

A new species of *Pteropagurus* McLaughlin & Rahayu, 2006 and a new genus and species of scaphopod dweller (Crustacea, Decapoda, Anomura, Paguroidea, Paguridae)

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ABSTRACT

A new species of the distinctive hermit crab genus *Pteropagurus* McLaughlin & Rahayu, 2006, *P. spinulocarpus* n. sp., is described and illustrated, bringing to three the number of species found to occupy empty pteropod mollusc shells. This new species is distinguished from other members of the genus by the presence of spines on the dorsal margins of the carpi of the ambulatory legs and by the absence of corneous spines on the ventral margins of the dactyls of these appendages. Additionally, a new genus and species, *Dentalopagurus levii* n. gen., n. sp. is described and illustrated based on three male specimens collected during explorations south of the Isle of Pines, New Caledonia. This new genus differs from other scaphopod dwelling genera and species in having well developed, paired male sexual tubes.

KEY WORDS

Crustacea,
Anomura,
Paguroidea,
Paguridae,
Pteropagurus,
Mollusca,
New Caledonia,
new genus,
new species.

RÉSUMÉ

Une nouvelle espèce de Pteropagurus McLaughlin & Rahayu, 2006 et un nouveau genre et une nouvelle espèce utilisant des coquilles de scaphopodes (Crustacea, Decapoda, Anomura, Paguroidea, Paguridae).

Une nouvelle espèce du genre remarquable de bernard-l'hermite *Pteropagurus* McLaughlin & Rahayu, 2006, *P. spinulocarpus* n. sp., est décrite et illustrée, amenant à trois le nombre d'espèces connues pour occuper des coquilles vides de mollusques ptéropodes. Cette nouvelle espèce se distingue des autres membres du genre par la présence d'épines sur les marges dorsales des carpes des pattes ambulatoires et par l'absence d'épines cornées sur les marges ventrales des dactyles de ces appendices. De plus, un nouveau genre et une nouvelle espèce, *Dentalopagurus levii* n. gen., n. sp., sont décrits et illustrés d'après trois spécimens mâles récoltés durant des explorations au sud de l'Île des Pins en Nouvelle-Calédonie. Ce nouveau genre diffère des autres genres utilisant des coquilles de scaphopodes par la présence de tubes sexuels mâles bien développés.

MOTS CLÉS

Crustacea,
Anomura,
Paguroidea,
Paguridae,
Pteropagurus,
Mollusca,
Nouvelle-Calédonie,
genre nouveau,
espèces nouvelles.

INTRODUCTION

In 1986 the Office de la Recherche scientifique et technique d'Outre-Mer (ORSTOM), now the Institut de Recherche pour le Développement (IRD), together with the Muséum national d'Histoire naturelle, Paris (MNHN), began an extensive survey of the bathyal fauna of the region collectively referred to as the New Caledonia Exclusive Economic Zone (EEZ) (Richer de Forges 1990). This area has provided a rich and diverse hermit crab fauna, including numerous new taxa (Forest 1987, 1995; McLaughlin & Forest 1997; Lemaitre 1999, 2004a, b; McLaughlin 2000, 2004a, b, 2006, 2007; Asakura 2005; McLaughlin & Rahayu 2006).

In this first of a series of publications devoted specifically to regional Paguridae, the addition of a third species to the unique genus *Pteropagurus* McLaughlin & Rahayu, 2006 requires an emendation of the generic diagnosis. *Pteropagurus* was originally described for two species found inhabiting empty shells of pelagic pteropod molluscs, a habitat that appeared to evoke certain sexually dimorphic attributes. A third species has now been found with that same distinctive mollusc-hermit crab association, but without the sternal dimorphism observed in the previous species. This new species is described, illustrated and compared with its congeners. Although not as remarkable, the new genus and species described herein is also atypical in that the housing of choice of this species is scaphopod mollusc shells. It is compared and contrasted to other tusk-shell dwellers.

MATERIAL AND METHODS

Materials for the present study have come from samples collected during the cruises BIOCAL, MUSORSTOM 4 and MUSORSTOM 5. General information about these cruises, maps showing the specific areas of coverage, and station data are given by Richer de Forges (1990). The holotypes and paratypes are deposited in the collection of the MNHN, with the catalog code Pg. One measurement, shield length, measured from the tip of the rostrum or midpoint of the rostral lobe to the

midpoint of the posterior margin of the shield and given in parentheses following specimen sex, provides an indication of animal size. Ocular peduncle length was measured along the lateral surface of the left ultimate peduncular segment (Powar 1969), including the cornea. Corneal diameter represents the maximum width of the cornea when viewed dorsally. Terminology for the descriptions follows that of McLaughlin & Rahayu (2006).

ABBREVIATIONS

CC	otter trawl (shrimps);
DC	Charcot dredge;
DW	Warén dredge;
ovig.	ovigerous;
stn	station.

SYSTEMATICS

Family PAGURIDAE Latreille, 1802

Genus *Pteropagurus*

McLaughlin & Rahayu, 2006

TYPE SPECIES. — *Pteropagurus inermis* McLaughlin & Rahayu, 2006 by original designation.

EMENDED DIAGNOSIS. — Eleven pairs of biserial phyllobranchiate gills. Rostrum triangular, broadly rounded or obsolete; lateral projections developed or obsolete. Ocular peduncles stout, corneas prominently dilated or not; ocular acicles triangular, each with marginal or submarginal terminal spine. Antennal peduncles with supernumerary segmentation. Mandible with entirely calcified cutting edge or with minute corneous tooth at lower distal angle. Maxillule with external lobe of endopod obsolete, internal lobe with 1 stiff bristle. Maxilla with endopod reaching to or considerably overreaching distal margin of scaphognathite. First maxilliped with slender exopod. Second maxilliped without distinguishing characters. Third maxilliped with crista dentata reduced, no accessory tooth. Sternite of third maxillipeds (thoracic somite IX of Pilgrim 1973) unarmed. Sternite of chelipeds (thoracic somite X) quite narrow, incompletely fused to much broader sternite of second pereopods. Sternite of third pereopods (thoracic somite XII) sexually dimorphic or not: very little broadened and not prominently produced posteriorly in females, broad and prominently produced posteriorly in males; or broad and prominently produced posteriorly in both sexes.

Chelipeds long, slender, right appreciably stouter, but not necessarily longer. Second pereopods distinctly shorter

than third; dactyls with or without ventral corneous spines. Fourth pereopods semichelate or minutely chelate, propodal rasp with few scales. Fifth pereopods chelate, rasp moderately well developed.

Males with elongate, stout right sexual tube directed posteriorly and externally and curving up over anterior portion of pleon; left coxa with or without short tube; uniramous left pleopods 3-5. Females with paired gonopores or unpaired left; no paired and modified first pleopods, unpaired biramous left pleopods 2-4, pleopod 5 short, uniramous as in males. Pleon somewhat reduced, straight; pleomere 1 partially fused with last thoracic somite, tergites 2-5 weakly delineated or not; tergite 6 chitinous. Uropods symmetrical; protopods each with or without posteriorly directed spine; exopods elongate, endopods reduced, both with 1 or 2 marginal rows of scales. Telson without transverse incisions, with slight to moderately well developed median cleft or concavity; terminal margins rounded or oblique, unarmed, with few minute bristles, very small tubercles, or tiny spines.

REMARKS

With the discovery of a third species adapted to this specialized habitat, the suggestion by McLaughlin & Rahayu (2006) that broadening of the sternite XII (sternite of the third pereopods) is a character exhibited exclusively by males is refuted. In the new species, such broadening is seen in both sexes. Although the new species is known from only five individuals, the distribution of the species is considerably broader than those of the earlier described taxa, a fact that lends support to McLaughlin & Rahayu's suggestion that the paucity of specimens is simply oversight because the habitat has been neither expected nor heretofore considered a resource for hermit crabs.

Pteropagurus spinilocarpus n. sp. (Fig. 1)

HOLOTYPE. — New Caledonia. BIOCAL, stn DW 44, 22°47.30'S, 167°14.30'E, 440-450 m, 30.VIII.1985, ♂ (1.6 mm, posterior portion of pleon, uropods and telson missing) (MNHN-Pg 7738).

PARATYPES. — New Caledonia. MUSORSTOM 4, stn CC 212, 22°47.40'S, 167°10.50'E, 375-380 m, 28.IX.1985, 1 ovig. ♀ (1.5 mm, right cheliped and right second pereopod missing, left third pereopod regenerating) (MNHN-Pg 7737). — Stn DW 222, 22°57.60'S, 167°33'E, 410-440 m, 30.IX.1985, 1 ♀ (1.5 mm, with rhizocephalan, missing both chelipeds, left second and

third right pereopods) (MNHN-Pg 7701).

MUSORSTOM 5, stn DW 274, 24°44.84'S, 159°41.00'E, 285 m, 9.X.1986, 1 ♀ (1.2 mm, missing right cheliped and both third pereopods) (MNHN-Pg 7702). — Stn DC 361, 19°52.50'S, 158°38.10'E, 400 m, 19.X.1986, ♂ (1.5 mm, right cheliped regenerating; left cheliped with fixed finger broken off; left third pereopod missing) (MNHN-Pg 7700).

ETYMOLOGY. — From the Latin *spinula*, diminutive of *spina* meaning thorn, and *carpus* meaning wrist, and referring to the carpal spines of the ambulatory legs.

DISTRIBUTION. — New Caledonia from the Chesterfield Plateau to south of the Isle of Pines; 285-440, possibly 450 m.

DESCRIPTION

Shield (Fig. 1A), slightly longer than broad to slightly broader than long, weakly calcified; anterior margin between rostral lobe and obsolete lateral projections somewhat concave to nearly straight; anterolateral margins sloping; posterior margin truncate. Rostral lobe only slightly produced, very faintly rounded, unarmed. Lateral carapace lobes elongate, reaching to or beyond proximal 0.5 of shield. Posterior carapace with moderate to broad median plate; cardiac sulci reaching to posterior margin. Branchiostegites membranous, unarmed.

Ocular peduncles very short and stout, 0.6-0.7 length of shield, corneal diameter 0.6-0.9 of peduncular length (including cornea). Ocular acicles narrowly triangular, each with prominent terminal spine, separated by more than twice basal width of one acicle.

Antennular peduncles overreaching distal margins of corneas by at least lengths of ultimate peduncular segments. Ultimate segment with 1-4 long setae at dorsodistal margin, surfaces with few scattered shorter setae; penultimate and basal segments each with few scattered setae.

Antennular peduncles overreaching distal corneal margins by approximately 0.5 lengths of ultimate segments. Fifth and fourth segments each with few scattered short setae; third segment with or without small spine and tuft of sparse setae at ventrodistal angle; second segment with dorsolateral distal angle produced, with acute terminal spine and smaller spine on lateral margin subterminally, dorsomesial distal angle with small spine; first segment with small

spine on laterodistal margin, ventrolateral margin with spine. Antennal acicle slender, reaching to or nearly to distal margin of fourth peduncular segment, terminating in simple spine. Antennal flagellum with 1 or 2 minute setae every article.

Right cheliped of male paratype regenerating; missing in all three female paratypes. Right cheliped of holotype (Fig. 1B) approximately equal to length of left, but appreciably stouter; dactyl and fixed finger with slight hiatus. Dactyl 0.6 length of palm; dorsomesial margin rounded, all surfaces unarmed, but with few scattered setae, particularly ventrally; cutting edge calcareous, with 2 moderately large teeth at midlength, terminating in small corneous claw and slightly overlapped by fixed finger. Palm slightly shorter than length of carpus; dorsomesial and dorsolateral margins rounded, unarmed, convex dorsal and ventral surfaces also unarmed, but with few setae ventrally; fixed finger similarly unarmed, cutting edge with several small calcareous teeth, terminating in small corneous claw. Carpus slightly longer than merus; dorsomesial and dorsolateral margins each with row of 5 or 6 quite small spines, largest laterally; other surfaces unarmed. Merus with row of widely-spaced, single bristles on dorsal surface; other surfaces unarmed but with few scattered setae. Ischium unarmed.

Left cheliped of larger specimens (Fig. 1C, D) long, slender, ventrally arched, slight hiatus between dactyl and fixed finger; dactyl equal or approximately 1.2 length of palm; smallest female paratype (Fig. 1E, F) with dactyl much shorter than palm; surfaces all unarmed but with sparse scattering of short setae particularly ventrally; dactyl and fixed finger without slight hiatus, cutting edges each with row of minute corneous teeth; palm long, slender, surfaces unarmed but with few scattered setae. Carpus approximately equal to length of merus; dorsomesial and dorsolateral margins each row of quite small spines, other surfaces unarmed but with few scattered setae. Merus unarmed in small female paratypes but with small spine at ventrolateral distal angle in larger specimens of both sexes. Ischium unarmed.

Second and third pereopods similar in armature, but dissimilar in length and proportion. Dactyls of second pereopods (Fig. 1G) slightly shorter than propodi; dorsal surfaces each with row of tiny corneous

spinules or spiniform bristles; mesial faces each with row of widely-spaced small bristles adjacent to ventral margin, lateral and ventral surfaces unarmed; terminating in small corneous claw; propodi approximately twice length of carpi, unarmed but with sparse row of setae on each dorsal surface; carpi each with row of small spines on dorsal surface; meri and ischia unarmed. Third pereopods (Fig. 1H) appreciably longer and stouter than second; dactyls long, slender, practically straight or only slightly curved ventrally; dorsal surfaces each with row of minute corneous spinules, mesial faces each with row of widely-spaced small bristles ventrally; lateral and ventral surfaces unarmed; propodi glabrous and unarmed; carpi each with row of spines on dorsal surface; meri each with 1 distal and 1 or 2 subdistal spinulose protuberances or small spines and 1 or 2 setae, ventrolateral distal angles each with tiny spinule; ischia unarmed. Fourth pereopods (Fig. 1I) semichelate; propodal rasp with 1 row of spiniform corneous scales.

Sternites of second and third pereopods (Fig. 1J) broad; second with longitudinal median groove giving sternite bilobed appearance; third broadly subrectangular anteriorly and drawn out posteriorly into broader, terminally rounded plate in both sexes. Sternites of fourth and fifth pereopods widely separated. Sternite of fifth pereopod (Fig. 1K) with faintly bilobed median projection in both sexes.

Male with coxae of fifth pereopods approximately equal, right with long, stout sexual tube developed as posterior coxal extension (Fig. 1K) directed posteriorly and exteriorly and curving over anterior portion of dorsal pleon; coxa of left with gonopore. Female with paired gonopores, with sternite of fifth pereopods as in male. Eggs in early stages of development 0.3-0.5 mm diameter.

Uropods symmetrical, exopods and endopods each with 2 rows of corneous scales. Telson (Fig. 1L) with V- or U-shaped median cleft; terminal margins oblique, each with 2-4 tiny blunt or acute spines; lateral margins each with 1 or 2 moderately long setae.

Coloration

Unknown.

Habitat

Empty pteropod shells.

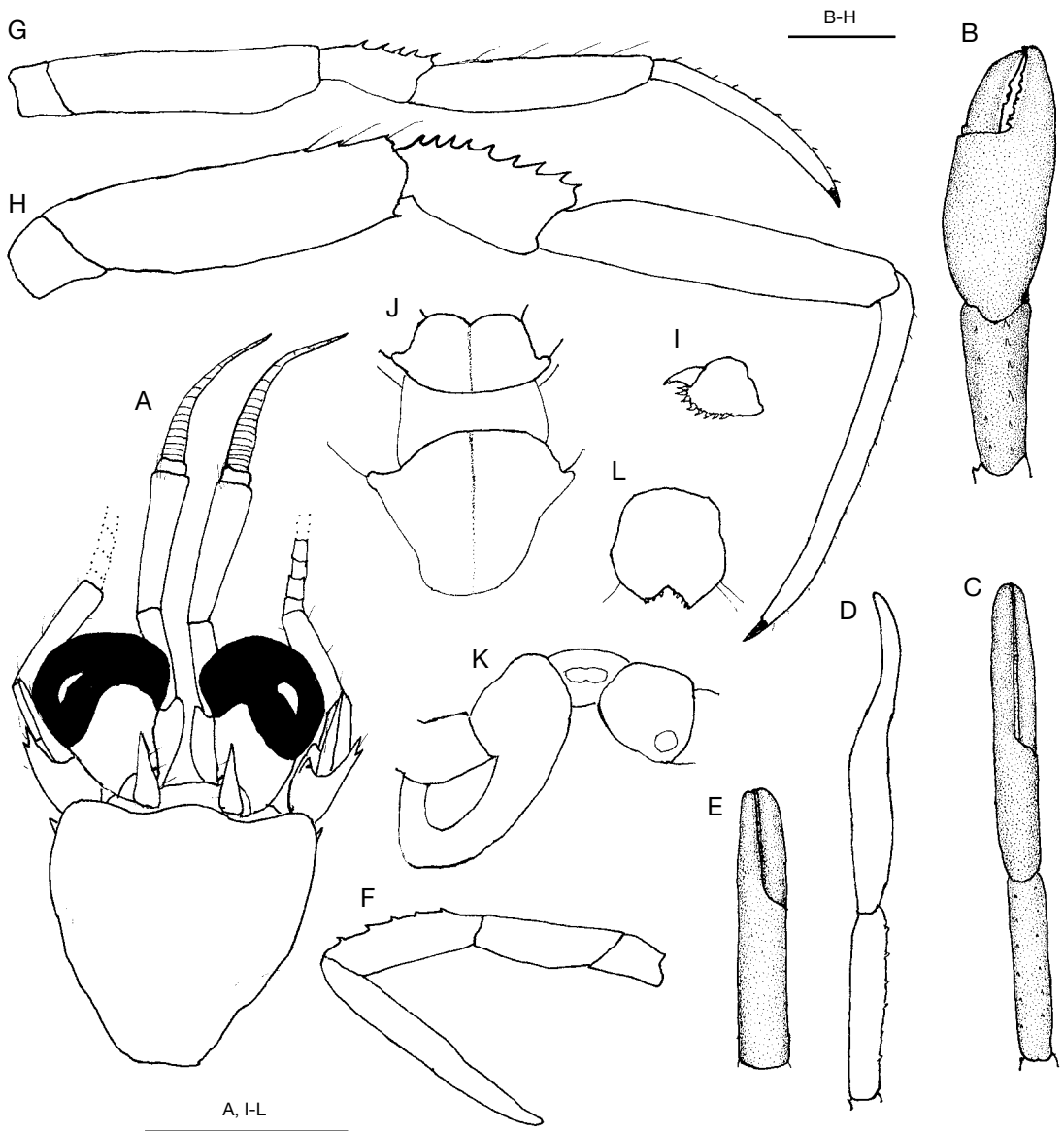


FIG. 1. — *Pteropagurus spinulocarpus* n. sp., New Caledonia: **A, G-L**, ♂ paratype 1.5 mm, MUSORSTOM 5, stn DC 361 (MNHN-Pg 7700); **B-D**, holotype ♂ 1.6 mm, BIOCAL, stn 44 (MNHN-Pg 7738); **E, F**, ♀ paratype 1.2 mm, MUSORSTOM 5, stn DW 274 (MNHN-Pg 7702); **A**, shield and cephalic appendages (aesthetascs omitted); **B**, chela and carpus of right cheliped (dorsal view, setae omitted); **C**, chela and carpus of left cheliped (dorsal view, setae omitted); **D**, chela and carpus of left cheliped (lateral view); **E**, left chela (dorsal view, setae omitted); **F**, left cheliped (lateral view, setae omitted); **G**, right second pereopod (lateral view); **H**, right third pereopod (lateral view); **I**, dactyl and propodus of left fourth pereopod (lateral view, setae omitted); **J**, sternites of second and third pereopods; **K**, coxae with sexual tube and sternite of fifth pereopods; **L**, telson. Scale bars: 1 mm.

REMARKS

The lengthening of the left cheliped and the ventral arching of the dactyl and fixed finger in *P. spinulo-*

carpus n. sp. does not appear to be a function of sexual dimorphism as it is in some pagurid genera, but rather a growth related change. The dactyl

and fixed finger of the left cheliped of the smallest female (Fig. 1F) are straight, whereas both arch noticeably in both males (Fig. 1D) and in the largest female. Corneal dilation also appears to decrease slightly with increased animal size, with the most prominent dilation seen in the smallest specimen.

Pteropagurus spinulocarpus n. sp. is immediately distinguished from *P. inermis* and *P. spina* McLaughlin & Rahayu, 2006 by several characters, not the least of which is the enlargement of the sternite of the third pereopods in females as well as in males. The spines on the dorsal margins of the carpi of the ambulatory legs will also immediately identify *P. spinulocarpus* n. sp., as will the absence of corneous spines or spinules on the ventral margins of the dactyls of these appendages. Additionally, the poorly defined rostral lobe and prominently dilated corneas of *P. spinulocarpus* n. sp. set this species apart from *P. spina*, whereas the lack of armature on the ambulatory legs immediately distinguishes *P. inermis*.

Given the specialized habitat of *Pteropagurus* species, it is somewhat surprising that MUSORSTOM 5 station DW 274 is not only the type locality of *P. spina* but also the collection site of the smallest of the female paratypes of *P. spinulocarpus* n. sp. Although it is conceivable that there was an initial labeling error when the specimens were collected, there is no likelihood that intraspecific variation is responsible for the apparent sympatry. Both the holotype of *P. spina* and the paratype of *P. spinulocarpus* n. sp. have shield lengths of 1.2 mm and both are females, therefore both allometry and sexual dimorphism are ruled out. In addition to the distinct differences in the development of the sternite of thoracic somite XII in the two specimens, the corneas of *P. spina* show very little dilation, the rostrum is well developed and triangular, and corneous spines are present on the ventral margins of the dactyls of pereopods 2 and 3. In contrast, the most prominent corneal dilation is seen in the specimen of *P. spinulocarpus* n. sp. from station DW 274, the rostrum is obsolete and there are no ventral spines on the pereopodal dactyls. Thus, it must be concluded that sympatry probably does occur.

Dentalopagurus n. gen. (Fig. 2)

TYPE SPECIES. — *Dentalopagurus levii* n. sp., by present designation.

ETYMOLOGY. — The generic name is derived from the molluscan family Dentaliidae in combination with *Pagurus* and reflects the domicile of the type species. Gender masculine.

DISTRIBUTION. — Presently known only from the area south of the Isle of Pines, New Caledonia.

DIAGNOSIS. — Eleven pairs of quadriserial phyllobranchiate gills. Rostrum triangular, acute. Ocular peduncles moderately short, corneas not dilated; ocular acicles triangular, each with prominent submarginal spine. Antennal peduncle with supernumerary segmentation. Mandible with entirely calcified cutting edge. Maxillule (Fig. 2A) with external lobe of endopod weakly developed; internal lobe with long distal seta. Maxilla (Fig. 2B) with endopod not reaching to distal margin of scaphognathite. First maxilliped (Fig. 2C) with very slender exopod. Second maxilliped (Fig. 2D) with elongate exopod. Third maxilliped (Fig. 2E) with crista dentata moderately well developed, 1 accessory tooth. Sternite of third maxillipeds (thoracic somite IX) with spinule on either side of deep V-shaped median concavity.

Chelipeds long, slender; right appreciably stouter, but not necessarily longer. Ambulatory legs generally similar; ventral margins of dactyls with corneous spines. Fourth pereopods very weakly semichelate, propodal rasp with single row of scales; no preungual process. Fifth pereopods chelate.

Males with short, stout right and left sexual tubes directed posteriorly; four unpaired left pleopods. Females unknown. Pleon straight. Uropods symmetrical. Telson with weak transverse incisions; posterior lobes separated by narrow to broad median concavity, terminal margins horizontal to slightly oblique, each with 4 or 5 prominent spines.

REMARKS

In having 11 pairs of quadriserial gills, an accessory tooth on the crista dentata, subequal chelipeds and sexual tubes developed from both left and right fifth male coxae, *Dentalopagurus* n. gen. bears considerable similarity to *Michelopagurus* McLaughlin, 1997. Even if the straight pleon and symmetrical uropods of *Dentalopagurus* n. gen. were domicile induced (cf. Imafuku & Ando 1999), the new genus is readily distinguished from *Michelopagurus* by the acute rostrum, relatively long shield, and most importantly

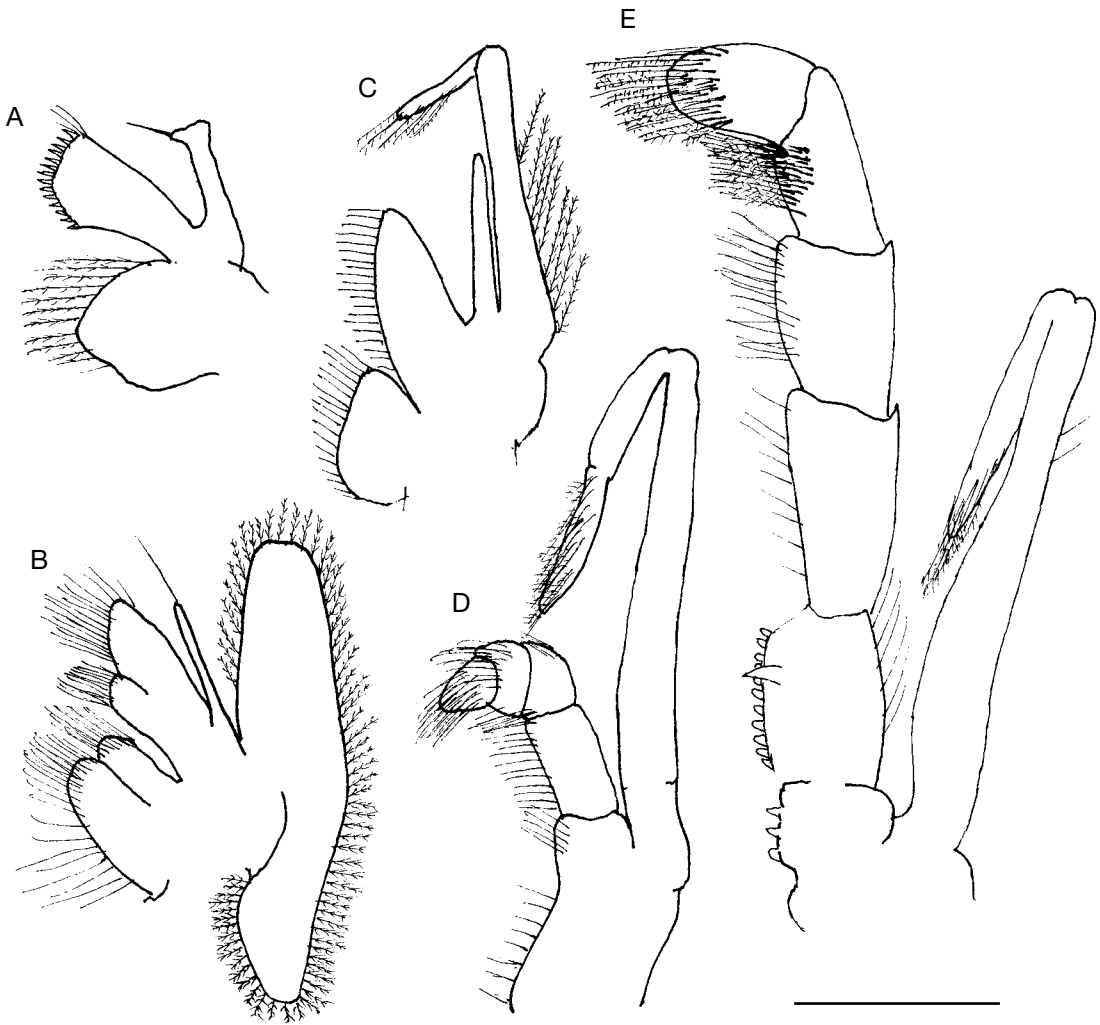


FIG. 2. — *Dentalopagurus levii* n. gen., n. sp., New Caledonia, ♂ paratype 2.0 mm, BIOCAL, strn DW 51 (MNHN-Pg 7704): **A**, maxillule; **B**, maxilla; **C**, first maxilliped; **D**, second maxilliped; **E**, third maxilliped. All internal views of right appendages. Scale bar: 0.5 mm.

the presence, in males, of four unpaired left pleopods. In fact, this character alone will differentiate *Dentalopagurus* n. gen. from the majority of genera in the family. Of the seven genera characterized, in part, by having four unpaired male pleopods, this condition is transitory in *Discorsopagurus* McLaughlin, 1974, *Pagurus* Fabricius, 1775, and *Propagurus* McLaughlin & de Saint Laurent, 1998, in which the number varies within species, or, in the case of *Pagurus*, occurs only in a minority of the assigned species. *Dentalopagurus*

n. gen. is immediately set apart from these three genera by its subequal chelipeds and well developed sexual tubes. The presence in *Decaphyllus* de Saint Laurent, 1968 and *Scopaeopagurus* McLaughlin & Hogarth, 1998 of 10 pairs of biserial gills readily separate these two genera from *Dentalopagurus* n. gen., while *Bathypaguroopsis* McLaughlin, 1994 and *Tomopaguroopsis* Alcock, 1905, with 13 pairs of gills and no male sexual tubes also are easily distinguished from the new genus.

Dentalopagurus levii n. sp.
(Figs 2; 3)

HOLOTYPE. — **New Caledonia**. BIOCAL stn DW 33, 23°09.71'S, 167°10.27'E, 675 m, 29.VIII.1985, ♂ (2.9 mm) (MNHN-Pg 7703).

PARATYPES. — **New Caledonia**. BIOCAL stn DW 51, 23°05.27'S, 167°44.95'E, 700 m, 31.VIII.1985, 2 ♂♂ (1.8 and 2.0 mm) (MNHN-Pg 7704).

ETYMOLOGY. — This species is dedicated to Professor Claude Lévi, Chief Scientist of the BIOCAL cruise.

DISTRIBUTION. — Known only from south of the Isle of Pines, New Caledonia.

DESCRIPTION

Shield (Fig. 3A) longer than broad; anterior margin between rostrum and lateral projections concave; anterolateral margins sloping, posterior margin truncate; dorsal surface glabrous. Rostrum acutely triangular, equaling or slightly overreaching level of lateral projections, with or without terminal spinule. Lateral projections prominently produced, with terminal or subterminal spine. Posterior median plate moderately narrow, weakly calcified.

Ocular peduncles 0.5-0.7 length of shield, row of sparse tufts of setae on each dorsomesial surface; corneas 0.3-0.4 of peduncular length, not dilated. Ocular acicles subtriangular, each terminally acute and with prominent submarginal spine; separated basally by approximately basal width of one acicle.

Antennular peduncles overreaching distal margins of corneas by 0.8-0.9 lengths of ultimate segments; dorsal surfaces of ultimate and penultimate segments with few scattered setae; basal segment with spine on lateral face of statocyst lobe.

Antennal peduncles overreaching distal corneal margins by 0.6-0.8 lengths of ultimate segments; fifth and fourth segments each with few scattered setae; third segment with small spine at ventrodiscal margin; second segment with dorsolateral distal angle produced, terminating acutely or with small spine, lateral margin with few setae, dorsomesial distal angle with spine; first segment with laterodistal margin unarmed; ventrodiscal angle with small spine. Antennal acicle considerably overreaching distal margin of cornea and reaching to or beyond midlength of fifth peduncular segment, terminat-

ing in small spine and with sparse setae distally and mesially. Antennal flagella reaching slightly beyond tips of chelipeds; each article with 1 or 2 tiny setae proximally, slightly longer distally.

Chelipeds subequal, right stouter, but not necessarily longer. Right cheliped (Fig. 3B) with dactyl 0.7-0.8 length of palm; dorsomesial margin not delimited but rounded surface with sparse setae, dorsal surface with row of widely-spaced tufts of sparse setae; ventral surface also with row of sparse setae; cutting edge with 2 broad, moderately widely separated calcareous teeth, terminating in small corneous claw and slightly overlapped by fixed finger. Palm only slightly shorter than carpus; dorsomesial margin only faintly delimited by row of short tuberculate ridges in holotype but not apparent in smaller paratypes, 1 slightly larger spine or protuberance at proximal angle, convex dorsal surface with only scattered fine setae in paratypes, but also proximal row of 4 very small spines in midline of holotype, dorsolateral margin unarmed (paratypes) or with faint row of tubercles (holotype) extending almost to tip of fixed finger; ventral surface with scattered fine setae; cutting edge with 2 widely-spaced calcareous teeth, terminating in small corneous claw. Carpus approximately equal to length of merus; distal margin with 1 spine mesially, dorsomesial margin with row of small spines and few fine setae, dorsal surface with few fine setae, dorsolateral margin not distinctly delimited, but with 1 or 2 low protuberances in holotype and row of sparse setae; mesial, lateral and ventral surfaces unarmed but with few scattered setae. Merus with row of tufts of sparse setae on dorsal margin; ventromesial and ventrolateral margins unarmed in paratypes, but ventromesial margin of holotype with few minute spinules distally and 1 larger spine at distal angle. Ischia unarmed. Coxa unarmed or with tiny spine at each ventrodiscal angle.

Left cheliped (Fig. 3C) approximately equal to length of right, but appreciably slenderer. Dactyl 1.2-1.4 length of palm; dorsomesial margin not delimited, surfaces unarmed, but each with 2 rows of tufts of sparse setae; cutting edge with row of very small corneous teeth, terminating in small corneous claw. Palm 0.6-0.8 length of carpus; dorsomesial margin weakly delimited by row of widely-spaced

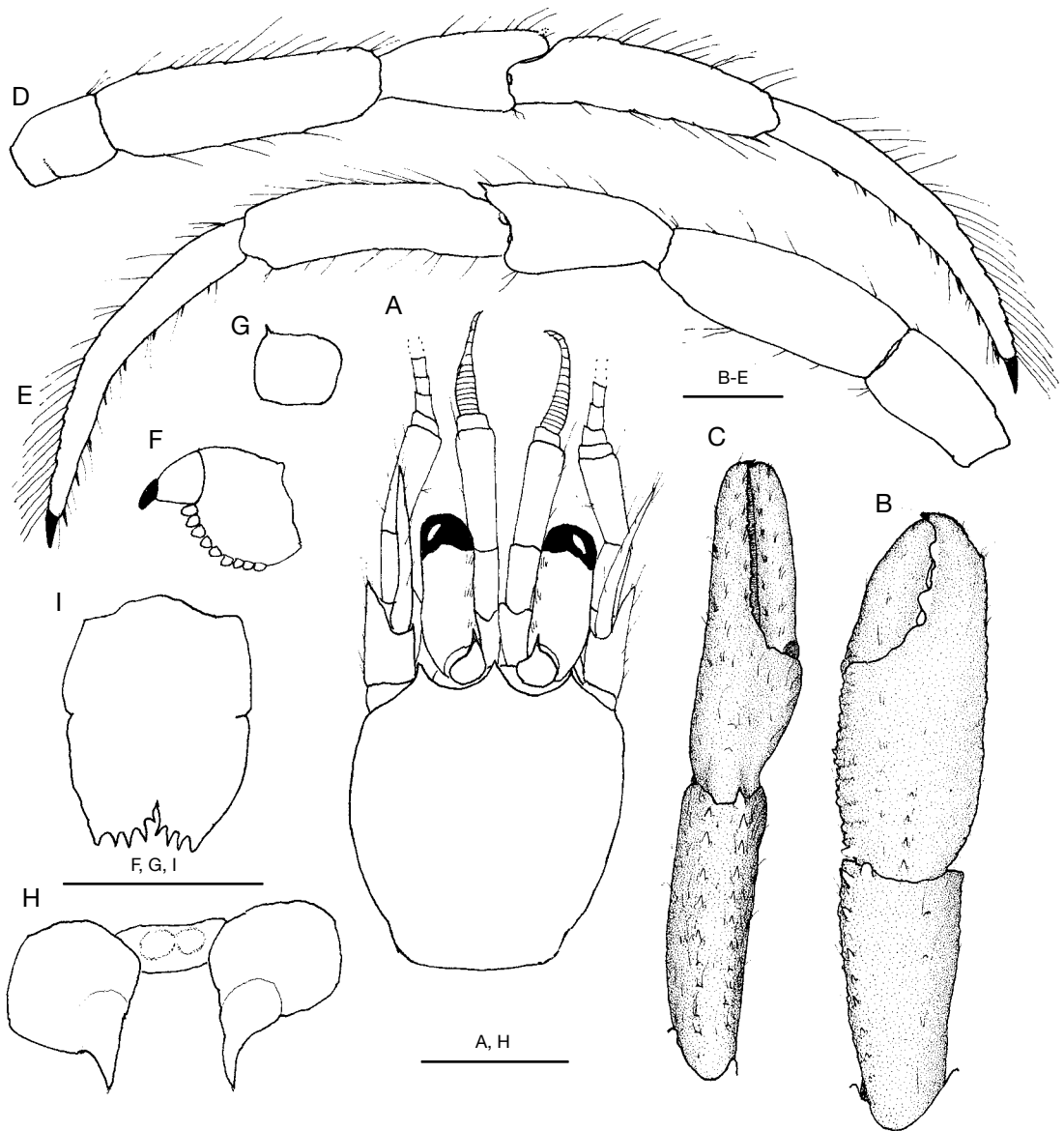


FIG. 3. — *Dentalopagurus levii* n. gen., n. sp., New Caledonia, holotype ♂ 2.9 mm, BIOCAL, stn DW 33 (MNHN-Pg 7703): **A**, shield and cephalic appendages (aesthetascs omitted); **B**, carpus and chela of right cheliped; **C**, carpus and chela of left cheliped; **D**, right second pereopod (lateral view); **E**, left third pereopod (lateral view); **F**, propodus and dactyl of left fourth pereopod (lateral view, setae omitted); **G**, anterior lobe of sternite of third pereopods; **H**, coxae and sternite of fifth pereopods; **I**, telson. Scale bars: 1 mm.

tufts of sparse setae, dorsal surface elevated into rounded plateau in midline, marked by low, short ridges accompanied by short setae in holotype, paratypes each with very small proximal spinule or

spinulose protuberance; dorsolateral surface sloping to ventrolateral margin, unarmed but with scattered fine setae; dorsal surface of fixed finger with 2 rows of tufts of sparse setae; cutting edge with very small

calcareous denticles interspersed with tiny corneous teeth, terminating in small corneous claw; ventral surface of palm and fixed finger with scattered tufts of sparse setae. Carpus approximately equal in length to merus; dorsomesial and dorsolateral margins each with row of small spines, largest mesially, accompanied by tufts of sparse setae; mesial, lateral and ventral surfaces unarmed but with scattered setae, sometimes produced from very low ridges. Merus with short transverse rows of setae on dorsal margin; ventromesial margin with sparse setae and tiny spine at distal angle in paratypes, row of transverse ridges of setae in holotype; ventrolateral margin with tiny distal spine in paratypes and row of small spines decreasing in size proximally in holotype; ventral surface with few scattered setae. Ischium unarmed. Coxa with small spine at each ventrodistal angle.

Ambulatory legs (Fig. 3D, E) nearly reaching to slightly overreaching tip of right cheliped; in dorsal view, straight; in lateral view somewhat curved ventrally. Dactyls 1.2-1.4 length of propodi; dorsal surfaces each with few tufts of sparse setae in proximal half, row of long, stiff setae in distal half; mesial and lateral faces each with few fine setae dorsally; ventral margins each with 10 or 11 corneous spines and few fine setae; terminating well developed claws. Propodi 1.2-1.3 length of carpi; dorsal and ventral surfaces each with tufts of sparse setae, 1 corneous spinule at ventrodistal margin; mesial and lateral surfaces glabrous. Carpi each with small dorsodistal spine (right second broken in holotype), dorsal surface with few fine setae. Meri unarmed but with fine setae dorsally and ventrally. Ischia unarmed. Fourth pereopods (Fig. 3F) with short, stout dactyl and terminal claw. Sternite of third pereopods with subquadrate anterior lobe (Fig. 3G), unarmed or with small marginal spine. Males with pair of slightly elevated median lobes on sternite of fifth pereopods (thoracic somite XIV) (Fig. 3H); coxae symmetrical, each with short transparent sexual tube directed posteriorly (Fig. 3H).

Pleomeres 2-5 membranous but with segmentation usually apparent dorsally; tergite of pleomere 6 chitinous or weakly calcified, with submedian transverse suture. Males with four unpaired left pleopods on pleomeres 2-5, with external rami

well developed, internal rami rudimentary; females unknown. Uropods symmetrical. Telson (Fig. 3I) with transverse indentations, narrow to moderately broad median cleft; posterior lobes each with 4 or 5 well developed spines.

Coloration

Unknown.

REMARKS

Although *D. levii* n. sp. is known from only three males, certain variations observed appear to be correlated with animal growth. The ratio of ocular peduncle length to shield length, for example, decreases with increased size. Armature of the right cheliped is weaker in the smaller paratypes. As might be expected, sexual tube development is greatest in the larger holotype as is pleopod development.

As indicated in the remarks for the genus, the presence of quadriserial gills and male sexual tube development suggests a relationship to *Michelopagurus*. And in the general appearance and armature of the chelipeds, *D. levii* n. sp. might be confused with *M. limatulus* (Henderson, 1888). However, in addition to the straight pleon and symmetrical uropods of *D. levii* n. sp., the well developed, triangular rostrum, unarmed sternite of the third maxillipeds, longer ocular peduncles and shorter antennular peduncles of this species will immediately distinguish it from Henderson's taxon.

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REFERENCES

- ASAKURA A. 2005. — A review of the genus *Micropagurus* (Crustacea Decapoda Anomura Paguridae). *Zootaxa* 1090: 1-34.
- FOREST J. 1987. — Les Pylochelidae ou « Pagures symétriques » (Crustacea Coenobitoidea). Résultats des campagnes MUSORSTOM, volume 3. *Mémoires du*

- Muséum national d'Histoire naturelle*, sér. A, Zoologie 137: 1-254.
- FOREST J. 1995. — Crustacea Decapoda Anomura: révision du genre *Trizopagurus* Forest, 1952 (Diogenidae), avec l'établissement de deux genres nouveaux, in CROSNIER A. (ed.), Résultats des campagnes MUSORSTOM, volume 13. *Mémoires du Muséum national d'Histoire naturelle* 163: 9-149.
- IMAFUKU M. & ANDO T. 1999. — Behaviour and morphology of pagurid hermit crabs (Decapoda, Anomura) that live in tusk shells (Mollusca, Scaphopoda). *Crustaceana* 72: 129-144.
- LEMAITRE R. 1999. — Crustacea Decapoda: a review of the species of the genus *Parapagurus* Smith, 1879 (Parapaguridae) from the Pacific and Indian oceans, in CROSNIER A. (ed.), Résultats des campagnes MUSORSTOM, volume 20. *Mémoires du Muséum national d'Histoire naturelle* 180: 303-378.
- LEMAITRE R. 2004a. — A review of *Strobopagurus* Lemaître, 1989 (Crustacea: Decapoda: Paguroidea: Parapaguridae), with description of a new species. *Scientia Marina* 68: 355-372.
- LEMAITRE R. 2004b. — Crustacea Decapoda: a worldwide review of the hermit crab species of the genus *Sympagurus* Smith, 1883, in MARSHALL B. & RICHER DE FORGES B. (eds), Tropical deep-sea benthos, volume 23. *Mémoires du Muséum national d'Histoire naturelle* 191: 85-149.
- MCLAUGHLIN P. A. 2000. — Crustacea Decapoda: *Porcellanopagurus* Filhol and *Solitariopagurus* Türkay (Paguridae), from the New Caledonian area, Vanuatu, and the Marquesas: new records, new species, in CROSNIER A. (ed.), Résultats des campagnes MUSORSTOM, volume 21. *Mémoires du Muséum national d'Histoire naturelle* 184: 389-414.
- MCLAUGHLIN P. A. 2004a. — A review of the hermit crab genus *Nematopagurus* A. Milne-Edwards & Bouvier, 1892 and the descriptions of five new species, in MARSHALL B. & RICHER DE FORGES B. (eds), Tropical deep-sea benthos, volume 23. *Mémoires du Muséum national d'Histoire naturelle* 191: 151-229.
- MCLAUGHLIN P. A. 2004b. — Redescription of *Tomopaguroides valdiviae* (Bass, 1911) (Decapoda: Anomura: Paguroidea: Paguridae) with notes on variation and female morphology. *Zoosystema* 26 (3): 469-481.
- MCLAUGHLIN P. A. 2006. — Two new hermit crabs from New Caledonia and environs, in RICHER DE FORGES B. & JUSTINE J.-L. (eds), Tropical deep-sea benthos, volume 24. *Mémoires du Muséum national d'Histoire naturelle* 193: 335-347.
- MCLAUGHLIN P. A. 2007. — A new genus and new species in the hermit crab family Pylojacquesidae (Crustacea: Anomura: Paguroidea). *Proceedings of the Biological Society of Washington* 120: 56-62.
- MCLAUGHLIN P. A. & FOREST J. 1997. — Crustacea Decapoda: *Diacanthurus* gen. nov., a new genus of hermit crabs (Paguridae) with both Recent and fossil representation, and the descriptions of two new species, in CROSNIER A. (ed.), Résultats des campagnes MUSORSTOM, volume 18. *Mémoires du Muséum national d'Histoire naturelle* 176: 236-259.
- MCLAUGHLIN P. A. & RAHAYU D. L. 2006. — A new genus with two new species of hermit crabs (Crustacea, Decapoda, Paguroidea, Paguridae) from an unique habitat. *Zootaxa* 1116: 55-68.
- PILGRIM R. L. C. 1973. — Axial skeleton and musculature in the thorax of the hermit crab, *Pagurus bernhardus* [Anomura: Paguridae]. *Journal of the Marine Biological Association of the United Kingdom* 53: 363-396.
- POWAR C. B. 1969. — Musculature of the eyestalk in Crustacea. *Acta Zoologica* 50: 127-141.
- RICHER DE FORGES B. 1990. — Les campagnes d'exploration de la faune bathyale dans la zone économique de la Nouvelle-Calédonie. Exploration for bathyal fauna in the New Caledonian economic zone, in CROSNIER A. (ed.), Résultats des campagnes MUSORSTOM, volume 6. *Mémoires du Muséum national d'Histoire naturelle* 145: 9-54.

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