New species and new records of lithodid crabs (Crustacea, Decapoda) from the southwestern and central Pacific Ocean

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ABSTRACT
Six species of lithodid crabs from New Caledonia, Vanuatu, Fiji and French Polynesia are studied. Two new species, *Paralomis arae* n. sp. and *P. dawsoni* n. sp., are described. Four other species, *Lithodes richeri, Neolithodes brodiei, N. nipponensis* and *Neolithodes* sp., are reported for the first time from these localities. *P. arae* n. sp. has the carapace and the abdomen surfaces covered with small granules of various size and it is characterized by the presence of few scattered spines on the dorsal surface of the carapace and a prominent central spine on the gastric region. The walking legs are moderately long, having well-developed spines along dorsal and ventral margins of merus and propodus. The closest species is *P. verrilli* from the northeastern Pacific (Bering Sea to California), but they are differentiated by the shape and armature of the carapace and the length of the dactylus of the walking legs. *P. dawsoni* n. sp. has the carapace, abdomen and pereiopods surfaces covered with clusters of rounded granules of different sizes. This new species is closely related to *P. granulosa* from the southern coasts of Argentina and Chile. Both species are easily distinguished by the armature of the carapace, scaphocerite and pereiopods and the length of the walking legs.

KEY WORDS
Crustacea,
Decapoda,
Lithodidae,
Lithodes,
Neolithodes,
Paralomis,
Pacific Ocean,
new species.

RÉSUMÉ

Nouvelles espèces et nouvelles occurrences des crabes lithodidés (Crustacea, Decapoda) dans l'océan Pacifique sud occidental et central.

Six espèces de Lithodidae de Nouvelle-Calédonie, Vanuatu, Fidji et Polynésie française sont étudiées. Deux espèces nouvelles, *Paralomis arae* n. sp. et *P. dawsoni* n. sp., sont décrites. Quatre autres espèces, *Lithodes richeri, Neolithodes brodiei, N. nipponensis* et *Neolithodes* sp. sont signalées pour la première fois pour les localités étudiées. *P. arae* n. sp. a la surface de la carapace et l'abdomen avec de nombreux granules de tailles différentes et elle est caractérisée par la présence d'épines peu nombreuses sur la surface dorsale de la carapace et une épine proéminente dans la région gastrique. Les pattes ambulatoires sont relativement longues, garnies d'une série d'épines fortes sur les bords dorsal et ventral du mérus et propode. La plus proche espèce est *P. verrilli* du Pacifique nord-est (mer de Bering jusqu'à la Californie), mais elles se différencient par la forme et l'ornementation de la carapace et par la longueur des dactyles des pattes ambulatoires. *P. dawsoni* n. sp. a la carapace, l'abdomen et les péréiopodes couvertes par des groupes de granules de tailles différentes. Cette nouvelle espèce est proche de *P. granulosa* des côtes sud de l'Argentine et du Chili. Elles peuvent se distinguer par l'ornementation de la carapace, du scaphocerite et des péréiopodes et par la longueur des pattes ambulatoires.

MOTS CLÉS
Crustacea,
Decapoda,
Lithodidae,
Lithodes,
Neolithodes,
Paralomis,
océan Pacifique,
nouvelles espèces.

INTRODUCTION

The family Lithodidae Samouelle, 1819, in the Pacific Ocean, has received some attention in the last years, indicating the presence of a rich fauna, mainly belonging to the genera *Lithodes* Latreille, 1806, *Neolithodes* A. Milne Edwards & Bouvier, 1894 and *Paralomis* White, 1856 (Macpherson 1988, 1990; Dawson 1989; Ikeda 1998). At present, the genus *Lithodes* comprises 18 species, with seven species known from the western and central Pacific, the genus *Neolithodes* has eight species, three of them present in the same area, and the most diverse genus *Paralomis* has 52 species, with 18 species cited in the area.

During the Cruises MUSORSTOM 8 to Vanuatu, MUSORSTOM 9 to Marquesas Islands, MUSORSTOM 10 to Fiji (Richer de Forges *et al.* 1996, 1999, 2000a, b) and several additional sampling carried out in New Caledonia, specimens of the family Lithodidae were obtained. These specimens have been examined, and those of the genus *Paralomis* have proven to represent two new species.

The types of the new species and other specimens are deposited in the collections of the Muséum national d'Histoire naturelle, Paris (MNHN). The measurements given are of carapace length × carapace width, excluding rostrum and lateral spines, respectively. The terminology used follows Macpherson (1988, 1990, 1992) and Saint-Laurent & Macpherson (1997).

SYSTEMATICS

Family LITHODIDAE Samonelle, 1819

Genus *Lithodes* Latreille, 1806

Lithodes richeri Macpherson, 1990

Lithodes richeri Macpherson, 1990: 219, figs 1a, 2b.

MATERIAL EXAMINED. — **Vanuatu.** MUSORSTOM 8, stn CP 1076, 15°53'S, 167°30'E, 1100-1191 m, 4.X.1994, 1 ♂ 48 × 46 mm (MNHN-Pg 5938). — Stn CP 1125, 15°57'S, 166°38'E, 1160-1220 m, 10.X.1994, 1 ♂ 59 × 58 mm (MNHN-Pg 5939). — Stn CP 1129, 16°00'S, 166°39'E, 1014-1050 m, 10.X.1994, 1 ♂ 11 × 11 mm (MNHN-Pg 5940).

REMARKS
The species was previously known only from the type locality (New Caledonia, depth unknown) and probably from New Zealand and south-east Australia (see McLay 1988). The present material extends its geographic distribution slightly to the north (Vanuatu), between 1014 and 1220 m.

Genus *Neolithodes* A. Milne Edwards & Bouvier, 1894

Neolithodes brodiei Dawson & Yaldwyn, 1970

Neolithodes brodiei Dawson & Yaldwyn, 1970: 227. — McLay 1988: 36, fig. 3. — Dawson 1989: 318 (list and references).

MATERIAL EXAMINED. — **Vanuatu.** MUSORSTOM 8, stn CP 1126, 15°58'S, 166°39'E, 1126-1260 m, 10.X.1994, 1 ♂ 109 × 98 mm (MNHN-Pg 5941).

REMARKS
The species has previously been cited in south-eastern Australia and New Zealand, in 798-1120 m. The present specimen extends its geographic distribution to the north, in 1126-1260 m.

Neolithodes nipponensis Sakai, 1971

Neolithodes nipponensis Sakai, 1971: 7, figs 1a-f, pl. 8; 1976, 697, figs 378a-f, pl. 244. — Dawson 1989: 318 (list and references). — Ikeda 1998: 47, pl. 65.

MATERIAL EXAMINED. — **Fiji.** MUSORSTOM 10, stn CP 1361, 18°00.00'S, 178°53.71'W, 1058-1091 m, 13.VIII.1998, 1 ♂ 138 × 127 mm (MNHN-Pg 5942). BORDAU 1, stn CP 1458, 17°21.52'S, 179°28.00'W, 1216-1226 m, 5.III.1999, 1 ♂ 73 × 64 mm (MNHN-Pg 5943).

REMARKS
The species has previously been cited in Japan, between 200 and 950 m. This new occurrence extends the distribution range of the species southwards to Fiji, and its depth range to 1058-1091 m.

Neolithodes sp.

MATERIAL EXAMINED. — **Marquesas Islands.** MUSORSTOM 9, stn CP 1278, 7°52.1'S, 140°38.6'W, 1000 m, 5.IX.1997, 1 juv. 9 × 7.5 mm (MNHN-Pg 5944).

REMARKS
The genus *Neolithodes* has not been cited in the Central Pacific. However, the specimen from Marquesas Islands is quite small to be identified accurately. The specimen seems to belong to the group of species in which the carapace, cheliped and walking legs have no spinules or granules, in addition to the main spines, e.g., *N. diomedeae* (Benedict, 1894) from the southwestern Atlantic and eastern Pacific, *N. vinogradovi* Macpherson, 1988, from the eastern Indian ocean and southwestern Pacific (Macpherson 1988, 1990).

Genus *Paralomis* White, 1856

Paralomis arae n. sp. (Figs 1-3)

TYPE MATERIAL. — **Fiji.** MUSORSTOM 10, stn CP 1361, 18°00.00'S, 178°53.71'W, 1058-1091 m, 13.VIII.1998, 1 ♂ holotype 74.5 mm × 72.0 mm (MNHN-Pg 5945).

ETYMOLOGY. — The name *arae* is one of the southern hemisphere constellations (the Altar).

DISTRIBUTION. — Fiji, 1058-1091 m.

DESCRIPTION
Carapace more or less hexagonal, as long as wide. Dorsal carapace surface covered with small granules of various size. Granules usually with several setae. Regions well-defined. Gastric region rather more prominent than other regions, with a thick spine on apex. Pair of thick granules between median spine and gastro-cardiac groove. Prominence of cardiac and branchial regions similar. Cardiac region with four thick granules in square pattern. Each branchial region with one median spiniform granule and two smaller thick granules near intestinal region (Figs 1; 2A, B).
Basal spine of rostrum more or less horizontal, slightly overreaching end of corneae, with spiniform tubercles on ventral side; two divergent dorsal spines, upwardly directed, extending well past end of corneae. External orbital spine slightly

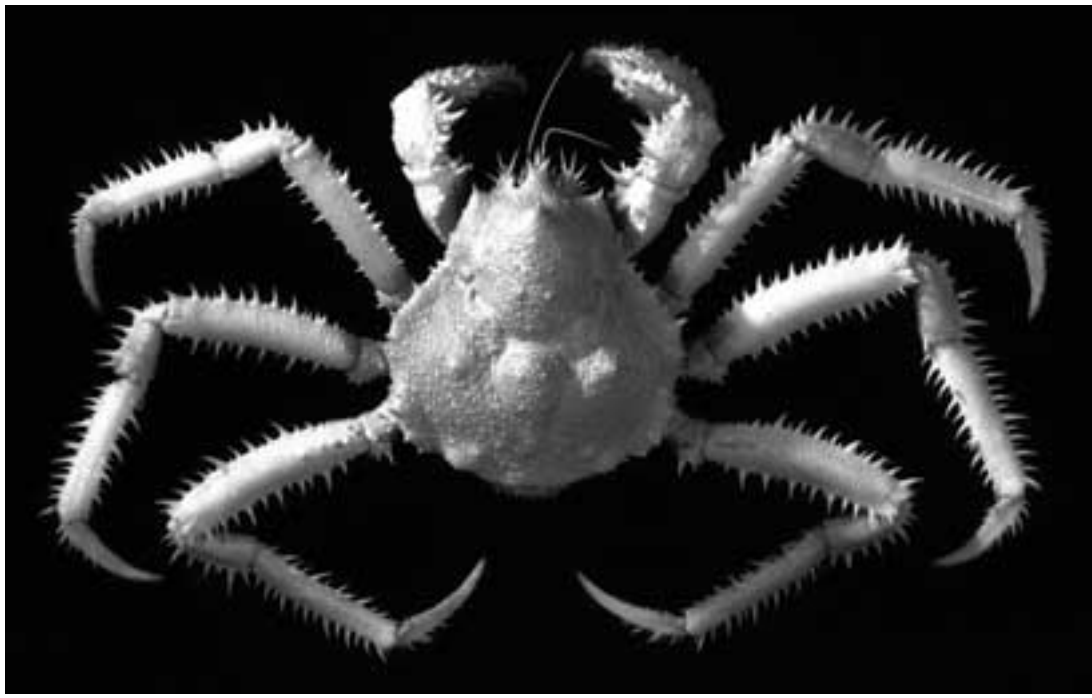

FIG. 1. — *Paralomis arae* n. sp., holotype ♂ cl 74.5 mm (MNHN-Pg 5945), dorsal view.

shorter than eyes. Anterolateral spine slightly shorter than external orbital, one small spine before cervical groove. Eight to nine spines on branchial lateral edge, more developed on anterior part of branchial border. Posterolateral angle with small crest, with some spinulous granules. Posterior border with some spiniform granules.
Abdomen plates smooth, with numerous granules of various size.
Ocular peduncles with several thick terminal spines. Basal segment of antennal peduncle with strong distolateral and distomesial spines. Scaphocerite with long, central spine, reaching end of last segment of antennal peduncle, two long spines and two or three smaller spines on lateral border; mesial margin with three well-developed spines; three or four spines of various size on dorsal side (Fig. 3).
Chelipeds bearing thick spines on mesial border of merus, carpus and hand. Some large, more or less acute granules on dorsal surface of merus, carpus and hand. Lateral border of hand with spines. Numerous tuft of setae scattered on mesial and lateral borders and dorsal surface of articles (Fig. 2C).
Walking legs moderately long. First and second walking legs slightly longer than third. Third walking leg about two times carapace length; some acute granules on terminal border of coxa; merus shorter than carapace length, about two times longer than carpus and about 1.3 time longer than propodus, with thick spines of various size along dorsal and ventral borders, few spines on posterior surface; carpus with spines along dorsal margin; propodus 1.2 time longer than dactylus, with well-developed spines along dorsal and ventral margins; dactylus slightly curved, with several spines on proximal portion of dorsal edge and with corneous spinules along ventral margin. Scattered tuft of setae on posterior surface, dorsal and ventral margins of articles (Fig. 2D).

REMARKS

Paralomis arae n. sp. belongs to the group of species with few scattered spines on the dorsal surface of

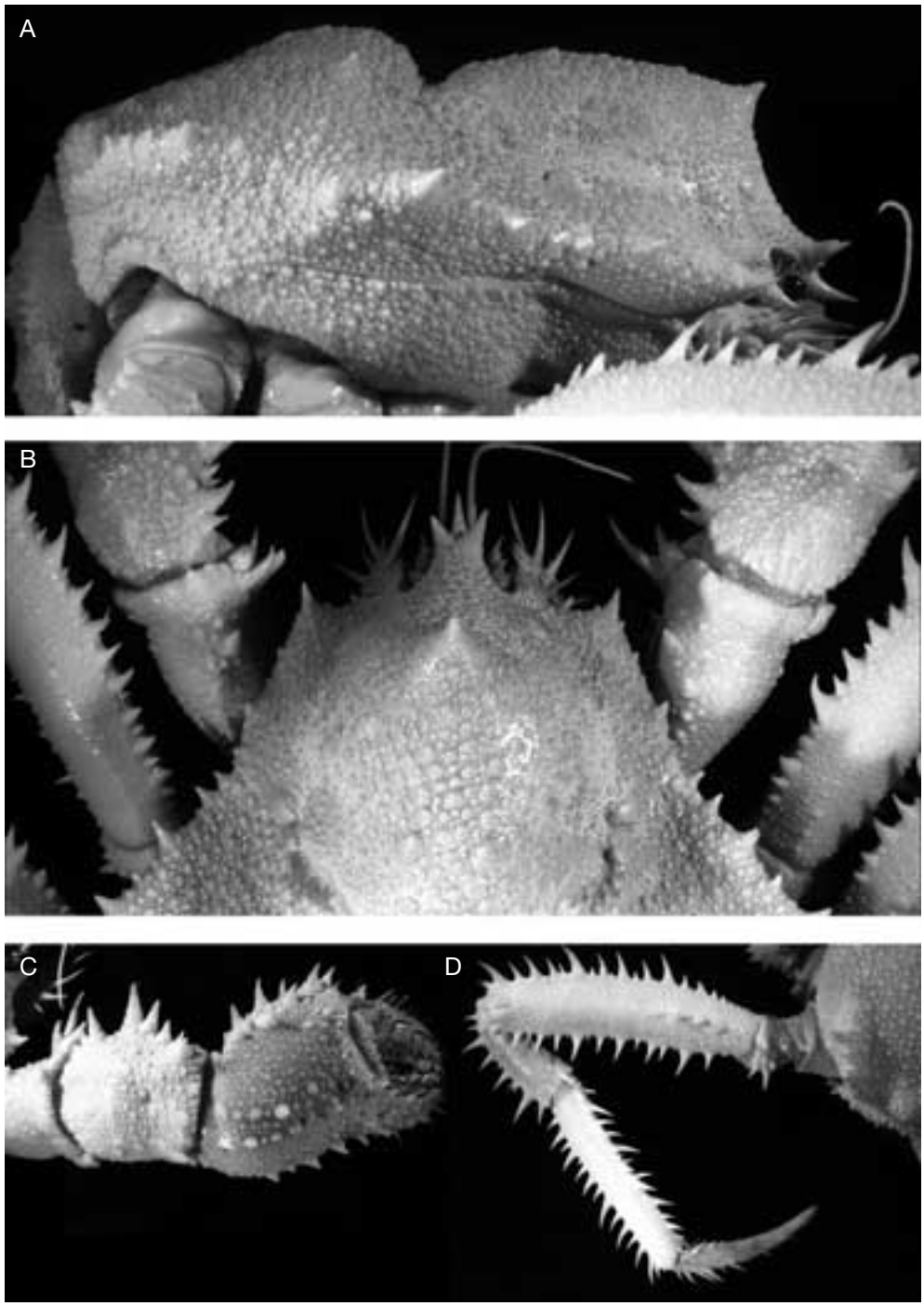

FIG. 2. — *Paralomis arae* n. sp., holotype ♂ cl 74.5 mm (MNHN-Pg 5945); **A**, carapace, lateral view; **B**, anterior part of carapace, dorsal view; **C**, right cheliped; **D**, third left ambulatory leg.

FIG. 3. — *Paralomis arae* n. sp., holotype ♂ cl 74.5 mm (MNHN-Pg 5945), anterior portion of carapace, including rostrum, eyes and antennal scaphocerite, dorsal view. Scale bar: 5 mm.

the carapace, covered with small, rounded granules varying in size and a prominent gastric region with one central spine. The closest congeners are: *P. verrilli* (Benedict, 1895) from Bering Sea to California, 850 to 3290 m; *P. otsuae* Wilson, 1990 from Peru and Chile, 1740 and 1860 m and *P. formosa* Henderson, 1888, from the southeastern Atlantic, 400-1600 m (Sakai 1976; Takeda *et al.* 1984; Wilson 1990; Macpherson 1992).

Paralomis arae n. sp. resembles the types of *P. verrilli* (National Museum of Natural History, Washington, D-5685), but it is distinguished by features such as:

– carapace as long as wide in the new species, clearly wider than long in *P. verrilli*;

– granules on dorsal carapace surface and posterolateral crest in *P. verrilli* more prominent than in *P. arae* n. sp.;

– dactylus of the walking legs in *P. verrilli* as long or longer than propodus, clearly shorter in the new species.

The new species is also similar to *P. otsuae*. However, the spines on the walking legs and chelipeds are much more developed in *P. arae* n. sp. than in *P. otsuae*. Furthermore, *P. arae* n. sp. has the rostrum with several spiniform tubercles on the ventral border and the scaphocerite has some spines on the dorsal side, whereas in *P. otsuae* the rostrum only has one spinule on the ventral border and the scaphocerite is smooth on the dorsal side.

Paralomis arae n. sp. is clearly differentiated from *P. formosa* by the spines on the dorsal surface and lateral borders of the carapace, much more developed in *P. formosa* than in the new species.

Paralomis dawsoni n. sp.
(Fig. 4)

Paralomis sp. Macpherson 1990: 225, figs 2c, 4.

TYPE MATERIAL. — **New Caledonia**. Trap, seaward side of the reef, holotype 1 ov. ♀ 71 × 72 mm (MNHN-Pg 4278); 3 ♀ ♀ paratypes 62 × 60 to 72 × 72 mm (MNHN- Pg 4275, 4279).

ETYMOLOGY. — This species is dedicated to E. W. Dawson, National Museum of New Zealand, for his important contribution to lithodid taxonomy.

DISTRIBUTION. — New Caledonia.

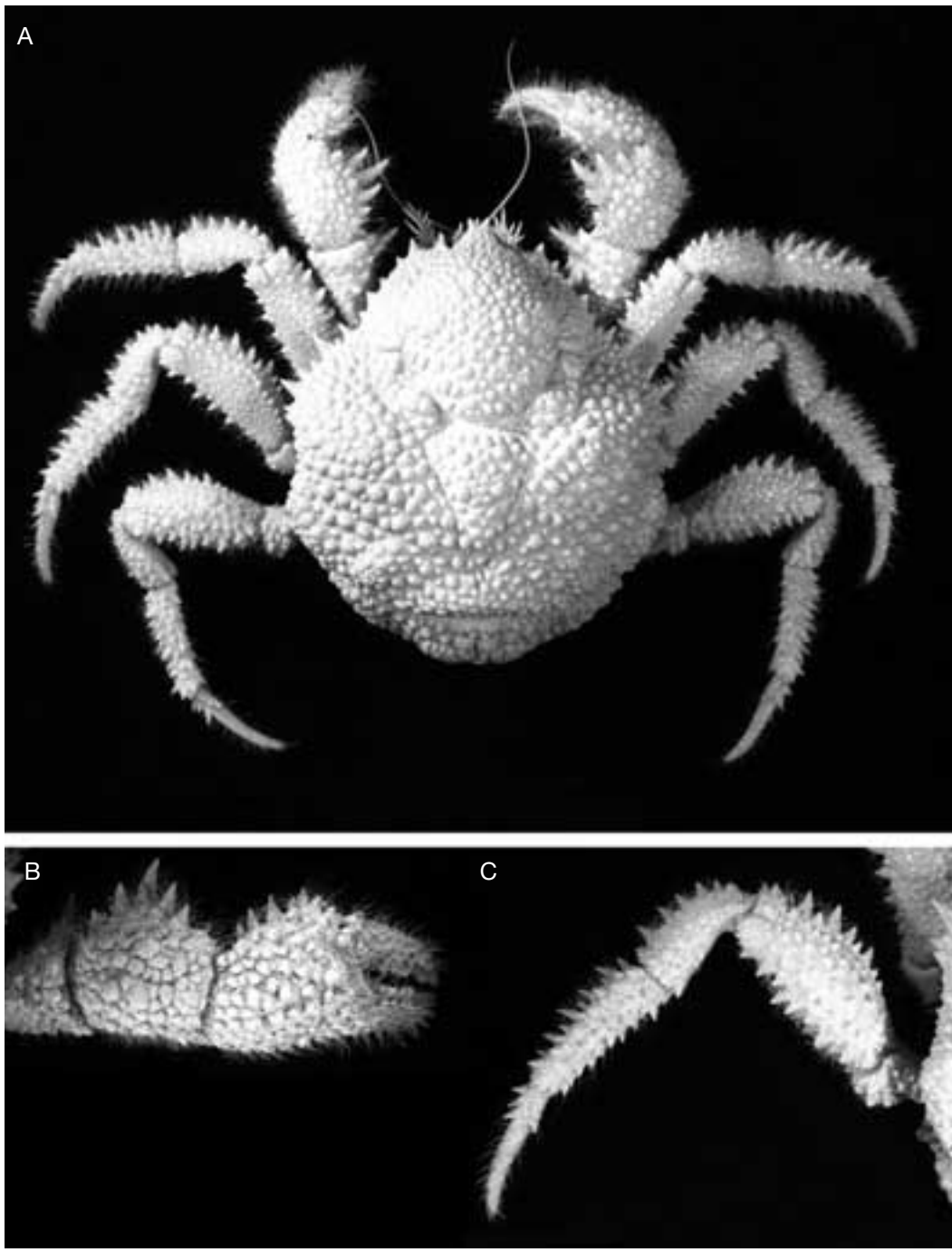

FIG. 4. — *Paralomis dawsoni* n. sp., holotype ov. ♀ cl 71 mm (MNHN-Pg 4278); **A**, dorsal view; **B**, right cheliped; **C**, third left ambulatory leg.

DESCRIPTION

Carapace more or less hexagonal, as long as wide, surface covered with rounded, clustered granules of different sizes. Granules with several short setae. Regions well-defined. Gastric region slightly more prominent than rest. Prominence of cardiac and branchial regions similar (Fig. 4A).

Basal spine of rostrum short more or less horizontal, slightly overreaching end of corneae, with several granules on ventral side; pair of somewhat divergent, dorsal spines, pointing slightly upwards, not exceeding end of corneae. External orbital spine shorter than eyes. Anterolateral spine slightly shorter than external orbital. Anterolateral margins of carapace with 11 to 13 stout spines, of different size, extending to level of gastro-cardiac groove. Posterolateral and posterior borders with granules.

Abdomen plates with numerous rounded granules of various size.

Ocular peduncles with several thick terminal and dorsal spines.

Basal segment of antennal peduncle with strong distolateral and distomesial spines. Scaphocerite with a long, central spine, slightly overreaching end of last segment of antennal peduncle, two or three long spines and two to four smaller spines on lateral border; mesial margin with three to five spines; some acute granules on dorsal side (Macpherson 1990: fig. 4).

Chelipeds with merus armed with spines in terminal border, one spine larger than others; carpus with six to seven well-developed spines not situated on a crest; numerous spines, less developed than spines of carpus, on dorsal border of hand; numerous granules scattered over all articles; numerous tuft of setae scattered on mesial and lateral borders and dorsal surface of articles (Fig. 4B).

Walking legs moderately long, with numerous granules on posterior surface of articles. First and second walking legs slightly longer than third. Third walking leg less than 1.5 time carapace length; some acute granules on terminal border of coxa; merus about 1.5 time longer than carpus and about 1.3 time longer than propodus, with spines of various size along dorsal and ventral borders; carpus with spines along dorsal margin; propodus as long as dactylus, with well-developed spines along dorsal margin and some smaller spines along ventral edge; dactylus slender, slightly curved, with several spines on proximal portion of dorsal edge and with corneous spinelets along ventral margin. Scattered tuft of setae on posterior surface, dorsal and ventral margins of articles (Fig. 4C).

REMARKS

Paralomis dawsoni n. sp. belongs to the group of species with the carapace, abdomen and pereiopods surfaces densely covered with clusters of rounded granules, varying in size, without spiniform tubercles or spines. This group is represented in the Pacific ocean by three species: *P. granulosa* (Jacquinot, 1847) from the southern coasts of Argentina and Chile, *P. dofleini* Balss, 1911 from Japan and *P. haigae* Eldredge, 1976 from Guam, New Caledonia and Samoa Islands (Sakai 1971, 1976; Macpherson 1988, 1990; Dawson 1989; Ikeda 1998).

Paralomis dawsoni n. sp. appears to be most closely related to *P. granulosa*, but the two can be differentiated by the following characters:

– the gastric region is usually more convex in *P. dawsoni* n. sp. than in *P. granulosa*;

– the spines on the carapace margins are larger in the new species than in *P. granulosa*;

– the scaphocerite has more and longer spines in *P. dawsoni* n. sp. than in *P. granulosa*;

– the carpus of the chelipeds has a high crest dorsally, with six or seven stout spines in *P. granulosa*, this crest is not present in *P. dawsoni* n. sp. although some well-developed spines are present;

– the walking legs are longer and more slender in the new species than in *P. granulosa*. The propodus of the third walking legs is more than 2.5 times longer than higher in *P. dawsoni* n. sp., being less than two times in *P. granulosa*.

The new species is also close to *P. dofleini* and *P. haigae*, although it is readily differentiated by the following features:

– the rostrum has not dorsal spines in *P. dofleini* and *P. haigae*, whereas two dorsal spines are always present in *P. dawsoni* n. sp.;

– the carapace margins lack spines, and the walking legs have few and small spines in *P. dofleini* and *P. haigae*; the carapace edges have well-developed spines, and the walking legs have numerous dorsal spines in the new species;
– the granules on the carapace have few very short scattered setae in the new species, whereas these setae are more numerous and form a circle in *P. haigae*.

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