Special Issue for Prof. Jacques Forest

A NEW SPECIES OF *BATHYPAGUROPSIS* MCLAUGHLIN, 1994 FROM JAPAN, AND REDESCRIPTION OF *B. KUROSHIOENSIS* (MIYAKE, 1978) (DECAPODA, ANOMURA, PAGURIDAE)

BY

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ABSTRACT

A new species of the genus *Bathypaguropsis* McLaughlin, 1994, *B. foresti*, is described from off Boso Peninsula, central Japan. The assignment of *Pagurus kuroshioensis* Miyake, 1978 to *Bathypaguropsis* is confirmed based on examination of the holotype and supplemental material. *Bathypaguropsis rahayuae* McLaughlin, 1997 is found to be a junior subjective synonym of *B. kuroshioensis*, which is redescribed and illustrated in detail. Morphological similarities of *B. foresti* and *B. kuroshioensis* are discussed. A key to aid in the identification of the species of the genus *Bathypaguropsis* is presented.

RÉSUMÉ

Une nouvelle espèce du genre *Bathypaguropsis* McLaughlin, 1994, *B. foresti*, est décrite de la péninsule de Boso, Japon. L'appartenance de *Pagurus kuroshioensis* Miyake, 1978 au genre *Bathypaguropsis* est confirmée après examen de l'holotype et de nouveau matériel. *Bathypaguropsis rahayuae* McLaughlin, 1997 est un synonyme subjectif plus récent de *B. kuroshioensis* qui est redécrit et illustré en détail. Les similarités morphologiques de *B. foresti* et de *B. kuroshioensis* sont discutées. Une clé d'identification des espèces du genre *Bathypaguropsis* est présentée.

INTRODUCTION

During ongoing revisionary studies of Paguridae from Japan, a new species of the genus *Bathypaguropsis* McLaughlin, 1994 from off Boso Peninsula, central Japan, was discovered. This new species is herein described. Although the new species is represented only by a single female specimen, it clearly belongs in *Bathypaguropsis*, a genus with species characterized by the presence of 13 pairs of quadriserial gills, a massive, operculate right cheliped, the absence of paired first pleopods in females, and the presence of four unpaired pleopods in males (McLaughlin, 1994). The new species is most similar to *B. cruentus* De Saint

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Laurent & McLaughlin, 2000, known from New Zealand (De Saint Laurent & McLaughlin, 2000).

Miyake (1978) briefly described a new species of pagurid hermit crab, *Pagurus kuroshioensis* Miyake, 1978, based on five specimens from Sagami Bay and Tosa Bay, Japan. Subsequently, Baba (1986) reported this same taxon from Tosa Bay. Recently, De Saint Laurent & McLaughlin (2000) indicated that *P. kuroshioensis* should be assigned to *Bathypaguropsis*. Our examination of the holotype of *P. kuroshioensis* has confirmed that Miyake's taxon indeed belongs in *Bathypaguropsis*. In addition, *B. rahayuae* McLaughlin, 1997, described based on a single specimen from the Banda Sea, Indonesia (McLaughlin, 1997), has been found to be a junior synonym of *B. kuroshioensis*. Given the brevity of Miyake's (1978) original description, and the current assignment of his taxon to *Bathypaguropsis*, which now contains five similar species, *B. kuroshioensis* is redescribed and illustrated in detail in order to clarify its identity. A key to aid in the identification of all species of *Bathypaguropsis* is also presented.

Specimens used for this study remain deposited in the Natural History Museum and Institute, Chiba (CBM); Showa Memorial Institute, National Science Museum, Tsukuba (NSMT); Muséum national d'Histoire naturelle, Paris (MNHN); and National Museum of Natural History, Smithsonian Institution, Washington, D. C. (USNM). General terminology used in the description follows McLaughlin (1974), with exception of the posterior carapace (see Lemaitre, 1995), fourth pereopod (see McLaughlin, 1997), and gill structure (see McLaughlin & De Saint Laurent, 1998). One measurement, shield length (sl), taken in millimeters (mm) provides an indication of size of the specimens examined. Illustrations were made with the aid of a drawing tube mounted on a Leica MZ-8 stereomicroscope. Abbreviations used are: ovig, ovigerous female(s), and sta, station. KARUBAR is an acronym of the 1991 French-Indonesian campaign to the islands of Kai, Aru, and Tanimbar.

TAXONOMIC ACCOUNT

Bathypaguropsis foresti sp. nov. (figs. 1-3)

Material examined. — Holotype: female (sl 5.4 mm), off Katsuyama-Ukishima Islet, Boso Peninsula, central Japan, 140-220 m, 10.v.1995, scampi gill net, coll. T. Komai, CBM-ZC 1669.

Description. — Gill lamellae deeply divided in slender elements (fig. 1E).

Shield (fig. 1A, B) 1.16 times longer than broad; anterior margin between rostrum and lateral projections concave; anterolateral margins sloping; posterior margin truncate; dorsal surface with few tufts of short setae laterally; dorsal surface weakly calcified medially on posterior half. Rostrum acutely triangular,

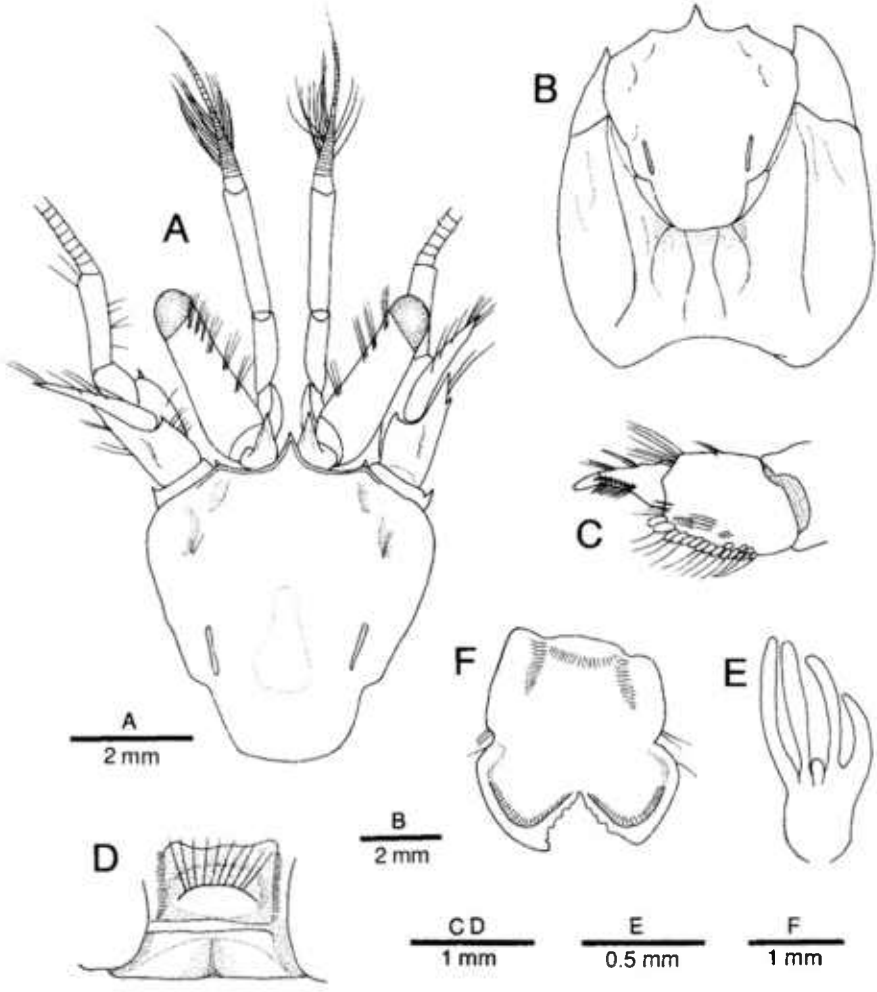

Fig. 1. *Bathypaguropsis foresti* sp. nov., holotype, female (sl 5.4 mm), off Boso Peninsula, Japan, CBM-ZC 1669. A, shield and cephalic appendages, dorsal; B, shield and posterior carapace (setae omitted); C, dactylus and propodus of left fourth pereopod, lateral; D, sternite of third pereopods, ventral; E, gill lamella of posterior arthrobranch of fourth pereopod; F, telson, dorsal.

overreaching mid-length of ocular acicles. Lateral projections obtusely triangular, armed with minute submarginal denticle.

Branchiostegite calcified along dorsal margin. Posterior carapace (fig. 1B) with membranous branchial regions; posteromedian plate weakly calcified anteriorly; cardiac sulci not reaching posterior margin of carapace; sulci cardiobranchiales curving inward and ending well before cardiac sulci; area between cardiac sulci and sulci cardiobranchiales better calcified anteriorly; branchial region with few short setae.

Ocular peduncles (fig. 1A) 0.55 times as long as shield, narrowing distally, inflated basally, with row of tufts of moderately short setae dorsomesially; corneae not dilated, diameter about 0.24 peduncular length. Ocular acicles narrowly triangular, simple, terminating in acute spine; dorsal surface flattened.

Antennular peduncles (fig. 1A), when fully extended, overreaching ocular peduncles by 0.80 length of ultimate segment. Basal segment with prominent subdistal spine on dorsolateral margin. Ultimate segment long, 1.60 times longer than penultimate segment, with few setae on dorsal surface.

Antennal peduncles (fig. 1A) overreaching distal margins of corneas by 0.30 length of fifth segment. Fifth and fourth segments with few setae. Third segment with prominent spine at ventromesial distal margin. Second segment with dorsolateral distal angle strongly produced into triangular, elongate process reaching midlength of fourth peduncular segment, and terminating in simple spine; mesial margin unarmed; lateral surface with 1 small spine; dorsomesial distal angle with small but prominent spine. First segment with small subdistal spine on lateral face; ventrodistal margin produced, with 1 spinule. Acicle reaching to mid-length of fifth antennal segment, slightly arcuate, with row of tufts of long setae mesially, terminating in simple spine. Antennal flagellum long, overreaching extended right cheliped; articles with very short setae on distal margin, and long setae every 2 or 3 articles.

Mouthparts similar to those of *B. kuroshioensis*.

Right cheliped (fig. 2A-E) with dactylus broad, shorter than palm. Dactylus somewhat curved ventrally; cutting edge with calcareous margin faintly cusped, terminating in large corneous claw; dorsal surface slightly elevated in midline proximally, with sparse pits and few tufts of short setae; dorsomesial margin not delimited; mesial face with scattered, very low transverse ridges and minute pits; ventral surface with row of flattened, corneous-tipped, blister-like tubercles becoming smaller and obsolete distally, mesial half concave. Palm (fig. 2A, D) as long as greatest breadth, subrectangular in shape, becoming noticeably broader distally, distinctly longer than carpus; dorsomesial distal angle produced laterally and armed with large blunt tubercle; dorsomesial margin with 3 moderately small tubercles and 5 small, obtuse tubercles; dorsal surface slightly convex, smooth, with scattered minute pits and low granules with 2 prominent tubercles near proximal margin; dorsolateral margin well delimited by blunt ridge; mesial face covered with numerous small, flattened tubercles, sometimes bearing minute pits; lateral face with numerous scattered, minute pits; ventral surface weakly convex, with several small to large, flattened, blister-like tubercles often corneous-tipped, and numerous low granules or tubercles sometimes bearing minute pits. Fixed finger weakly curved ventrally; cutting edge with 2 weakly delineated calcareous teeth, terminating in small corneous claw. Carpus (fig. 2E) slightly

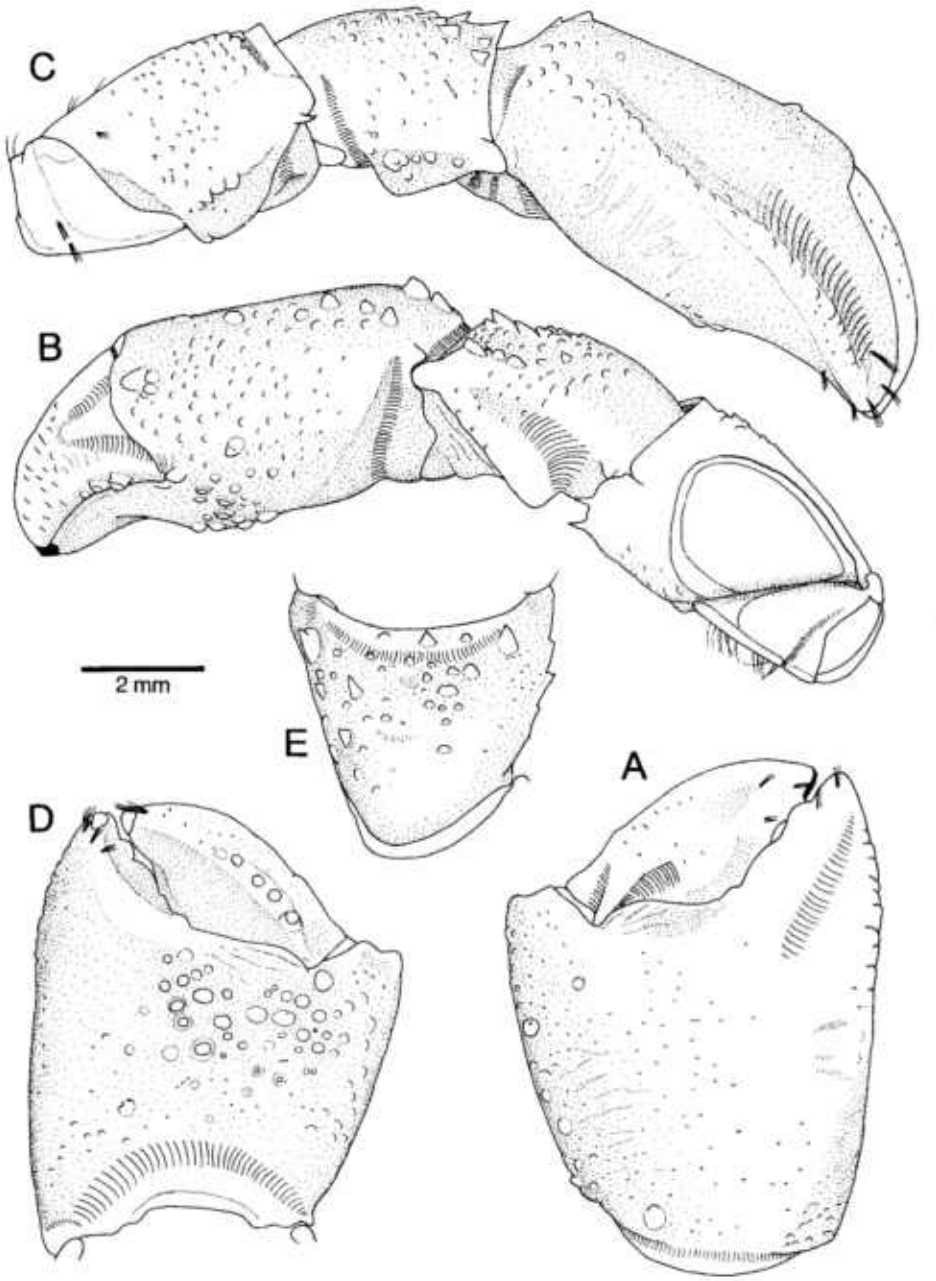

Fig. 2. *Bathypaguropsis foresti* sp. nov., holotype, female (sl 5.4 mm), off Boso Peninsula, Japan, CBM-ZC 1669. Right cheliped: A, chela, dorsal; B, entire cheliped, mesial; C, same, lateral; D, chela, ventral; E, carpus, dorsal.

shorter than merus, subquadrate in dorsal view; dorsomesial distal angle depressed and with 1 prominent spine; dorsal surface with few small spines and blunt or low tubercles (median area smooth, with shallow depression distally); dorsolateral and dorsomesial margins not delimited; mesial face weakly concave, with scattered minute, low tubercles; lateral face with scattered minute pits, laterodistal margin unarmed, ventrolateral margin with row of blunt tubercles. Merus not strongly compressed laterally, subtriangular in dorsal view; dorsal surface with short transverse ridges on distal 0.30; dorsodistal margin unarmed; mesial face smooth, unarmed; ventromesial margin slightly protuberant, with 2 small spines distally; lateral face with scattered, minute tubercles; ventrolateral margin indicated by row of low, squamiform protuberances; ventral surface convex, with 2 moderately small, corneous-tipped tubercles medially. Ischium unarmed on all surfaces.

Left cheliped (fig. 3A-C) reaching base of dactylus of right cheliped, slender; propodal-carpal articulation about 20° from perpendicular. Dactylus 1.10 times longer than palm; surfaces unarmed, but with scattered tufts of moderately short setae; cutting edge slightly sinuous in dorsal view, with row of small, mostly fused corneous teeth. Palm about 0.70 times as long as carpus; dorsal surface mesially with small, low tubercles and tufts of setae; dorsolateral or dorsomesial margins not delineated; lateral, mesial, and ventral surfaces unarmed except for few scattered tufts of setae mostly on fixed finger. Fixed finger curved laterally, separated slightly from dactylus distally when closed; cutting edge convex in dorsal view, with row of small, but relatively broad corneous teeth on distal 0.40. Carpus about 0.90 times as long as merus; dorsal surface with few short setae; dorsolateral margin not delineated; dorsomesial margin weakly delineated, with single row of small tubercles or blunt spines; dorsodistal margin with 1 small spine laterally; mesial, lateral, and ventral surfaces unarmed, but with few setae. Merus slightly compressed laterally; dorsal surface unarmed except for sparse tufts of setae; lateral, mesial, and ventral surfaces unarmed. Ischium unarmed, with row of long setae ventromesially.

Ambulatory legs (fig. 3D-G) similar except for right second and third pereopods longer than left. Dactyli 1.27-1.44 times longer than propodi, nearly straight in lateral view, nearly straight or slightly twisted in dorsal view; dorsal surfaces each with row of tufts of long stiff setae; lateral faces each with weak, median longitudinal sulcus and few tufts of short setae; mesial faces (fig. 3E, G) each with weak median longitudinal sulcus, and 1 irregular row (second) or 2 rows (third) of small corneous spines and few short setae on dorsomesial margin; ventral margins each with row of 11-13 slender corneous spines and few tufts of setae. Propodi longer than carpi, each with sparse tufts of moderately short setae; lateral face with few simple or tufts of very short setac; ventral surfaces each with row of widely separated small corneous spinules, ventrodistal margins each with 1 or 2

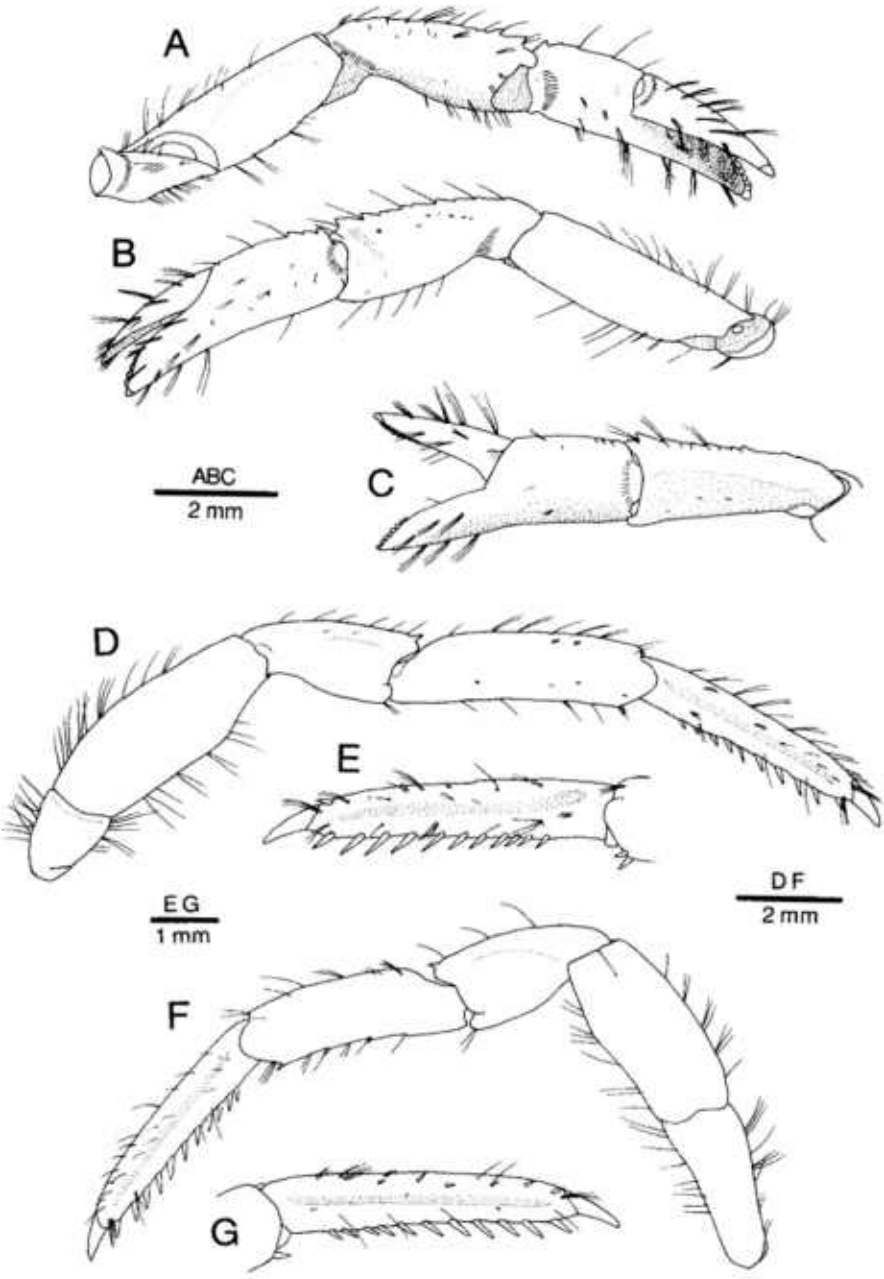

Fig. 3. *Bathypaguropsis foresti* sp. nov., holotype, female (sl 5.4 mm), off Boso Peninsula, Japan, CBM-ZC 1669. A, left cheliped, mesial; B, same, lateral; C, chela and carpus of same, dorsal; D, right second pereopod, lateral; E, dactylus of same, mesial; F, right third pereopod, lateral; G, dactylus of same, mesial.

small corneous spines. Carpi 0.60-0.80 times as long as meri; dorsal surfaces each with small dorsodistal spine and few tufts of short setae. Meri and ischia unarmed on dorsal and ventral surfaces except for row of sparse tufts of moderately short setae. Coxae of third pereopods each with moderately large gonopore in females.

Fourth pereopods (fig. 1C) with sparse tufts of long setae on dorsal surfaces of propodus and carpus. Dactylus weakly curved, terminating in large corneous claw; with row of small corneous teeth on ventral margin; preungual process absent. Propodus with weakly convex ventral margin; rasp consisting of 1 row of corneous scales distally, and 2 rows proximally.

Fifth pereopods chelate, moderately long and slender; chela with dense tuft of long setae on ventral surface of propodus.

Anterior lobe of sternite of third pereopods (fig. 1D) rectangular, with semicircular fringe of short setae distally. Sternite of fifth pereopods divided into 2 lobes, each with numerous short setae subdistally.

Four unpaired pleopods; second to fourth with both rami well developed and with tufts of long setae, fifth reduced.

First abdominal somite with tergite weakly calcified anteriorly; second to fifth somites with tergites indicated by transverse bands of fibrils; sixth somite with tergite divided by deep transverse furrow on posterior 0.30. Uropods strongly asymmetrical. Telson (fig. 1F) asymmetrical; with deep, transverse lateral indentations; anterior lobes slightly narrower than posterior lobes; posterior lobes separated by small median cleft, dorsal surface mostly chitinous and with raised, calcified submarginal area; terminal margins strongly oblique, each with row of small, blunt spinules.

Color in life. — Shield generally light yellow-brown; posterior carapace white. Ocular peduncle generally orange, with dark red longitudinal stripes on lateral and mesial faces; cornea darkly pigmented. Antennule and antenna orange-red. Right cheliped generally light orange. Left cheliped and ambulatory pereopods red; meri of ambulatory pereopods becoming pale proximally. Eggs red.

Habitat. — The single known specimen was found living in a gastropod shell.

Distribution. — Known only from the type locality, off Katsuyama-Ukishima Islet, Boso Peninsula. Depth: 140-220 m.

Etymology. — This species is dedicated to Prof. Jacques Forest, in recognition of his numerous and important contributions to the study of crustaceans in general, and of decapods and hermit crabs in particular.

Remarks. — Although only a single female specimen is known of *B. foresti* sp. nov., it unquestionably belongs in *Bathypaguropsis* based on the presence of 13 pairs of quadriserial branchiae, the absence of paired first pleopods, and presence

of a massive, operculate right cheliped. The new species resembles *B. cruentus* in that both have a relatively long rostrum that reaches the midlength of the ocular acicles, and sparsely setose mesial faces of the ambulatory dactyli. The two, however, can be differentiated by the dorsomesial distal angle of the palm of the right cheliped, which is considerably more produced in *B. cruentus* (see De Saint Laurent & McLaughlin, 2000: 12, fig. 38a) than in *B. foresti* (fig. 2A); and by the dorsal armature of the carpus of the right cheliped, which has spines and tubercles in *B. foresti* (fig. 2E) but only punctae in *B. cruentus*. Also, the antennal peduncle (fig. 1A) clearly exceeds the distal margin of the cornea in the new species, whereas the peduncle only reaches the proximal margin of the cornea in *B. cruentus* (see De Saint Laurent & McLaughlin, 2000: 118, fig. 37a).

This new species can also be distinguished from the other Japanese representative of the genus, *B. kuroshioensis*, by the presence in the new species of a more prominently produced rostrum, the palm of the right cheliped with a more produced dorsomesial distal angle, and the much less sparse setation on the mesial faces of the dactyli of the ambulatory pereopods.

In the holotype, the fixed finger of the left cheliped is slightly directed laterally and its cutting edge is noticeably convex, and thus, the tips of the fixed finger and dactylus are not in contact distally when closed. Whether or not this dactylar condition is abnormal cannot be determined based on a single specimen.

Bathypaguropsis kuroshioensis (Miyake, 1978) (figs. 4-7)

Pagurus kuroshioensis Miyake, 1978: 115, fig. 48 (type locality: Sagami Bay, Japan); 1982: 197, 225 (key); 1991: 198, 225 (key); 1999: 198, 225 (key); Baba, 1986: 203, fig. 150.

Bathypaguropsis rahayuae McLaughlin, 1997: 539, figs. 29a-h, 42c, d (type locality: Kai Islands, Indonesia, KARUBAR sta DW14, 05°18′S 132°38′E).

Bathypaguropsis kuroshioensis — De Saint Laurent & McLaughlin, 2000: 117.

Type material. — Holotype of *Pagurus kuroshioensis* Miyake, 1978: Sagami Bay, 4 km W-SW of Jogashima Islet, 120-195 m, 13.ii.1966, male (sl 4.7 mm), NSMT-CrR 2390.

Holotype of *Bathypaguropsis rahayuae* McLaughlin, 1997, Banda Sea, Kai Islands, Indonesia, KARUBAR, sta DW 14, 05°18′S 132°38′E, 245-246 m, 24.x.1991, male (sl 3.2 mm), MNHN-Pg 5313.

Supplemental material. — Tosa Bay: 4 males (sl 4.3-4.9 mm), 1 female (sl 3.6 mm), 4 ovig. females (sl 4.2-4.3 mm), 190 m, 10.vi.1985, coll. M. Toriyama, USNM 309912; RV "Toyohatamaru", beam trawl, coll. K. Sasaki: 6 males (sl 4.3-5.2 mm), 3 females (sl 4.3-5.4 mm), 4 ovig (sl 4.4-5.2 mm), 190 m, 10.viii.1991, CBM-ZC 186; 3 males (sl 4.2-5.6 mm), 33°17.16′N 133°40.13′E, 146-150 m, 17.v.1993, CBM-ZC 3460; 5 males (sl 4.6-5.3 mm), 1 female (sl 4.3 mm) 33°16.02′N 133°40.02′E, 189-190 m, 9.iv.1993, CBM-ZC 3838; 7 males (sl 2.8-5.0 mm), 3 females (sl 4.8-4.9 mm), 33°17.12′N 133°40.23′E, 150-152 m, 4.ii.1993, CBM-ZC 3940.

Redescription. — Gill lamellae deeply divided in slender elements.

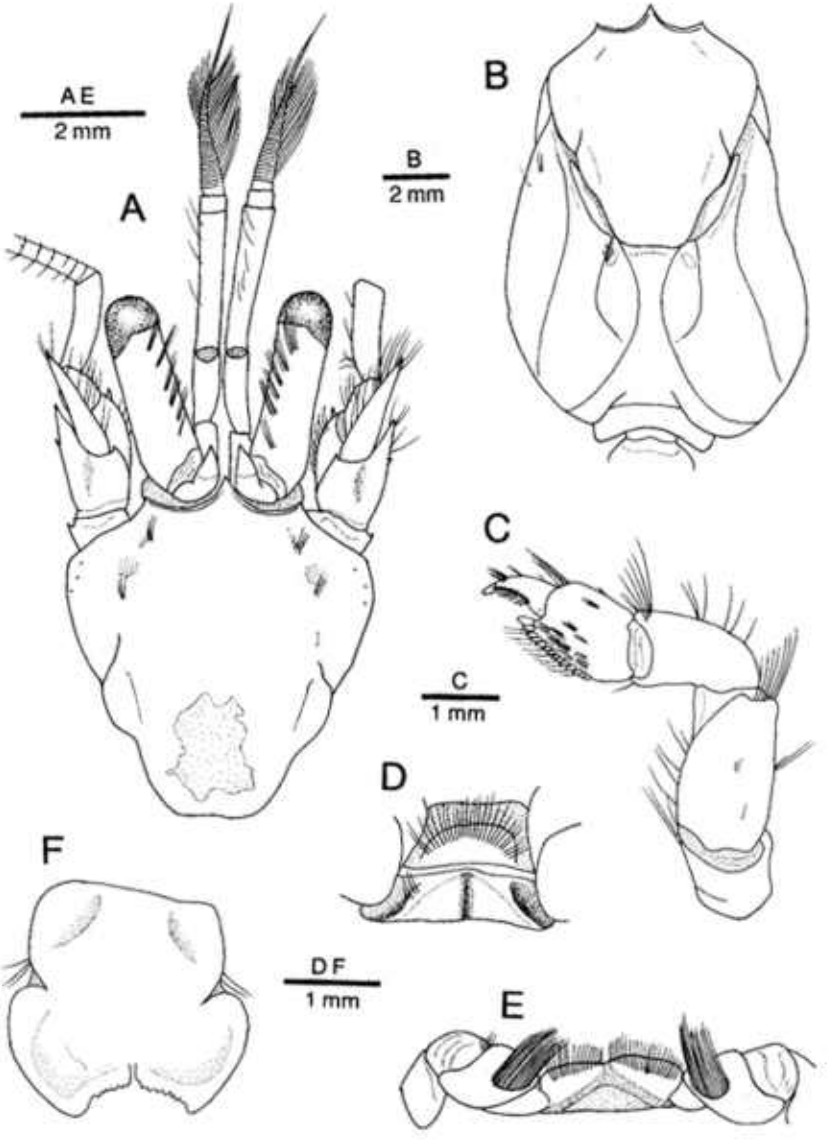

Fig. 4. *Bathypaguropsis kuroshioensis* (Miyake, 1978), male (sl 5.6 mm), Tosa Bay, Shikoku, Japan, CBM-ZC 4033. A, shield and cephalic appendages, dorsal; B, shield and posterior carapace (setae on shield omitted); C, left fourth pereopod, lateral; D, sternite of third pereopods, ventral; E, coxae and sternite of fifth pereopods, ventral; F, telson, dorsal.

Shield (fig. 4A, B) 1.10-1.20 times longer than broad; anterior margin between rostrum and lateral projections concave; anterolateral margins sloping; posterior margin truncate or slightly emarginate; dorsal surface with few tufts of short setae laterally; dorsal surface weakly calcified medially on posterior half. Rostrum

acutely triangular, not reaching midlength of ocular acicles. Lateral projections obtusely triangular, unarmed or armed with minute marginal denticle.

Branchiostegite calcified along dorsal margin. Posterior carapace (fig. 4B) with membranous branchial regions; posteromedian plate weakly calcified; cardiac sulci extending posteriorly parallel to posterior margin of carapace; sulci cardiobranchiales curving inward and ending near cardiac sulci; area between cardiac sulci and sulci cardiobranchiales better calcified anteriorly; branchial region with few short setae.

Ocular peduncles (fig. 4A) 0.58-0.63 times as long as shield, slightly inflated basally, with row of tufts of moderately short setae dorsomesially; corneae not dilated, corneal diameter about 0.15 peduncular length. Ocular acicles narrowly triangular, simple, terminating in acute spine; dorsal surface flattened.

Antennular peduncles (fig. 4A), when fully extended, overreaching ocular peduncles by 0.70-0.80 length of ultimate segment. Basal segment with prominent subdistal spine on dorsolateral margin. Ultimate segment long, 1.40-1.60 times longer than penultimate segment, with few setae on dorsal surface.

Antennal peduncles (fig. 4A) overreaching distal margin of cornea by 0.20-0.30 length of fifth segment. Fifth and fourth segments with few setae. Third segment with prominent spine at ventrodistal margin. Second segment with dorsolateral distal angle strongly produced into broad, triangular process reaching midlength of fourth peduncular segment, and terminating in simple or bifid spine; mesial margin often with 1 or 2 tiny spinules; lateral surface with 1 or 2 small spines; dorsomesial distal angle with small but prominent spine. First segment with small subdistal spine on lateral face; ventrodistal margin produced, with 2 or 3 spinules. Acicle reaching 0.20-0.30 length of fifth antennal segment, slightly arcuate, terminating in simple spine; with row of tufts of long setae mesially. Antennal flagellum long, overreaching extended right cheliped; each article with very short setae on distal margin, and long setae every 2 or 3 articles.

Mandible (fig. 5A) with corneous tooth on mesial margin of molar process. Maxillule (fig. 5B) with subquadrate proximal endite; endopod with 1 apical bristle on produced internal lobe, outer lobe straight, basally articulated. Maxilla (fig. 5C) with endopod reaching anterior margin of scaphognathite. First (fig. 5D) and second maxilliped (fig. 5E) with moderately broad exopods. Third maxilliped (fig. 5F, G) moderately slender; ischium with crista dentata composed of row of bluntly triangular corneous teeth and large accessory tooth; merus with prominent dorsodistal spine, unarmed ventromesially; carpus without dorsodistal spine.

Right cheliped (fig. 6A-E) with dactylus moderately broad, slightly shorter than palm. Dactylus somewhat curved ventrally; cutting edge with calcareous margin faintly cusped, terminating in small corneous claw; dorsal surface slightly elevated in midline proximally, with few low tubercles or short transverse ridges

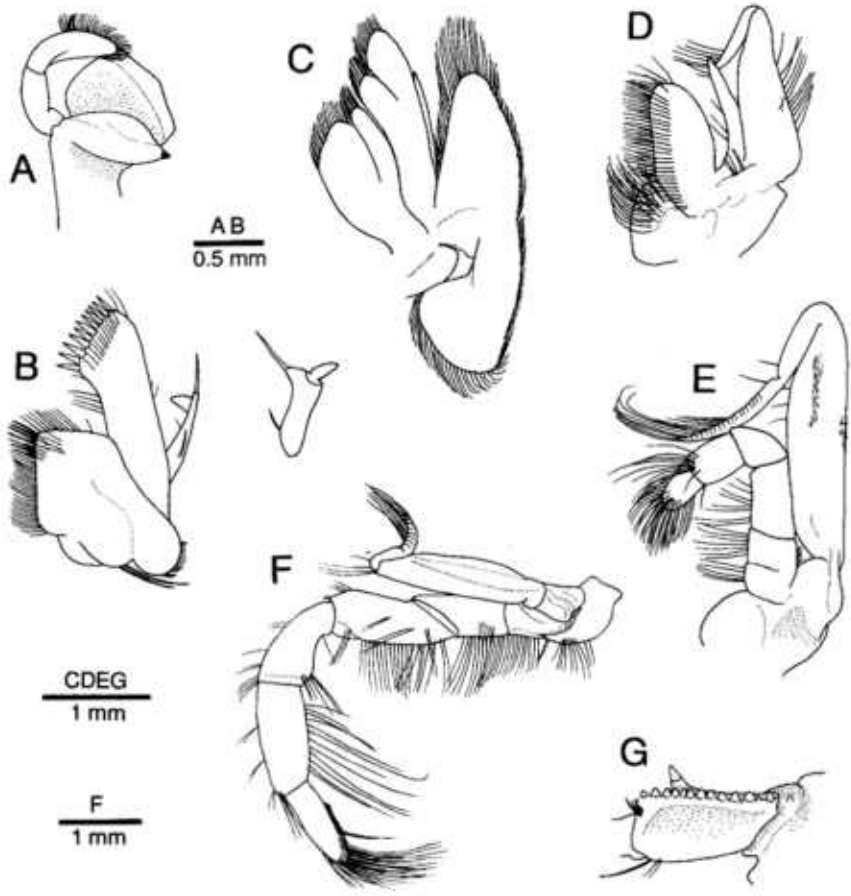

Fig. 5. *Bathypaguropsis kuroshioensis* (Miyake, 1978), male (sl 5.6 mm), Tosa Bay, Shikoku, Japan, CBM-ZC 4033. Left mouthparts: A, mandible, internal; B, maxillule, external, and inset of endopod, lateral; C, maxilla, external; D, first maxilliped, external; E, second maxilliped, external; F, third maxilliped, lateral; G, ischium of same, internal.

and few tufts of short setae; dorsomesial margin not delimited; mesial face with low tubercles dorsally and scattered transverse ridges, often accompanied by tuft of setae, and 1 prominent proximal tubercle; ventral surface with row of flattened, corneous-tipped, blister-like tubercles, mesial half concave. Palm (fig. 6A, D) slightly longer than broad, distinctly longer than carpus; dorsomesial distal angle slightly produced and armed with moderately large, blunt spines; dorsomesial margin with single row of 7-9 blunt, small to moderately small spines (some with corneous tips), interspersed with small spines and/or tubercles; dorsal surface convex, smooth, covered with flattened granules (granules each with small pit anteriorly), with 1 or 2 prominent tubercles near proximal margin; dorsolateral margin not clearly delimited; mesial face covered with numerous granules each

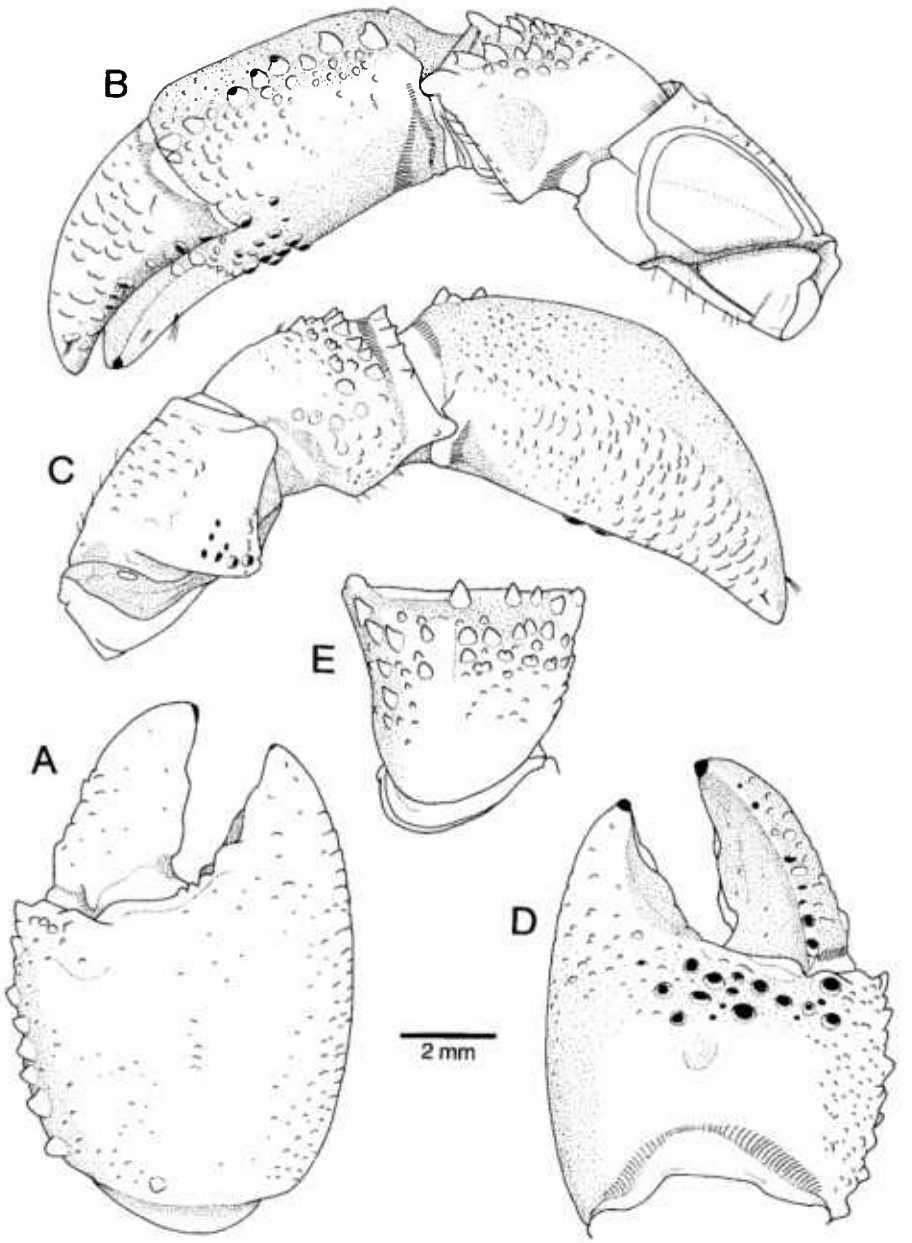

Fig. 6. *Bathypaguropsis kuroshioensis* (Miyake, 1978), male (sl 5.6 mm), Tosa Bay, Shikoku, Japan, CBM-ZC 4033. Right cheliped: A, chela, dorsal; B, entire cheliped, mesial; C, same, lateral; D, chela, ventral; E, carpus, dorsal.

bearing small anterior or central pit or tufts of short setae; dorsolateral face with low, short transverse ridges on fixed finger and with numerous low granules (each bearing anterior or central pit) continuous with ventral surface; ventral surface slightly convex, distally with several small to large flattened, blister-like tubercles often bearing corneous surfaces, and numerous low granules each bearing anterior or central pit. Fixed finger weakly curved ventrally, terminating in small corneous claw; cutting edge with 3 or 4 weakly delineated calcareous teeth. Carpus (fig. 6E) as long as or slightly longer than merus, subquadrate in dorsal view; dorsomesial distal angle depressed, with 1 small spine; dorsal surface with scattered small to moderately large, forwardly directed spines on mesial half, and scattered blunt spines or tubercles in lateral half, median region with small, low tubercles; dorsolateral margin not delimited; mesial face slightly concave, with scattered low tubercles; lateral face with numerous low tubercles each bearing central pit or short seta, laterodistal margin with row of blunt, corneous-tipped spines. Merus not strongly compressed laterally, subtriangular in dorsal view; dorsal surface smooth, rounded; dorsodistal margin unarmed; mesial face smooth, unarmed; ventromesial margin slightly dentate only distally; lateral face with scattered low protuberances or tiny tubercles; ventrolateral margin unarmed; ventral surface with some small, corneous-tipped tubercles distally. Ischium unarmed on all surfaces.

Left cheliped (fig. 7A-C) not reaching base of dactylus of right cheliped, slender; propodal-carpal articulation 30-35° from perpendicular. Dactylus 1.10-1.20 times longer than palm; surfaces unarmed, but with scattered tufts of short setae; cutting edges each with row of small, mostly fused corneous teeth. Palm about 0.60 times as long as carpus; dorsal surface mesially with minute tubercles and tufts of setae; dorsolateral or dorsomesial margins not delineated; lateral, mesial, and ventral surfaces unarmed, except for few scattered tufts of setae mostly on fixed finger. Cutting edge of fixed finger with fine row of small corneous teeth on distal 0.50-0.60. Carpus about 0.90 times as long as merus; dorsal surface mesially with single or double row of low, small tubercles and tufts of setae mesially; dorsolateral or dorsomesial margins not delineated; mesial, lateral, and ventral surfaces unarmed. Merus slightly compressed laterally; dorsal surface unarmed, but with sparse tufts of setae; lateral, mesial, and ventral surfaces unarmed. Ischium unarmed, with row of long setae ventromesially.

Ambulatory legs (fig. 7D-G) similar, except for right second and third pereopods longer than left. Dactyli 1.20-1.50 times longer than propodi, slightly curved ventrally in lateral view, nearly straight or slightly twisted in dorsal view; dorsal surfaces each with row of tufts of long stiff setae; lateral faces with few tufts of short setae; mesial faces each with 2 or 3 rows of tufts of short to moderately long setae; ventral margins each with row of 7-11 slender corneous spines and few tufts of setae. Propodi longer than carpi, each with sparse tufts of moderately short

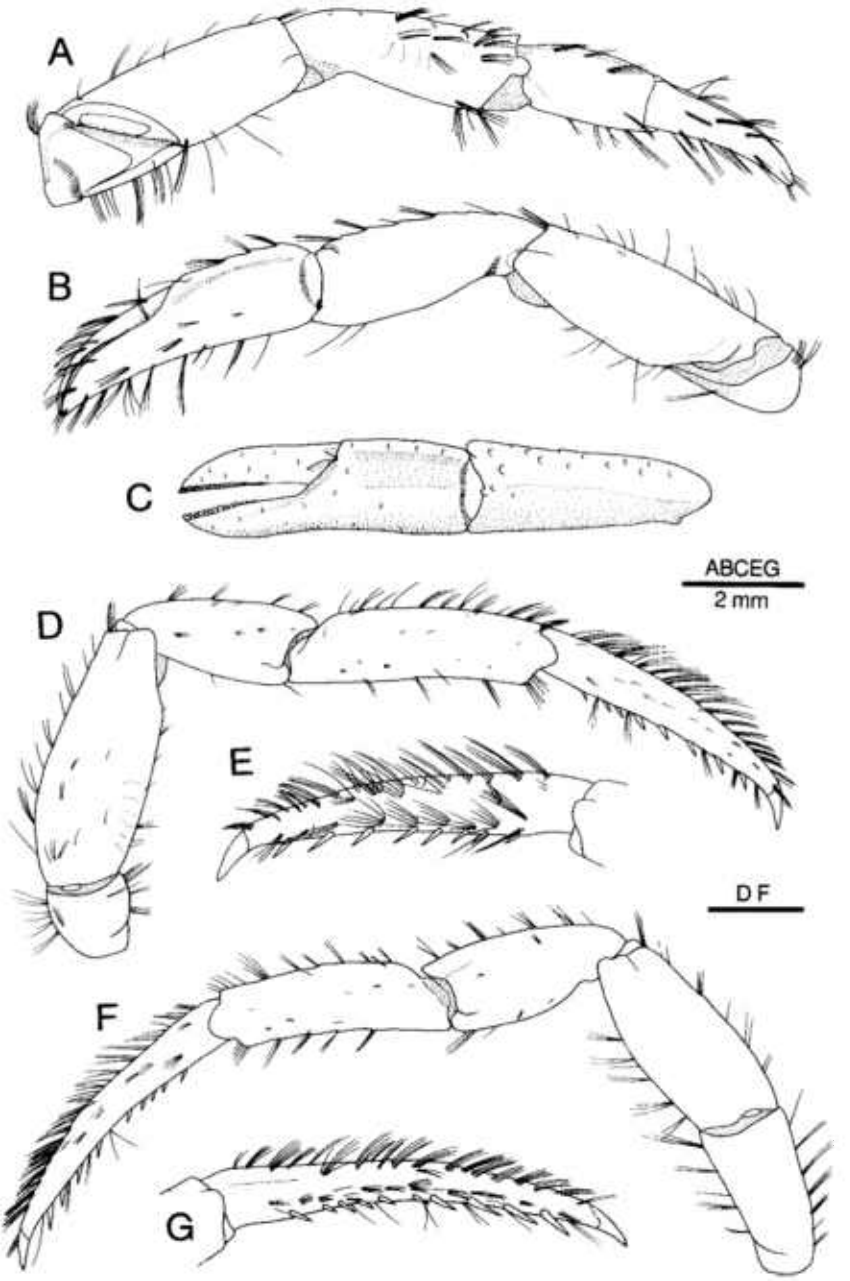

Fig. 7. *Bathypaguropsis kuroshioensis* (Miyake, 1978), male (sl 5.6 mm), Tosa Bay, Shikoku, Japan, CBM-ZC 4033. A, left cheliped, mesial; B, same, lateral; C, chela and carpus of same, dorsal; D, right second pereopod, lateral; E, dactylus of same, mesial; F, right third pereopod, lateral; G, dactylus of same, mesial.

setae; lateral face with few tufts of very short setae; ventral surfaces each with row of widely separated small corneous spinules, ventrodistal margins each with 1 or 2 small corneous spines. Carpi 0.60-0.80 times as long as meri; dorsal surfaces with sparse row of tufts of short setae, with or without small subdistal spine or tubercle. Meri and ischia unarmed on dorsal and ventral surfaces except for row of sparse tufts of moderately short setae. Coxae of third pereopods each with moderately large gonopore in females.

Fourth pereopod (fig. 4C) with sparse tufts of long setae on dorsal margins of propodus and carpus. Dactylus curving inward distally, terminating in large corneous claw; with row of small corneous teeth on ventral margin; preungual process absent. Propodus with weakly convex ventral margin; rasp consisting of 1 row of corneous scales distally, and rarely 2 rows proximally.

Fifth pereopods chelate, moderately long and slender; chela with dense tuft of long setae on ventral surface of propodus. Coxae in males (fig. 4E) each with moderately large gonopore partially masked by dense long setae directed anteriorly.

Anterior lobe of sternite of third pereopods (fig. 4D) subrectangular, with semicircular fringe of short setae distally. Sternite of fifth pereopods (fig. 4E) divided into 2 lobes, each with subdistal fringe of short setae.

First abdominal somite with tergite weakly calcified anteriorly; second to fifth somites with tergites indicated by transverse bands of fibrils; sixth abdominal somite with tergite divided by deep transverse furrow on posterior 0.30. Uropods strongly asymmetrical. Telson (fig. 4F) asymmetrical; with deep, transverse lateral indentations; anterior lobes slightly narrower than posterior; posterior lobes subtriangular, separated by moderately deep median cleft; terminal margins oblique, each with row of small, blunt spinules.

Four unpaired (second to fifth) left pleopods in males; exopods moderately well developed, endopods markedly reduced. Four unpaired left pleopods in females; second to fourth with both rami well developed and with tufts of long setae; fifth reduced as in males.

Color in life. — Shield, ocular peduncles, antennal peduncles, chelipeds, and ambulatory pereopods orange-red. Posterior carapace transparent. Antennular peduncles with proximal 2 segments red, ultimate segment becoming colorless distally.

Habitat. — Gastropod shells.

Distribution. — Pacific coast of Japan, from Sagami Bay to Tosa Bay; Kai Islands, Indonesia. Depth: 120-246 m.

Remarks. — As previously mentioned, De Saint Laurent & McLaughlin (2000: 117) indicated that *Pagurus kuroshioensis* should be included in the genus *Bathy-*

paguropsis. Our examination of the holotype of *P. kuroshioensis* and supplemental material has shown that such assignment is correct, as in all aspects this species fits well the diagnosis of *Bathypaguropsis* given by McLaughlin (1994) and De Saint Laurent & McLaughlin (2000).

A re-examination of the holotype of *B. rahayuae* from the Banda Sea showed that there is no morphological difference between *B. kuroshioensis* and *B. rahayuae*. Therefore, we consider *B. rahayuae* a junior synonym of *B. kuroshioensis*. The distribution of *B. kuroshioensis* is currently discontinuous as it has not been collected from other than Japanase waters and the Banda Sea.

Bathypaguropsis kuroshioensis is most similar to *B. yaldwyni* McLaughlin, 1994, known from New Zealand, Tasmania, and southeastern Australia. The two species, however, can be separated using several characters. The number of ventral spines on the dactyli of the second and third pereopods ranges from seven to 11 in *B. kuroshioensis*, whereas the range is 22 to 31 in specimens of *B. yaldwyni* having sl 9.5 mm. In small specimens (sl 5.0 to 9.5 mm) of *B. yaldwyni*, the number of the spines on the dactyli ranges from 15 to 18 (McLaughlin, 1994). The antennal acicles do not overreach the distal margin of the cornea in *B. kuroshioensis*, whereas the antennal acicles distinctly overreach the cornea in *B. yaldwyni*. In *B. kuroshioensis* the sulcus cardiobranchialis strongly curves inward posteriorly, reaching nearly to the cardiac sulcus (fig. 4B), and the area between the two sulci forms a chitinous or weakly calcified plate. In *B. yaldwyni* the sulcus cardiobranchialis only slightly curves inward toward the cardiac sulcus or is subparallel to the cardiac sulcus, and the area between the two sulci is only partially calcified anteriorly (McLaughlin, 1994: 470, fig. 1A).

The spination of the dactyli of the second and third pereopods of *B. kuroshioensis* is similar to that of *B. marionensis* McLaughlin, 1994, from Queensland, Australia, *B. cruentus* De Saint Laurent & McLaughlin, 2000, from New Zealand, and *B. foresti* sp. nov. However, *B. kuroshioensis* can be distinguished from those three species by the non-produced dorsomesial distal angle of the right palm. The subovate right chela with non-delineated dorsolateral margin, less produced rostrum, and much more setose mesial faces of the dactyli of the second and third pereopods, immediately distinguish *B. kuroshioensis* from *B. foresti* sp. nov.

There are clear differences in coloration among *Bathypaguropsis* species for which this information is known (see De Saint Laurent & McLaughlin, 2000, for *B. yaldwyni* and *B. cruentus*). The coloration in *B. marionensis* is at present unknown.

KEY TO THE SPECIES OF *BATHYPAGUROPSIS*

1. Dorsomesial distal angle of palm of right chela produced into prominent armed or unarmed lobe 2
– Dorsomesial distal angle of palm of right chela not produced into prominent lobe 4
2. Dorsomesial distal angle of palm of right chela armed with 2 or 3 prominent tuberculate spines ..... *B. marionensis*
– Dorsomesial distal angle of palm of right chela unarmed 3
3. Carpus of right cheliped armed dorsally with spines and tubercles; antennal peduncle distinctly exceeding distal margin of cornea ..... *B. foresti* sp. nov.
– Carpus of right cheliped unarmed dorsally, or at most punctate; antennal peduncle not exceeding distal margin of cornea ..... *B. cruentus*
4. Ventral margin of dactyli of ambulatory pereopods armed with 15 or more corneous spines .... *B. yaldwyni*
– Ventral margin of dactyli of ambulatory pereopods armed with less than 15 corneous spines .... *B. kuroshioensis*

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