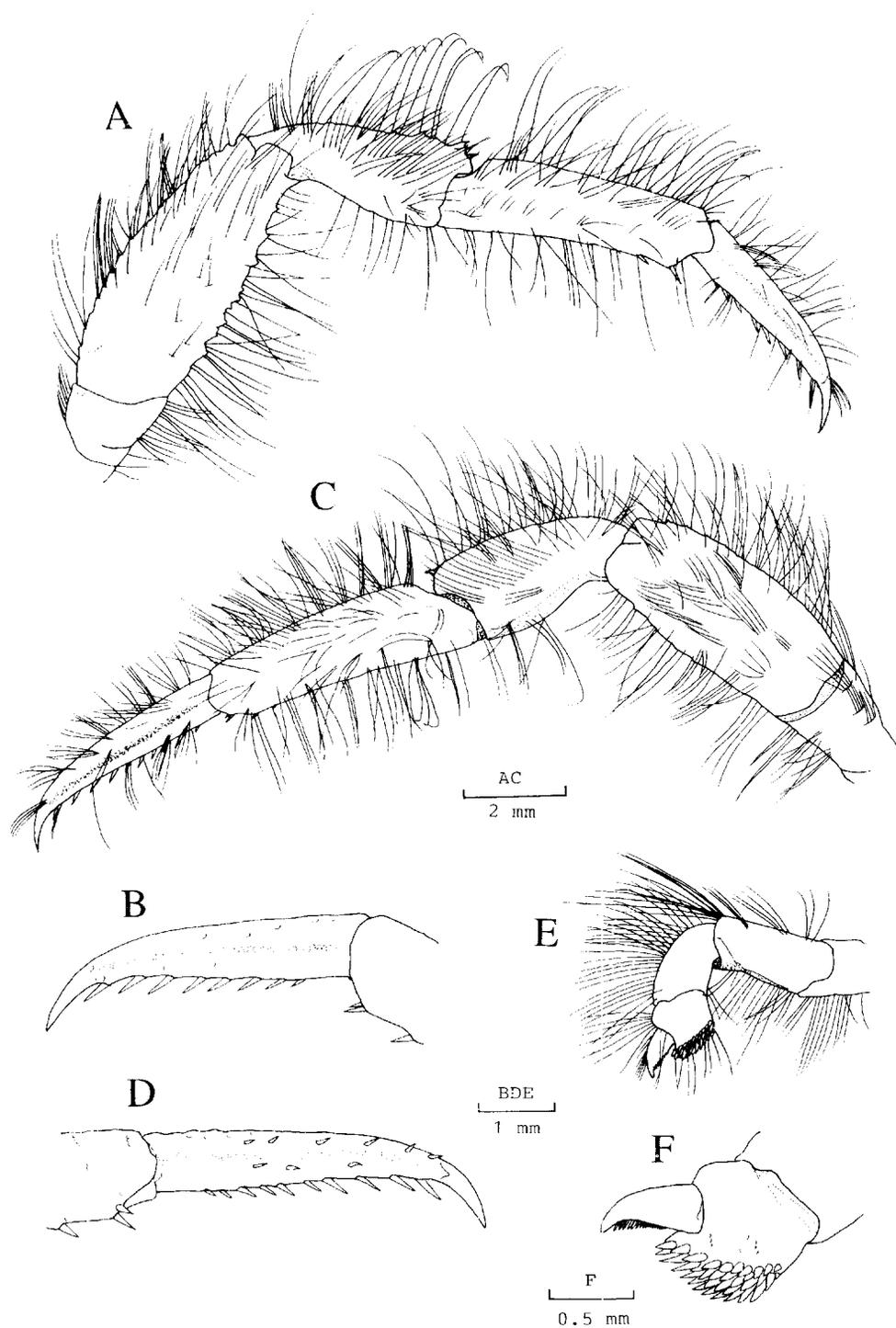


Fig. 3. *Pagurus spina* new species. Holotype male (SL 5.6 mm), second to fourth pereopods. A, right second pereopod, lateral; B, dactyl of same, mesial; C, left third pereopod, lateral; D, dactyl of same, mesial; E, left fourth pereopod, lateral; F, same, dactyl and propodus.

surface with spinulose tubercles distally and tufts of long stiff setae; ventromesial angle produced as moderately strong spine. Coxa similar to that of right.

Second and third pereopods (Fig. 3A, C) similar in general from right to left. Dactyls (Fig. 3B, D) 0.9 times as long as propodi, moderately broad, slightly twisted, terminating in strong, curved corneous claws; dorsal surfaces with tufts of long stiff setae; lateral and mesial faces with shallow longitudinal sulcus flanked by tufts of long stiff setae (second) and small corneous spines (third); ventral margins each with 8 or 9 moderately strong corneous spines, increasing in size distally. Propodi 1.5 times as long as carpi; dorsal, mesial, and lateral surfaces all with tufts of long stiff setae; ventral surfaces each with pair of corneous spines at distal margin, followed by 1-3 widely spaced corneous spines in distal half. Carpi with dorsal margin of left second bearing 3 or 4 moderately strong spines including one subterminal and low protuberances or only with subterminal spine in others, all with tufts of long stiff setae; lateral surfaces with dense tufts of long stiff setae, mesial surfaces nearly naked; ventral margins with few tufts of long stiff setae. Meri with dorsal margins each with single row of low protuberances (second) or only slightly protuberant (third) and tufts of long stiff setae; lateral surfaces with scattered tufts of long stiff setae, mesial surfaces almost naked; ventral margins each with prominent subdistal spine, followed by double rows of small spines or spinulose tubercles (second) or apparently unarmed (third), all with tufts of long stiff setae. Ischia with dorsal and ventral margins not markedly tuberculate, but with tufts of moderately long or long stiff setae. Coxae of third pereopods each with genital pore in female.

Anterior lobe of sternite of third pereopods (Fig. 1K) subrectangular, with spinulose tubercles on anterolateral mar-

gins.

Fourth pereopods (Fig. 3E, F) subchelate. Dactyl, long, lacking preungual process, dorsal margin with few tufts of short stiff setae. Propodus with well developed rasp of 3 or 4 rows of corneous scales; ventral margin strongly convex. Dorsal margins of propodus, carpus, and merus with long, dense setae.

Fifth pereopods chelate; coxae in male (Fig. 1L) each with gonopore partially encircled by short stiff setae. Sternite (Fig. 1L) developed as paired circular lobes.

Abdomen strongly twisted, with 3 unpaired left pleopods in male, 4 in females; tergites of second and third somites with tufts of moderately long setae. Uropods strongly asymmetrical, exopod of left with row of moderately spaced stiff setae on dorsal margin. Telson (Fig. 1M) with posterior lobes divided by shallow median cleft, lateral margins rounded, smooth, terminal margins slightly oblique, each armed with row of minute spinules and small but distinct spine at posterolateral angle.

Eleven pairs of phyllobranchiate gills present (2 arthrobranchs on either side of third to seventh thoracic somites and 1 pleurobranch on either side of seventh somite.

Coloration in life. — Chelipeds and ambulatory pereopods greenish brown, without distinct bands, stripes, or spots; setae light brown. Antennal flagellum reddish brown. Shield greenish brown or grayish brown; posterior carapace with some obscure white stripes on gray background. In preservative, color fading to uniformly straw.

Biological note. — This species was found in the tide pool on the rocky substrate with dense patches of sea weed, *Phyllospadix* sp., or in the shallow subtidal, where *Pagurus filholi*, *P. lanuginosus* or *P. middendorffii* are commonly found, but the new species seemed to be very rare. *Pagurus spina* used shells of *Chlorostoma lischkei* (Tapparone-

Canefri) and *Littorina brevicula* (Philippi).

Distribution. — Known only from the type-locality.

Etymology. — The specific name is a noun in apposition from the Latin *spina* (spine), referring to the presence of ventral spine on the ischia of chelipeds.

Remarks. — Among the western Pacific species of *Pagurus*, *P. spina* most closely resembles *P. lanuginosus*, particularly in the strongly produced, acute rostrum, and thickly hairy chelipeds and ambulatory pereopods. I compared the new species with specimens of *Pagurus lanuginosus* from southern Hokkaido (CBM-ZC 274, 2 ♂, 2 ovig. ♀), and found that it differs from the latter in several morphological characters. The presence of a spine at the ventrolateral distal corner of ischium of either cheliped and spinulose anterior lobe of sternite of the third pereopod distinguish immediately the new species from *P. lanuginosus*. The spination of the right palm of *P. spina* differs from that of *P. lanuginosus* in that the dorsomesial margin of the right palm of the latter species has a row of strong spines whereas a distinct row of spines is absent in the new species. The absence of a strong protuberance just posterior to the dactylar articulation of right palm is also a reliable character to distinguish the new species from *P. lanuginosus*. In coloration, *P. spina* is also generally similar to *P. lanuginosus*, but apparently differs from it in the absence of scattered black spots on the chelipeds and ambulatory pereopods.

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