

# *Pagurus parvispina*, a New Species of Hermit Crab (Decapoda: Anomura: Paguridae) from Northern Japan

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**Abstract** A new species of hermit crab, *Pagurus parvispina*, is described and illustrated on the basis of eight specimens collected from southern Hokkaido and Iwate, northeastern Honshu mainland, Japan, at sublittoral depths of 100–200 m. It is a member of the “*capillatus*” group, differing from its closest relative *P. arcuatus* Squires, 1964, from the northeastern Atlantic in having less dilated corneal region of the ocular peduncle and several tufts of long setae obscuring the lateral surface of the dactyl of the left third pereopod.

**Key words:** *Pagurus parvispina*; new species; Paguridae; Anomura; northern Japan.

In this paper I describe a new species of pagurid hermit crab of the genus *Pagurus*, the fifth new species of hermit crab from material collected during a continuous taxonomic study of decapod crustaceans in northern Japan by the author, since 1987. Previously described species are: *Pagurus spina* Komai, 1994b; *P. nigrofascia* Komai, 1996; *Discorsopagurus maclaughlinae* Komai, 1995; and *D. cavicola* Komai & Takeda, 1996. The specimens of the present new species were collected from the Pacific coast of southern Hokkaido (off Esan and off Tomakomai) and from off Miyako, Iwate Prefecture, northeastern Honshu, at sublittoral depths of 150–200 m. They represent a species of the “*capillatus*” group of *Pagurus* proposed by McLaughlin (1974), which includes seven species at present (McLaughlin, 1974; Komai, 1994a; Komai, unpublished data). In order to ascertain the identity of the present specimens I compared them with authentic specimens or previous descriptions of these close species, and confirmed that the Japanese specimens are distinct, but strikingly close to *P. arcuatus* Squires, 1964.

### Materials and Methods

The holotype is deposited in the Natural History Museum and Institute, Chiba (CBM), and the paratypes are deposited in the Labo-

ratory of Marine Zoology, Faculty of Fisheries, Hokkaido University (HUMZ) and the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). The abbreviation SL indicates shield length measured from the tip of the rostrum to the midpoint of the posterior margin of the shield. Terminology mainly follows McLaughlin (1974); and Lemaitre (1995) is referred to for the carapace sulci. The drawings were made with the aid of a drawing tube mounted on an OLYMPUS SZH stereomicroscope.

The data of the comparative specimens are as follows:

*Pagurus arcuatus* Squires, 1964: USNM 2606, 2 males (SL 8.4, 10.9 mm) and 1 female (SL 10.4 mm), off Gloucester, Massachusetts, U.S., North Atlantic Ocean, 42°31' N, 70°37' W, 75.6 m depth, 16 Sept 1878, RV *Speedwell*, det. A. B. Williams; USNM 10197, 1 male (SL 7.3 mm) and 4 females (6.4–10.0 mm), Misaine Bank, off Nova Scotia, Canada, North Atlantic Ocean, 45°27.30' N, 58°27.45' W, 90 m depth, 6 July 1885, dredge by RV *Albatross*, det. A. B. Williams.

*Pagurus capillatus* (Benedict, 1892): USNM 282239, 3 males (SL 6.0–8.0 mm) and 9 females (SL 10.9–12.4 mm), Bering Sea, 49 m depth, 55°40' N, 162°49' W, 28 July 1961, RV *Albatross*, det. P. A. McLaughlin.

*Pagurus brachiomastus* (Thallwitz, 1891): CBM-ZC 1684, 1 male (SL 9.5 mm), Miyako Bay, Iwate, northeastern Honshu, Japan, 15–20 m depth, 24 May 1995, caught by gill net, coll. and det. T. Komai.

*Pagurus pectinatus* (Stimpson, 1858): CBM-ZC 2363, 1 female (SL 9.0 mm), topotypic material, Hakodate Bay, southern Hokkaido, 10–20 m depth, 17 March 1995, caught by gill net, coll. and det. T. Komai.

### Sytematics

#### *Pagurus parvispina* sp. nov.

(Figs. 1–4)

*Pagurus rathbuni*: Igarashi, 1969: 6, pl. 4, fig. 13. Not *Pagurus rathbuni* (Benedict, 1892). See Remarks.

*Type-material.* Holotype: CBM-ZC 2700, female (SL 10.0 mm), off Esan, southern Hokkaido, 42° 10' N, 143° 32' E, 180–200 m depth, July 1987, commercial shrimp trap, coll. T. Komai.

Paratypes: HUMZ-C 54, 1 male (SL 11.2 mm), 1 female (SL 9.4 mm), data as for holotype; HUMZ-C 210, 1 male (SL 7.1 mm), off Miyako, Iwate, northeastern Honshu mainland, 150–200 m depth, 30 March 1987, commercial trawler, coll. T. Komai; HUMZ-C 399, 1 male (SL 5.0 mm), off Tomakomai, southern Hokkaido, 29 June 1988, otter trawl by RV Ushio-Marui, coll. F. Muto; HUMZ-C 404, 2 males (SL 5.4, 6.0 mm), off Tomakomai, 2 July 1988, otter trawl by RV Ushio-Marui, coll. F. Muto; USNM 276022, 1 male (SL 11.1 mm), data as for HUMZ-C 399.

*Description.* Shield (Fig. 1A) slightly longer than broad; anterolateral margins sloping; anterior margin between rostrum and lateral projections weakly concave; lateral margins convex; posterior margin roundly truncate; dorsal surface with scattered tufts of short or long stiff setae. Rostrum moderately produced, slightly overreaching lateral projections, triangular, terminating in acute or subacute spine; partially obscured by tuft of long setae. Lateral projections each with prominent marginal spine. Posterior carapace poorly calcified except for posteromedian plate, with numerous tufts of long setae laterally; posteromedian plate well calcified; cardiac sulci slightly divergent posteriorly; sulci

cardiobranchialis short.

Ocular peduncles (Fig. 1A) moderately long and stout (ratio of ocular peduncle length/shield length 0.7; ratio of ocular peduncle length/corneal width 3.6–4.3), slightly inflated basally, corneal region slightly dilated; dorsal face with longitudinal row of tufts of stiff setae. Ocular acicles with mesial margins strongly convex, lateral margins slightly convex, with strong submarginal terminal spine.

Antennular peduncles (Fig. 1A, B) moderately long and slender, exceeding ocular peduncles by half length of ultimate segment. Ultimate segment about 1.5 times as long as intermediate segment, with few setae only on dorsal surface. Basal segment laterally unarmed; statocyst separated from basal segment by narrow incision.

Antennal peduncles (Fig. 1A) moderately long, slightly falling short of or reaching distal margin of cornea of ocular peduncles; supernumerary segmentation present. Fifth and fourth segments with few tufts of short setae. Third segment with ventromesial distal angle produced, terminating in strong acute spine, obscured by stiff setae. Second segment with dorsolateral distal angle strongly produced, terminating in acute spine obscured by stiff setae, mesial margin with few spines, lateral margin with row of setae; dorsomesial distal angle with small spine, mesial surface with numerous setae. First segment with or without spine on lateral face distally; ventromesial margin strongly spinulose laterally. Antennal acicle moderately long, reaching or slightly falling short of mid-length of fifth peduncular segment, weakly arcuate, terminating in acute spine; dorsomesial surface with row of tufts of stiff setae; mesial margin unarmed. Antennal flagellum long, overreaching tip of right cheliped, each article usually with few minute bristles.

Mandible (Fig. 1C) without distinguishing character. Maxillule (Fig. 1D) with proximal endite subquadrate; endopod with 2 setae on strongly produced inner lobe, outer lobe tapering distally, not recurved. Maxilla (Fig. 1E) with endopod inflated basally, falling slightly short of anterior margin of scaphognathite; external surface of distal endites setose.

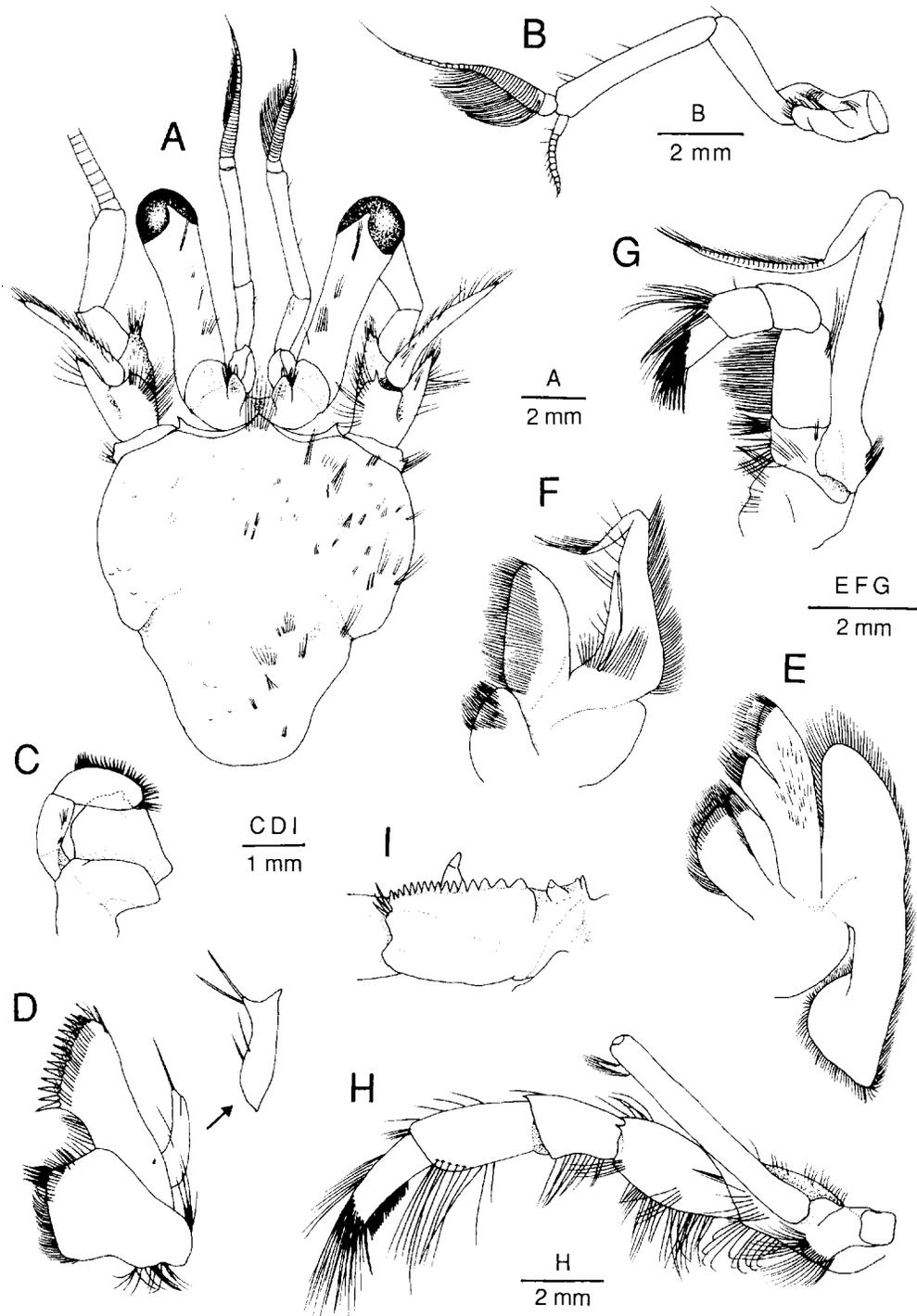


Fig. 1. *Pagurus parvispina* sp. nov. Holotype female from off Esan, southern Hokkaido, SL 10.0 mm. Appendages dissected from left. A, shield and cephalic appendages, setae on shield omitted from left side; B, antennule, lateral; C, mandible, internal; D, maxillule, external, inset, endopod, lateral; E, maxilla, external; F, first maxilliped, external; G, second maxilliped, external; H, third maxilliped, lateral; I, ischium and basis of same, internal (dorsal).

First maxilliped (Fig. 2F) with endopod approximately two-thirds length of exopod; exopod strongly inflated proximally. Second maxilliped (Fig. 1G) with incomplete basisischium fusion. Third maxilliped (Fig. 1H) with ischium (Fig. 1I) bearing well developed crista dentata, teeth becoming broader and more blunt proximally, and 1 strong accessory tooth; merus with 1 or 2 dorsodistal and 1 ventromesial spines; carpus with dorsodistal spine. Third thoracic sternite with anterior margin slightly concave, partially obscured with tufts of setae, anterolateral corners each with small spine.

Right cheliped (Fig. 2) somewhat elongate and slender, without torsion. Chela about twice as long as broad and 1.4 times as long as carpus. Dactyl relatively long, flattened distally, subequal to or slightly longer than palm, without prominent hiatus when closed, surfaces with tufts of long setae; cutting edge with row of strong calcareous teeth in proximal three-fourths, short row of corneous teeth in distal one-fourth, terminating in small corneous claw; dorsal surface with row of moderately strong or strong spines mesially, dorsomesial margin with double row of moderately strong spines; mesial and ventral surfaces nearly smooth. Fixed finger flattened distally, surfaces with tufts of long setae; cutting edge with low calcareous teeth in proximal half and row of small calcareous and corneous teeth in distal half, terminating in small corneous claw. Palm slightly inflated dorsoventrally, surfaces and margins with tufts of long setae; dorsal surface convex, with several rows of moderately strong or strong spines; dorsomesial margin with row of strong spines, dorsolateral margin with row of strong spines decreasing in size distally and proximally; lateral, mesial and ventral surfaces with moderately strong or small spines or spinulose tubercles. Carpus subequal in length to merus, slightly widened distally, moderately inflated ventrally, with tufts of long setae on surfaces and margins; dorsomesial margin with single or double row of strong spines, dorsomesial distal angle slightly produced, with cluster of strong spines; dorsal surface with scattered small spines, usually also with one irregular row of small

or moderately strong spines mesially; distal margin with row of some small spines; dorso-lateral margin with row of small or moderately strong spines; lateral face unarmed ventrally, ventrodistal margin with row of moderately strong spines; ventral surface unarmed or with scattered small spines or spinulose tubercles; mesial face with scattered moderately strong spines, sometimes with row of spines dorsally, distal margin with row of moderately strong spines. Merus subtriangular in cross section; dorsal surface with low transverse ridges bearing stiff setae distally, distal margin with row of prominent, slender spines; lateral face with scattered low, multidenticulate protuberances and few tufts of short setae, ventrolateral margin with row of strong spines; mesial face nearly unarmed, with vertical rows of long setae dorsally, ventromesial margin with single or double row of strong spines; ventral surface with scattered strong spines, multidenticulate tubercles and tufts of long setae. Ischium with row of small spines on ventromesial margin, ventrolateral margin smooth, ventrolateral distal angle not produced. Coxa with row of small tubercles on ventromesial margin, ventrodistal margin with dense tufts of long setae.

Left cheliped (Fig. 3A–D) moderately short and slender, exceeding base of dactyl of right cheliped. Chela about 2.7 times as long as broad and 1.7 times as long as carpus. Dactyl long, about twice times as long as palm, surfaces and margins with tufts of long setae; cutting edge with fine row of small corneous teeth, terminating in corneous claw; dorsal surface nearly smooth, dorsomesial margin with few small spines or spinulose tubercles; mesial and ventral surfaces unarmed. Cutting edge of fixed finger with small subacute or acute calcareous teeth proximally and small corneous teeth interspersed by small calcareous teeth distally, terminating in small corneous claw. Palm short, slightly inflated ventrally, with tufts of long setae on surfaces and margins including fixed finger; dorsal surface sloping laterally, with irregular rows of strong spines, prominently elevated in midline, with double row of strong spines, extending onto fixed finger, decreasing in size distally, dorsolateral margin with

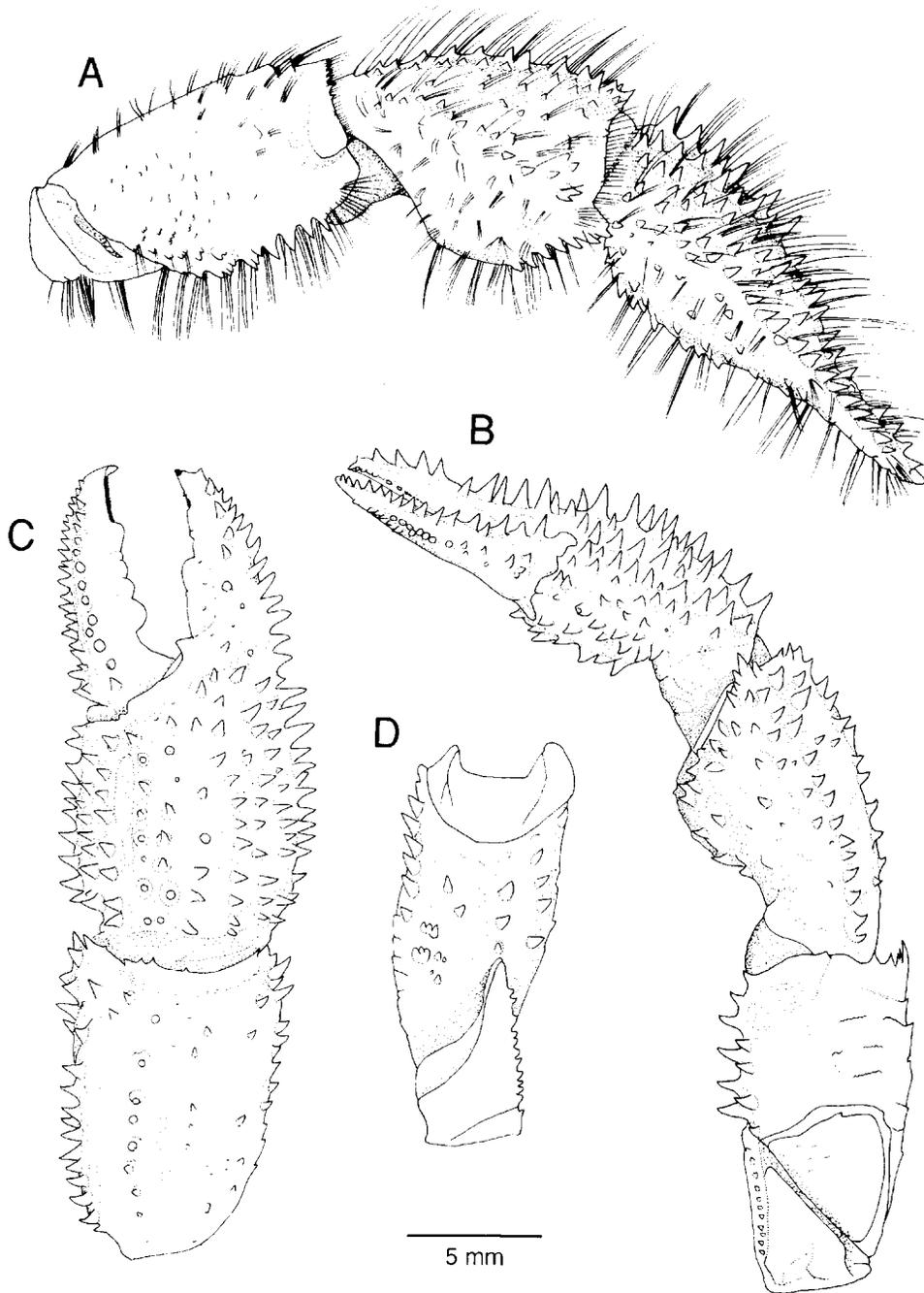


Fig. 2. *Pagurus parvispina* sp. nov. Holotype female from off Esan, southern Hokkaido, SL 10.0 mm. Right cheliped. A, entire cheliped, lateral; B, same, mesial, setae omitted; C, chela and carpus, dorsal, setae omitted; D, merus, ventral, setae omitted.

single or double row of moderately strong or strong spines becoming obsolete on fixed finger distally, dorsomesial surface sloping, with few scattered small spines and row of moderately strong spines, dorsomesial mar-

gin with row of strong spines; mesial and ventral faces with few prominent spines and small spinulose tubercles. Carpus subequal in length to merus, surfaces all with tufts of long setae; dorsal surface flattened, nearly

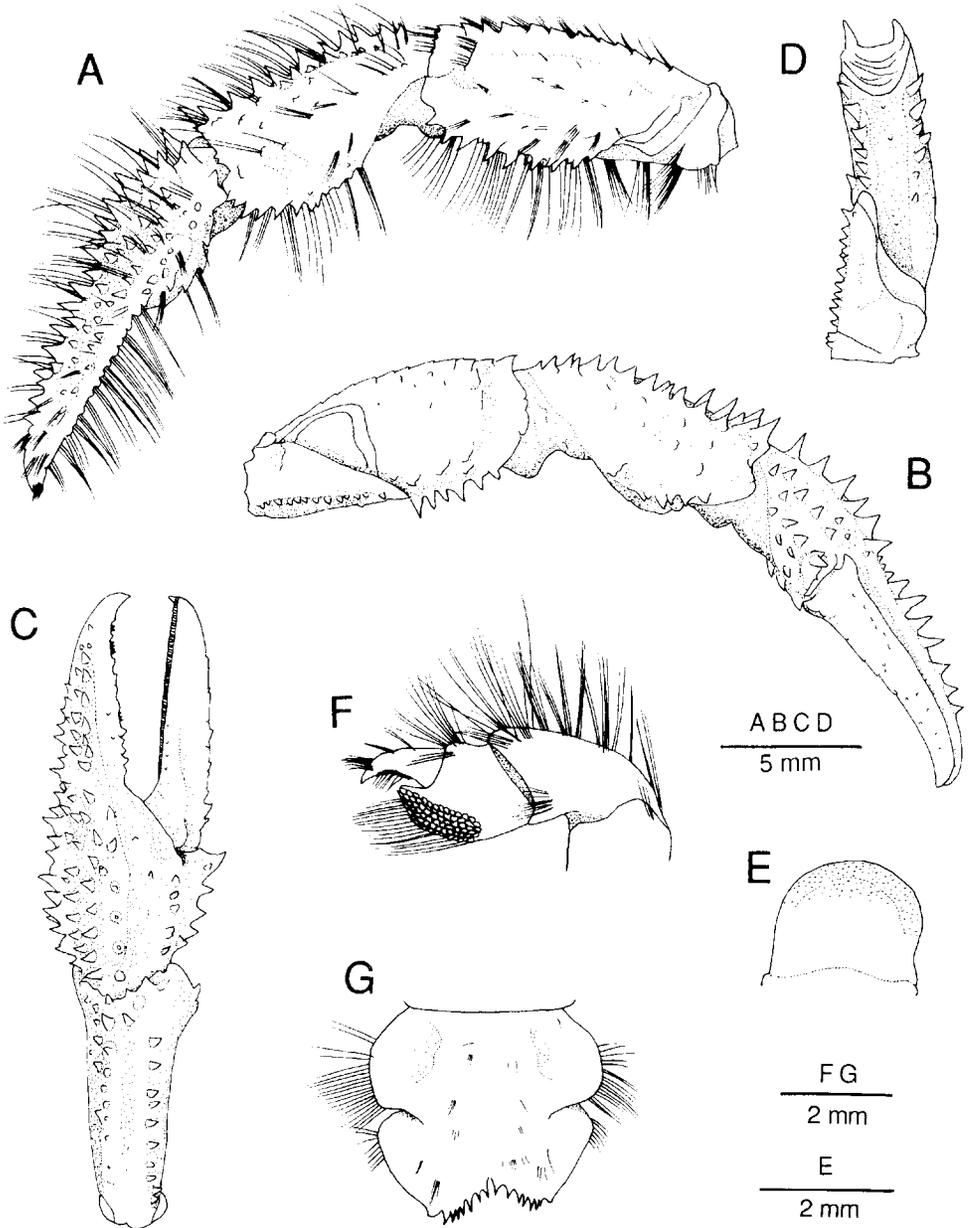


Fig. 3. *Pagurus parvispina* sp. nov. Holotype female from off Esan, southern Hokkaido, SL 10.0 mm. A, entire left cheliped, lateral; B, same, mesial, setae omitted; C, chela and carpus of left cheliped, dorsal, setae omitted; D, merus of left cheliped, ventral, setae omitted; E, anterior lobe of sternite of third pereopods, ventral, setae omitted; F, subchela and carpus, left fourth pereopod, lateral; G, telson, dorsal.

smooth, distal margin with few small sub-acute spines, dorsolateral and dorsomesial margins each with row of moderately strong spines increasing in size distally; mesial face with scattered low protuberances or small tubercles, distal margin with few small

spines or protuberances; distomesial angle produced, sometimes with few small spines, ventromesial margin with irregular row of moderately strong spines; lateral face with scattered multidenticulate or spinulose protuberances or tubercles, distolateral angle

slightly produced, ventrolateral margin with row of moderately strong spines distally; ventral surface with spinulose tubercles or small spines. Merus laterally compressed; dorsal surface with low, often spinulose protuberances, and row of stiff setae; lateral surface unarmed, but with scattered tufts of short setae; mesial face with few scattered short vertical rows of setae; ventral surface slightly concave, with numerous tufts of very long setae, ventrolateral and ventromesial margins each with row of moderately strong or strong spines. Ischium with row of small spines or spinulose tubercles and tufts of long setae on ventromesial margin; ventral surface with long setae; ventrolateral distal angle not produced. Coxa similar to that of right.

Second pereopods (Fig. 4A) slightly unequal in length (right longer than left), right second pereopod overreaching tip of right cheliped by length of dactyl. Dactyls (Fig. 4A, B) distinctly longer than propodi, slender, strongly curved, slightly twisted, terminating in strong corneous claws; dorsal surfaces each with double row of dense long setae; lateral faces each with shallow longitudinal sulcus flanked by row of tufts of moderately long setae; mesial faces with row of tufts of stiff setae along ventral border of longitudinal sulcus; ventral margins each with 9–25 corneous spinules, subdistal spinule usually more slender than remaining spinules and closely appressed against terminal claw, and with row of tufts of setae. Propodi about 1.5 times as long as carpi; dorsal margin with row of low protuberances and numerous tufts of long setae; lateral face with scattered tufts of short setae; mesial face with rows of tufts of moderately long setae dorsally and ventrally, median area naked; ventral surfaces each with corneous spinules at distal margin and with row of tufts of long setae. Carpi with row of moderately strong (right) or small spines (left), 1 subterminal spine and tufts of long setae on dorsal margins; lateral faces with scattered tufts of short setae; mesial faces almost naked; ventral surfaces with few stiff setae, ventrodistal angles not produced. Meri with dorsal margins each with row of low protuberances and row of stiff setae; lateral surfaces with few scattered

short setae, mesial surfaces mostly naked; ventral margins each with row of moderately strong or small spines decreasing in size proximally and tufts of long setae. Ischia with dorsal and ventral margins unarmed, but with tufts of moderately long setae.

Third pereopods (Fig. 4C) reaching or overreaching tip of right cheliped by length dactyl, generally similar in setation to second pereopods. Dactyls (Fig. 4C, D, E) with 3–23 ventral spinules and few corneous spinules on dorsomesial margins; right dactyl similar in setation to those of second pereopods; left dactyl with several tufts of long setae obscuring lateral surface, ventral margin with numerous tufts of long setae decreasing in length distally. Propodi without ventral row of small spines or spinulose tubercles on lateral surface. Carpi with row of few small spines or spinulose tubercles on dorsal surfaces; ventrodistal angles not produced. Meri with row of low protuberances on ventral margins.

Anterior lobe of sixth thoracic sternite (Fig. 3E) subcircular or subovate, slightly skewed, anterior face with dense long setae.

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

Fifth pereopods chelate; coxae in male each with gonopore partially encircled by short setae. Eighth thoracic sternite with 2 similar anterior lobes separated by shallow groove, its ventral margin with numerous long setae.

Abdomen strongly twisted, with 3 unpaired left pleopods in males and 4 unpaired in females. Uropods strongly asymmetrical. Telson (Fig. 3G) with posterior lobes slightly asymmetrical, left slightly larger than right, subtriangular, separated by narrow median cleft; terminal margins oblique, each with row of 7–11 small spines, 1 curved spine strongest at posterolateral angle; lateral margins with stiff setae.

*Coloration in life.* Shield mottled brown. Ocular peduncle entirely brown. Chelipeds mottled light brown. Ambulatory pereopods

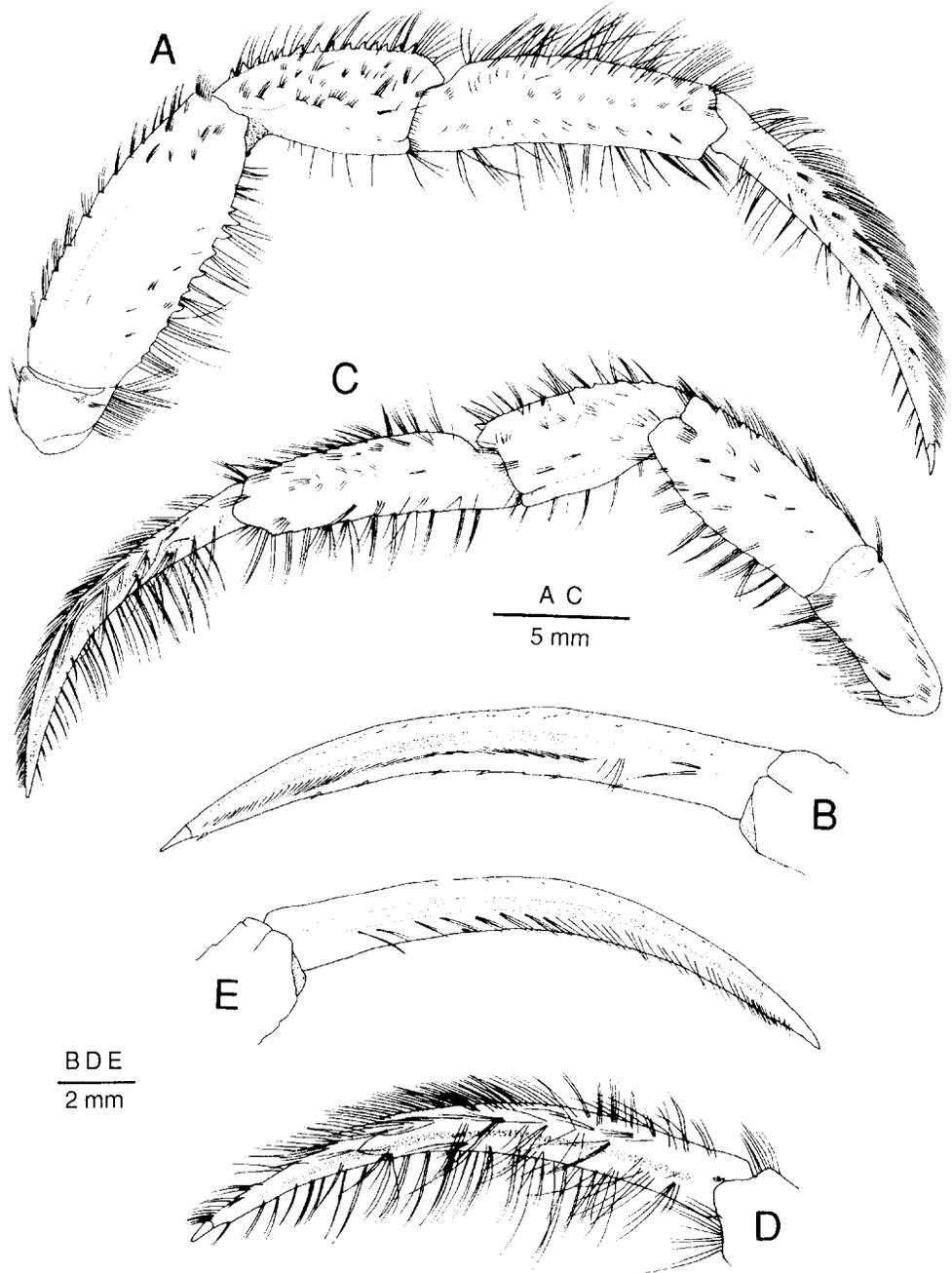


Fig. 4. *Pagurus parvispina* sp. nov. Holotype female from off Esan, southern Hokkaido, SL 10.0 mm. A, right second pereopod, lateral; B, dactyl of same, mesial, dorsal and ventral setae omitted; C, left third pereopod, lateral; D, dactyl of same, lateral; E, same, mesial, dorsal and ventral setae omitted.

with obscure dark brown bands on light brown background.

*Size.* Largest: male, SL 11.2 mm; female, SL 10.0 mm.

*Housing.* The gastropod shells used by *Pag-*

*urus parvispina* are as follows: *Fusitriton oregonensis* (Redfield) (Cymatiidae); and *Buccinum isaotakii* Kira (Buccinidae).

*Type locality.* Off Esan, southern Hokkaido, at depths of 180–200 m

**Table 1.** *Pagurus parvispina* sp. nov. Variation of the number of ventral spinules of the dactyls of the second and third pereopods.

Catalog No./sex	SL (mm)	No. of spinules			
		Second pereopods		Third pereopods	
		Right	Left	Right	Left
CBM-ZC					
Female (holotype)	10.0	8	8	4	3
HUMZ-C54					
Male	11.2	21	18	11	10
Female	9.5	17	22	19	25
HIUMZ-C210					
Male	7.1	23	22	23	21
HUMZ-C399					
Male	5.0	18	14	12	10
HUMZ-C404					
Male	5.4	15	13	8	8
Male	6.0	12	10	8	7
USNM 276022					
Male	11.1	20	23	16	10

*Distribution.* Hokkaido; Iwate, northeastern Honshu mainland; ?continental coast of Russian Far East; ?southern Kurile Islands; ?Saghalien; depth 150–200 m.

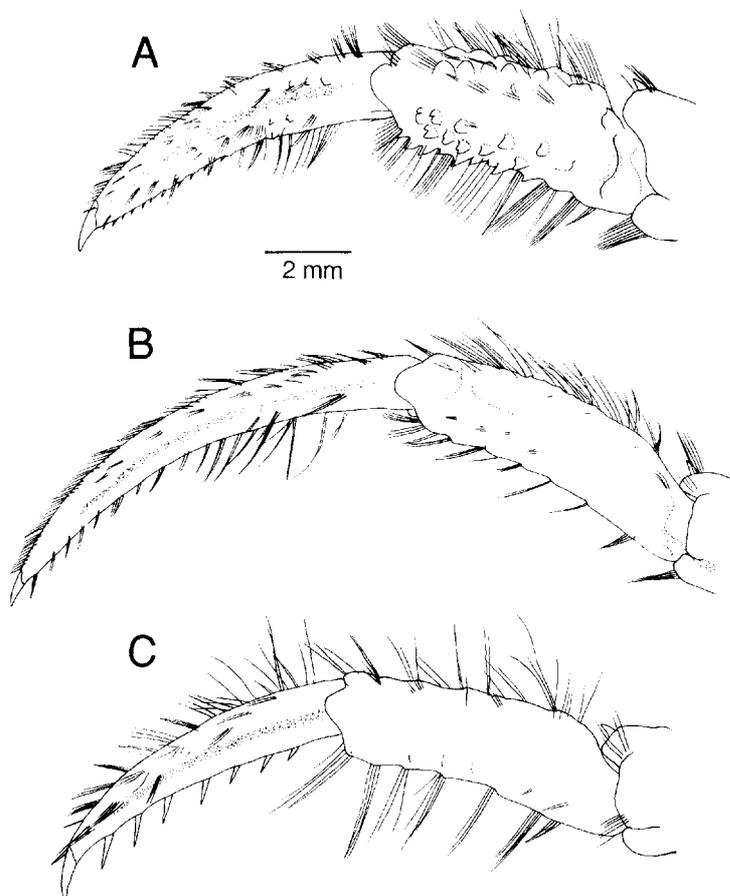
*Variation.* A total of eight specimens of the new species, six males and two females, were examined. Apart from the usual sexual differences such as the development of gonopores or of the pleopods, they did not show distinct sexual dimorphism.

Noticeable individual variation has been observed in the number of ventral spinules of the ambulatory dactyls. As summarized in Table 1, the number of the spinules are widely variable from three to 25 among the specimens examined. It is also variable among pereopods of a single specimen.

*Etymology.* The specific epithet is a noun in apposition from the Latin *parvus* (small) and *spina* (spine), in reference to the possession of spinules on the ventral margin of the ambulatory dactyls.

*Remarks.* In addition to the four informal species group within the genus *Pagurus* proposed by Forest and de Saint Laurent (1967), McLaughlin (1974) further added four species groups, amongst the “*capillatus*” group. She assigned the following species from North America to this group: *P. capillatus* (Benedict, 1892); *P. setosus* (Benedict, 1892); *P. kennealyi* (Stimpson, 1864); and *P. arcuatus*

Squires, 1964. Komai (1994a) added recently *P. imaii* (Yokoya, 1939) from Japan to this group. My personal observation has shown that the two western Pacific species, *P. pectinatus* (Stimpson, 1858) and *P. brachiomastus* (Thallwitz, 1891), are also assignable to this group. *Pagurus parvispina* appears closer to *P. capillatus* (Benedict, 1892) and *P. arcuatus* Squires, 1964. These three species differ from other members of the group in having corneous spinules (Fig. 4B, D, E, Fig. 5A, B), instead of moderately strong corneous spines (Fig. 5C), on the ventral margins of the ambulatory dactyls (McLaughlin, 1974; present study). As McLaughlin (1974) indicated, the presence of calcareous small spines or tubercles on the ventrolateral face of the propodus of the left third pereopod readily separates *P. capillatus* from *P. arcuatus* and *P. parvispina* (Fig. 5A). *P. parvispina* strikingly resembles *P. arcuatus*, but it differs from the latter in having more slender ocular peduncles with less dilated corneal regions (ratio of the ocular peduncle length/corneal width are 3.6–4.3 in the new species and 3.2–3.3 in *P. arcuatus*), several tufts of long setae which obscure the lateral face of the dactyl of the left third pereopod, and fewer spines on the dorsolateral surface of the palm of the left cheliped. In *P. arcuatus*, the dactyl of the left third pereopod bears few tufts of shorter



**Fig. 5.** A, *Pagurus capillatus* (Benedict, 1892), female from Bering Sea, SL 12.5 mm (USNM 282239); B, *Pagurus arcuatus* Squires, 1964, male from northeastern Atlantic, SL 10.9 mm (USNM 2606); C, *Pagurus pectinatus* Stimpson, 1858, female from Hakodate Bay, Hokkaido, SL 9.0 mm (CBM-ZC 2363), setae partially omitted. Dactyl and propodus of left third pereopod in lateral view.

setae on the lateral face (Fig. 5B). The spines on the right palm seem to be stronger in *P. parvispina* than in *P. arcuatus*, but this character is variable and subjective, thus less significant diagnostically.

The distributional range of *P. capillatus* has been reported as continental coast of the Japan Sea to California including the Chukchi Sea (Makarov, 1938b; McLaughlin, 1974), but the occurrence of this species in Japanese waters has not been confirmed despite recent extensive surveys around northern Japan. Because of the close resemblance between *P. capillatus* and *P. parvispina*, there is a possibility that previous records of *P. capillatus* from the Japan and Okhotsk Seas and southern Kurile Islands (Makarov, 1937, 1938a, 1938b, 1962; Vinogradov, 1947, 1950;

Kobjakova, 1937, 1956, 1958, 1967) might actually represent *P. parvispina*, but I have not been able to confirm the identity of the previous materials. The specimen figured by Igarashi (1970: pl. 4, fig. 13) as *Pagurus rathbuni* represents a species other than *P. rathbuni*. Although Igarashi's specimen has not been available for reexamination, the setose chelipeds and ambulatory pereopods, slightly dilated corneal region of the ocular peduncle and relatively long and slender dactyls of the ambulatory pereopods, of which the left third pereopod has numerous long setae on the lateral surface, strongly suggest that it should be referred to *P. parvispina*.

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北日本産ホンヤドカリ属 (十脚目:  
異尾下目: ホンヤドカリ科)  
の 1 新種の記載

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北海道南部および岩手県沖の水深 100-200 m にお

いて採集された標本 8 個体に基づき、ホンヤドカリ科ホンヤドカリ属の 1 新種 *Pagurus parvispina* を記載した。模式産地は北海道渡島半島恵山沖である。本新種は, McLaughlin (1974) により提唱された "*capillatus*" 種群に属し, 歩脚の指節の下縁に微小な棘の列を持つことで, 北部北太平洋の広い海域から記録のある *P. capillatus* (Benedict) と, 北大西洋に分布する *P. arcuatus* Squires に近縁であると考えられ, 特に後者に酷似する。しかしながら, 本新種は, *P. capillatus* からは第 3 胸脚の前節側面に棘あるいは棘状突起を欠くことにより容易に識別され, 一方, *P. arcuatus* からは眼柄が比較的細いこと, 第 3 胸脚の指節の側面に長い剛毛の束を多く持つことなどにより識別される。Igarashi (1970) により *Pagurus rathbuni* (Benedict) としてオホーツク海沿岸から記録されたものは実際は本新種であったと考えられる。また, *P. capillatus* と本新種が形態的に類似している点, 最近の北海道・本州東北海域の調査によっても *P. capillatus* の分布が確認されていない点などを考慮すると, 沿海州・サハリン・千島南部などのロシア極東域から *Pagurus capillatus* として記録された種は実際には本新種であった可能性がある。