A new genus and two new species of Spongicolidae (Crustacea, Decapoda, Stenopodidea) from the South-West Pacific

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ABSTRACT

A new genus, *Globospongicola*, is established for two new species of deep-water spongicolid shrimps, *G. nudibranchus* n. sp. from Indonesia and *G. spinulatus* n. sp. from Vanuatu and New Caledonia. The new genus is distinctive in having simple gills completely lacking lamellae or filaments, instead of typical trichobranchiate gills in all other species in the family. Furthermore, the reduced armament on the body and third pereopod separates the new genus from *Microprosthema, Paraspongicola,* and *Spongicola*; the well-developed exopod of the third maxilliped distinguishes the new genus from *Spongicola*, *Spongicoloides* and *Spongiocaris*. The two new species can be distinguished from one another by the shape and armature of the rostrum, the spination of the carapace, the shape of the sixth abdominal somite, the shape of the antennal scale, and the armament of the third pereopods and pleopods of male.

RÉSUMÉ

Un genre nouveau et deux espèces nouvelles de Spongicolidae (Crustacea, Decapoda, Stenopodidea) du Sud-ouest Pacifique.
Un genre nouveau, *Globospongicola*, est établi pour deux nouvelles espèces de crevettes spongicolides de profondeur : *G. nudibranchus* n. sp. d'Indonésie et *G. spinulatus* n. sp. du Vanuatu et de Nouvelle-Calédonie. Le nouveau genre se distingue par la possesion de branchies simples sans lamelles et filaments, au lieu de typiques branchies trichobranchiées chez toutes les autres espèces de la famille. De plus, l'ornementation réduite sur le corps et le troisième péréiopode sépare ce nouveau genre de *Microprosthema*, *Paraspongicola* et *Spongicola* ; l'exopodite bien développé du troisième maxillipède distingue ce nouveau genre de *Spongicola*, *Spongicoloides* et *Spongiocaris*. Les deux nouvelles espèces peuvent se distinguer entres elles par la forme et l'armature du rostre, la spinulation de la carapace, la forme du sixième somite abdominal, la forme de l'écaille antennaire et l'ornementation des troisièmes péréiopodes et des pléopodes du mâle.

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INTRODUCTION

During studies of the rich collection of the stenopodidean shrimps made by various French expeditions in the Indo-Pacific regions, two undescribed species belonging to the family Spongicolidae Schram, 1986 were found. The two species present morphological characteristics incompatible with any of the spongicolid genera as at present defined, although showing a general resemblance to species of *Spongicoloides* Hansen, 1908 and *Spongiocaris* Bruce & Baba, 1973. Therefore, a new genus *Globospongicola* is here established to accommodate the two new species, *G. nudibranchus* n. sp. from Indonesia and *G. spinulatus* n. sp. from Vanuatu and New Caledonia and these are described and fully illustrated.

MATERIAL AND METHODS

The measurements used are of postorbital carapace length (CL), all given in millimetres. The type specimens are deposited in the collection of the Muséum national d'Histoire naturelle, Paris (MNHN). Sex of specimens was determined primarily by the position of the gonopores.

SYSTEMATIC ACCOUNT

Infraorder STENOPODIDEA Claus, 1872
Family SPONGICOLIDAE Schram, 1986

GLOBOSPONGICOLA n. gen.

Type species: *Globospongicola nudibranchus* n. sp.

ETYMOLOGY. — From the Latin, *globosus* meaning globular, and a generic name *Spongicola*, a type genus of the Spongicolidae, in reference to the strongly inflated, globular carapace in females of the two new species. Gender masculine.

DIAGNOSIS. — Body integument soft. Rostrum short, directed downward. Carapace markedly inflated, particularly in females, smooth, occasionally with spinules on anterolateral part; cervical groove present. Abdomen dorsoventrally compressed. Telson elongate subrectangular; dorsal surface with one longitudinal ridge on either side of midline bearing row of small spines. Eyes distinct, but cornea strongly reduced, non-pigmented. Antennule with basal segment not particularly elongate. Antennal scale small. Second maxilliped with well-developed exopod. Third maxilliped with long

TABLE 1. *Globospongicola* n. gen. Gill formula. r, rudimentary.
TABLEAU 1. Globospongicola *n. gen. Formule branchiale. r, rudimentaire.*

Thoracic somites	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
	maxillipeds				*pereopods*			
	1	*2*	*3*	*1*	*2*	*3*	*4*	*5*
Pleurobranchs	–	–	1	1	1	1	1	1
Arthrobranchs	1	1	2	2	2	2	2	–
Podobranchs	–	– or r	–	–	–	–	–	–
Epipods	1	1	1	1	1	1	1	–
Exopods	1	1	1	–	–	–	–	–

exopod. First pereopod devoid of grooming apparatus on carpus and propodus. Third pereopods largest; chela smooth on dorsal margin, occasionally with very small spinules on ventral margins. Gills (Fig. 2G) simple, completely lacking lamellae or filaments; cuticle of gills soft and membranous; cross section at midlength nearly circular or oval; gill formula summarized in Table 1; podobranch of second maxilliped absent in *G. nudibranchus* n. sp., rudimentary in *G. spinulatus* n. sp.; arthrobranchs present above bases of first maxilliped to fourth pereopod, one on maxillipeds, two on first to fourth pereopods; pleurobranchs on third through eighth thoracic somites. Epipods present on all maxillipeds and anterior four pereopods; pereopodal epipods weakly curved. Protopods of second to fifth pleopods in spawning females strongly flattened and oval in shape; angles of articulations rotated at 90° from original positions, and thus lateral faces corresponding to original dorsal faces; endopods and exopods also broad. Uropodal exopod with two longitudinal ridges on dorsal surface. Eggs few and large.

SEXUAL DIMORPHISM. — Like other spongicolid species, the two new species exhibit strong sexual dimorphism in general body shape (more stout and more depressed in females than in males), length of the rostrum (longer in males than in females), strength of armature on the carapace, abdominal pleura and appendages (spines or teeth are larger in males than in females), the lengths of the antennal peduncles and of the pereopods (longer in males than in females), and the shape and structure of the pleopods (much more compressed laterally and broader in females than in males). In spawning females, the abdomen and the pleopods are widened to accommodate eggs; the second to fifth pleopods are rotated at 90° from the original positions (the lateral surfaces correspond to the original dorsal surfaces); and the median spines on the abdominal tergites are reduced or absent.

DISTRIBUTION. — Southwest Pacific Ocean, 210-1000 m.

REMARKS. — The new genus is assigned to Spongicolidae on account of the depressed body shape, the subrectangular telson and the possession of a single median ridge on the endopod of the uropod (Holthuis 1993). The generic classification of Spongicolidae is still in a state of flux. Holthuis (1993) recognized five genera within the family, i.e. *Microprosthema* Stimpson, 1860, *Paraspongicola* de Saint Laurent & Cléva, 1981, *Spongicola* de Haan, 1844, *Spongicoloides* Hansen, 1908 and *Spongiocaris* Bruce & Baba, 1973. De Saint Laurent & Cleva (1981) synonymized *Spongiocaris* under *Spongicoloides*. Saito & Takeda (2003) investigated phylogenetic relationships among species of the Spongicolidae known at that time using 38 morphological characters. Their result suggests that all but the monotypic *Paraspongicola* are non-monophyletic, although they did not attempt to clarify the genus level classification.

In spite of the unsettled taxonomy of the family, a new genus is established for the two new species described in this study because of their distinctiveness. The reduced armature of the body and appendages links *Globospongicola* n. sp. to species assigned to *Spongicoloides* or *Spongiocaris*. However, the new genus is unique within Spongicolidae in having simple gills, completely lacking filaments or lamellae. In all other known taxa of the Spongicolidae, as well as Stenopodidae, the second family of the infraorder Stenopodidea, the gills are trichobranchiate, although some degree of reduction of the size and numbers of gill filaments are found at least in *Spongicoloides inermis* (Bouvier 1905) (see A. Milne-Edwards & Bouvier 1909). It can be assumed that the simple gills of the new genus are derived from the typical trichobranchiate gills with complete loss of gill filaments and thickening of the rachis. Other presumably apomorphic characters of the new genus include the strongly inflated carapace of female, the strongly reduced, non-faceted cornea of the eye, the non-dentate mesial margin of the incisor process of the mandible, the simple endopod of the first maxilliped, and the broadly oval protopods of the second to fifth pleopods. Among these characters, the reduction of the eye is seen also in *Spongicoloides inermis* (see A. Milne-Edwards & Bouvier 1909); some degree of enlargement of the pleopodal protopods is found in certain species of *Spongicola* (unpublished data). Furthermore, the well-developed exopods on the second and third maxillipeds separate the new genus from *Spongicola*, *Spongicoloides* and *Spongiocaris*. In this regard, the new genus appears rather conservative (see Saito & Takeda 2003).

Globospongicola nudibranchus n. sp.

Figs 1-6

TYPE MATERIAL. — Holotype. Kai Islands, Banda Sea, Indonesia, KARUBAR Expedition, stn CP 36, 6°05'S, 132°44'E, 268-210 m, 27 October 1991, ovigerous ♀ CL 5.9 mm (MNHN-Na 15634).
Allotype. Same data as holotype, 1 ♂ CL 3.3 mm (MNHN-Na 15635).

Type species of *Globospongicola* n. gen.

DESCRIPTION OF FEMALE. — Rostrum (Fig. 2A, B) very short, 0.14 of carapace length, somewhat compressed laterally, directed strongly downward, narrow triangular in dorsal view; dorsal margin sharply edged, without distinct teeth; rostral tip truncate in lateral view, with 3 small denticles; lateral face concave; ventrolateral ridge sharp, but unarmed, confluent with orbital margin; ventral margin unarmed. Carapace (Figs 1, 2A, B) strongly inflated; dorsal surface strongly convex, and anterior part sloping toward rostrum; lateral surface entirely smooth; cervical groove very shallow, but reaching midline of carapace; orbital margin concave; antennal spine small; pterygostomial margin somewhat produced, exceeding antennal spine, angular.

Thoracic sternum (Fig. 2C) notably broadened posteriorly, with bi-lobed prominences on fifth to seventh somites; prominences on fifth and sixth somites widened posteriorly, those on fifth somites showing as triangular tooth with denticulate lateral margin, and those on sixth somites roundly triangular; prominence on seventh somite broad, divided in 2 lobes by shallow median emargination, surface deeply concave.

Abdomen (Figs 1, 2D) strongly flattened dorsoventrally, dorsal surface of each somite rounded. Posterodorsal margins of first and second somites deeply concave, that of third somite weakly concave, and those of fourth and fifth somites straight. First somite divided in two sections by strong transverse ridge extending onto pleuron, partially overhanging deeply depressed anterior section; pleural margin broadly rounded. Pleura of second to fifth somites unarmed, ventral margins of second to fourth pleura shallowly concave; posterolateral parts of fourth and fifth pleura produced in subtriangular lobe. Sixth abdominal somite slightly widened posteriorly; lateral margins slightly concave, unarmed;

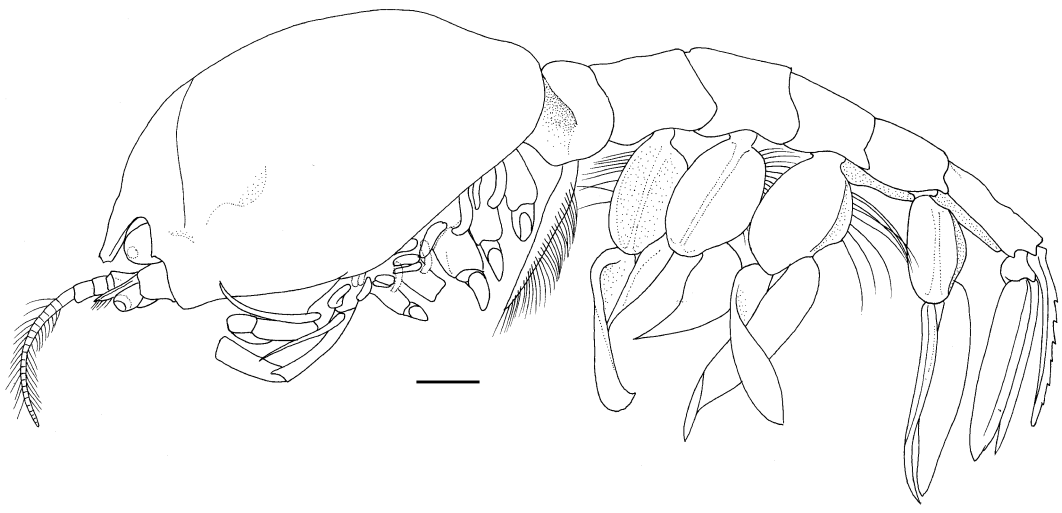

FIG. 1. *Globospongicola nudibranchus* n. gen., n. sp. Holotype female (CL 5.9 mm) from Kai Islands, Indonesia (MNHN-Na 15634). Entire animal in lateral view (pereopods all detached; setae on abdominal appendages and telson partially omitted). Scale bar = 1 mm.

FIG. 1. Globospongicola nudibranchus *n. gen., n. sp. femelle holotype (CL 5,9 mm) des Îles Kai, Indonésie (MNHN-Na 15634). Animal entier en vue latérale (les périopodes sont détachés; les soies sur les appendices abdominaux et le telson sont partiellement omises). Échelle = 1 mm.*

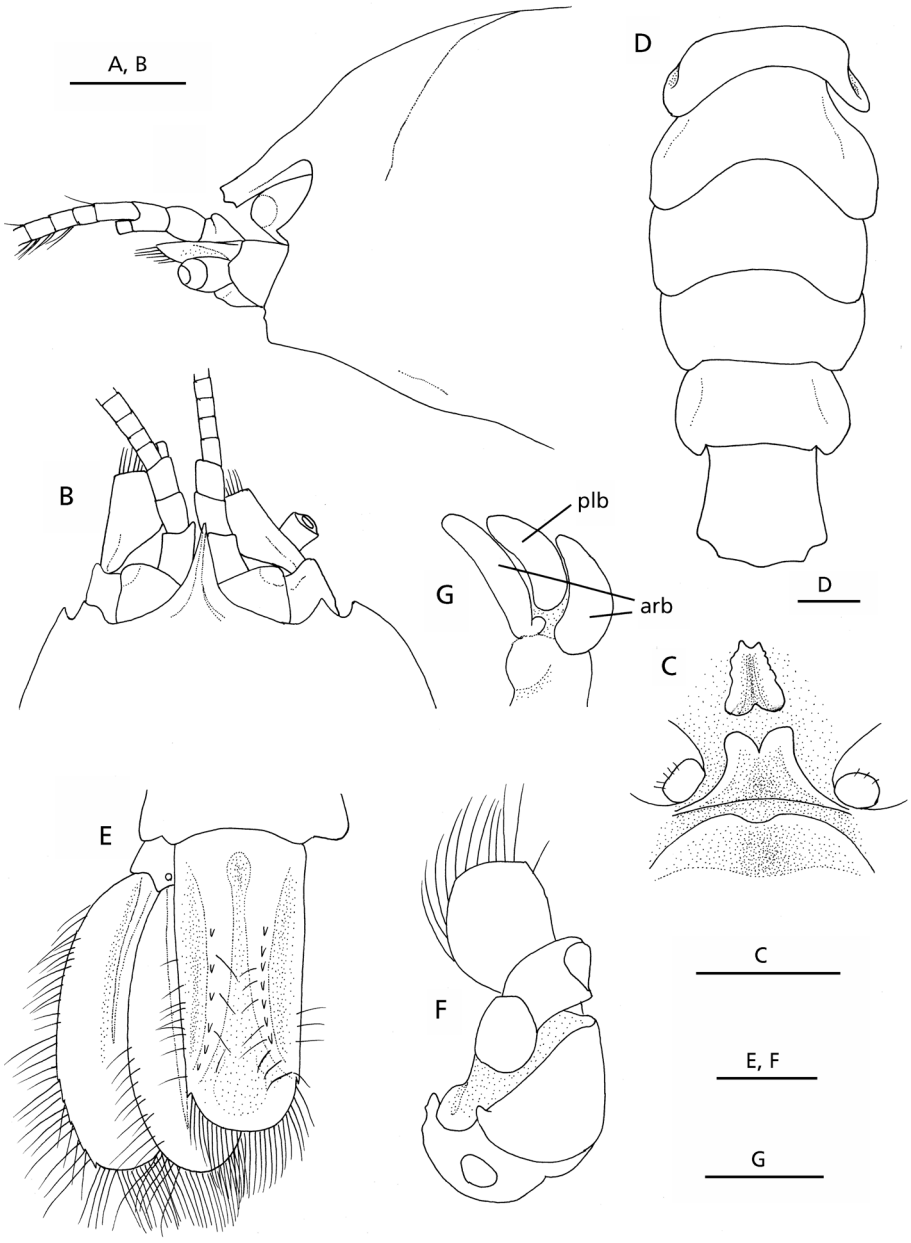

FIG. 2. *Globospongicola nudibranchus* n. gen., n. sp. Holotype female (CL 5.9 mm) from Kai Islands, Indonesia (MNHN-Na 15634). A, anterior part of carapace and cephalic appendages, lateral view; B, same, dorsal view; C, thoracic prominences on fifth to seventh somites; D, abdomen, dorsal view; E, telson and left uropod, dorsal view; F, left antenna, ventral view; G, pleurobranch and arthrobranchs on first pereopod, ventrolateral view. arb, arthrobranch; plb, pleurobranch. Scale bars: A-D = 1 mm; E-G = 0.5 mm.

FIG. 2. Globospongicola nudibranchus *n. gen., n. sp. femelle holotype (CL 5,9 mm) des Îles Kai, Indonésie (MNHN-Na 15634). A, partie antérieure de la carapace et des appendices céphaliques en vue latérale ; B, la même en vue dorsale ; C, proéminences thoraciques sur les cinquième et septième somites ; D, abdomen, vue dorsale ; E, telson et uropode gauche en vue dorsale ; F, antenne gauche, vue ventrale ; G, pleurobranchie et arthrobranchie sur le premier péréiopode, vue ventrolatérale. arb, arthrobranchie ; plb, pleurobranchie. Échelles : A-D = 1 mm ; E-G = 0,5 mm.*

posterolateral process rounded; posteroventral process relatively small, also rounded. Telson (Fig. 2E) elongate subrectangular, about 2.30 times longer than broad; lateral margins with faint concavity subproximally and with small spine at each posterolateral angle, otherwise smooth; posterior margin strongly produced, rounded, with fringe of numerous long setae; dorsal surface with distinct submedian ridges slightly diverging posteriorly, bearing 6 (left) or 7 (right) small spines.

Abdominal sternites generally concave, all somites unarmed.

Eye (Fig. 2A, B) small, directed anterolaterally, tapering distally to small cornea; cornea slightly produced, non-faceted and non-pigmented; surfaces of eye-stalk unarmed.

Antennular peduncle (Fig. 2A, B) short. First segment longer than distal two segments combined, with stylocerite strongly reduced in very small rounded lobe located near base. Second segment wider than long. Third segment nearly as long as wide. Lateral flagellum uniramous, composed of many articles, each article bearing numerous short to long setae on distal margin. Mesial flagellum broken, only 12 articles of right preserved; articles similarly setose to those of mesial flagellum.

Antennal peduncles (Fig. 2A, B, F) short, widely separated at base, thus antennular peduncles visible in ventral view. First segment with antennal gland opening on ventral surface. Second segment stout, with small blunt tubercle basally on ventral surface; dorsodistal and dorsolateral margins unarmed. Third segment with concave ventral surface. Fourth segment short and stout. Fifth segment also short and stout, not reaching midlength of antennal scale. Antennal scale short, 0.13 carapace length and 1.80 times longer than wide, distinctly narrowed toward base; lateral margin straight, smooth, terminating in very small distolateral tooth; distal margin of lamella truncate; mesial margin strongly convex; fringe of setae on distal to mesial margins. Flagellum missing.

Mandible (Fig. 3A, B) with palp composed of 3 articles; third article with numerous stiff setae; molar process with well delineated mesial surface bordered by sharp, minutely denticulate, chitinous ridge; incisor process with strongly convex external surface, distomesial angle pointed, mesial margin faintly denticulate. Maxillule (Fig. 3C) with coxal endite subovate, bearing numerous stiff setae marginally; basial endite subrectangular, with row of slender spines on truncate mesial margin; palp simple, with 1 apical seta. Maxilla (Fig. 3D) with coxal and basial endites both divided in 2 unequal lobes; endopod well-developed, non-articulated, weakly curved mesially, tapering distally, with row of setae on lateral margin; anterior lobe of scaphognathite weakly broadened anteriorly, posterior lobe distinctly shorter than anterior lobe, rounded, with several long setae on posterior margin. First maxilliped (Fig. 3E) with rounded coxal endite; basial endite large; endopod stout, not tapering distally, with row of long plumose setae on lateral margin; exopod long; epipod distinctly bilobed. Second maxilliped (Fig. 3F) pediform, composed of 6 segments; ischium and merus fused, flattened; carpus with tuft of long setae at distomesial angle; dactylus subequal in length to propodus, reaching nearly to base of ischium-merus fused segment in flexed position; dense stiff setae on mesial margin of propodus and dactylus; exopod long, distinctly overreaching distal margin of carpus; epipod well developed, but lacking podobranch. Third maxilliped (Fig. 3G, H) composed of 7 segments, overreaching antennal scale when fully extended; ischium large, strongly compressed laterally, unarmed on ventral margin; merus shorter and narrower than ischium, slightly tapering distally; dactylus subequal to carpus, but shorter than propodus; exopod long, reaching midlength of merus.

First pereopod (Fig. 4A, B) moderately stout; all segments unarmed; chela 0.82 of carpus length; dactylus 0.58 of palm length. Second pereopod (Fig. 4C, D) similar to first pereopod in general structure, but distinctly longer; chela 0.62 of carpus length; dactylus 0.50 of palm length. Third pereopods (Fig. 4E, F) subequal, over-reaching anterolateral margin of carapace by length of carpus and chela; ischium, merus and carpus all smooth; merus obliquely articulated to ischium, about 2.80 times longer than high; carpus subequal in length to ischium and merus combined, broadened distally, about 4.50 times longer than distal width; distomesial angle rounded; chela about 1.30 length of carpus, about as long as carapace, and about 4.20 times longer than wide, entirely unarmed on surfaces; palm with row of short setae on dorsal surface; fixed finger slightly deflexed, terminating in small corneous claw; cutting edge of fixed finger with very low, broad teeth proximally, otherwise unarmed; dactylus 0.54 length of palm, terminating in curved claw, cutting edge faintly denticulate. Fourth and fifth pereopods (Fig. 4G-J) similar; ischium and merus obliquely articulated; meri 4.50-4.60 times as long as wide; carpus and propodus combined longer than ischium and merus combined; carpi slightly longer than meri;

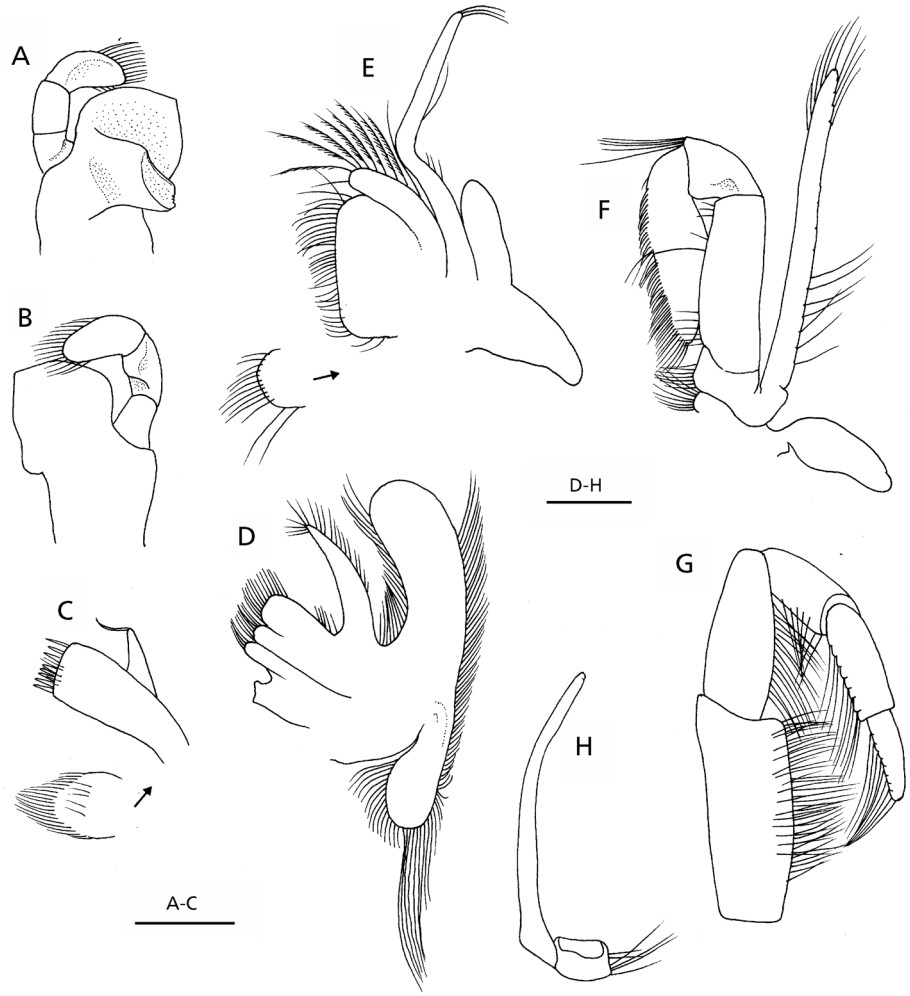

FIG. 3. *Globospongicola nudibranchus* n. gen., n. sp. Holotype female (CL 5.9 mm) from Kai Islands, Indonesia (MNHN-Na 15634). Mouthparts. A, left mandible, inner view; B, same, outer view; C, left maxillule, outer view (coxal endite broken off); D, left maxilla, outer view (setae partially missing); E, left first maxilliped, outer view (coxal endite broken off); F, left second maxilliped, outer view; G, right third maxilliped, lateral view; H, basis and exopod of right third maxilliped, ventral view. Scale bars = 0.5 mm.

FIG. 3. Globospongicola nudibranchus *n. gen., n. sp. femelle holotype (CL 5,9 mm) des Îles Kai, Indonésie (MNHN-Na 15634). Pièces buccales. A, mandibule gauche, vue interne ; B, le même en vue externe ; C, maxillule gauche, vue extérieure (endite coxal cassé) ; D, maxille gauche, vue externe (soies partiellement manquantes) ; E, premier maxillipède gauche, vue externe (endite coxal cassé) ; F, second maxillipède gauche, vue externe ; G, troisième maxillipède droit, vue latérale ; H, base et exopodite du troisième maxillipède droit, vue ventrale. Échelles = 0,5 mm.*

propodi about half length of carpi, with row of 5 (fourth) or 8 (fifth) slender spines on ventral margin; dactyli 0.43-0.45 times as long as propodi, clearly biunguiculate (ventral unguis shorter than dorsal unguis), both unguis not clearly demarcated from corpus.

Pleopods (Fig. 1) very broad, forming space embracing eggs together with concave sternum of abdomen. First pleopod uniramous; protopod subrectangular; ramus fused with protopod, lance-shaped. Protopods of second to fifth pleopods articulated at lateral extremity of sternites, oval and flat, about 1.60-1.70 times longer than wide; margins slightly upturned; lateral surfaces of protopods of second and third pleopods slightly concave on either side of blunt median ridge; those of fourth and fifth pleopods divided in two sections by sharp ridge adjacent to posterior margin, posterior section, possibly corresponding to ventral surface before modifying for spawning, strongly concave; endopods and exopods broad,

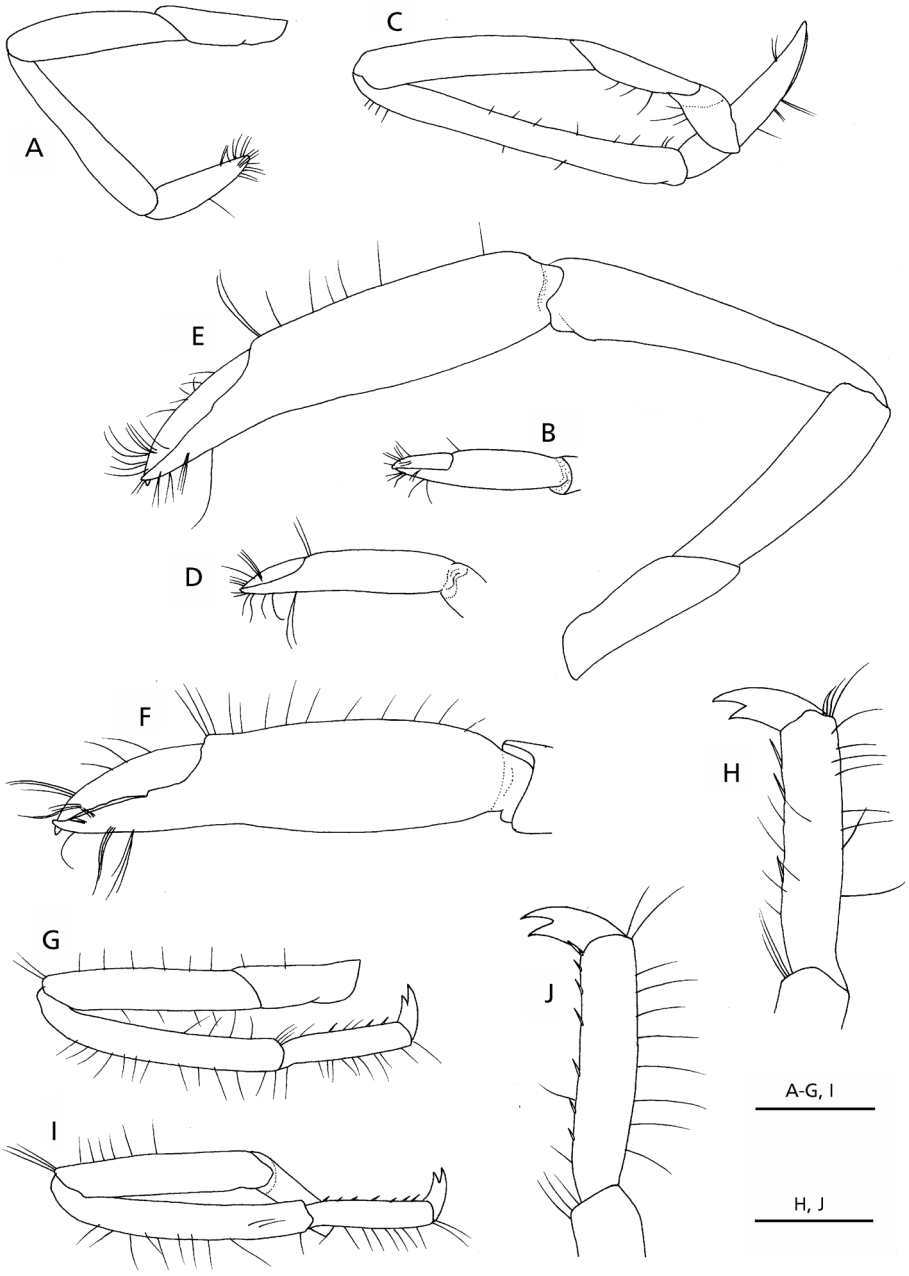

FIG. 4. *Globospongicola nudibranchus* n. gen., n. sp. Holotype female (CL 5.9 mm) from Kai Islands, Indonesia (MNHN-Na 15634). Left pereopods. A, first pereopod, lateral view; B, chela of first pereopod, dorsolateral view; C, second pereopod, lateral view; D, chela of second pereopod, dorsolateral view; E, third pereopod, lateral view; F, chela of third pereopod, oblique lateral view; G, fourth pereopod, lateral view; H, dactylus and propodus of fourth pereopod, lateral view; I, fifth pereopod, lateral view; J, dactylus and propodus of fifth pereopod, lateral view. Scale bars: A-G, I = 1 mm; H, J = 0.5 mm.

FIG. 4. Globospongicola nudibranchus *n. gen., n. sp. femelle holotype (CL 5,9 mm) des Îles Kai, Indonésie (MNHN-Na 15634). Péréiopodes gauches. A, premier péréiopode, vue latérale ; B, pince du premier péréiopode, vue dorsolatérale ; C, deuxième péréiopode, vue latérale ; D, pince du deuxième péréiopode, vue dorsolatérale ; E, troisième péréiopode, vue latérale ; F, pince du troisième péréiopode, vue latérale oblique ; G, quatrième péréiopode, vue latérale ; H, dactyle et propode du quatrième péréiopode, vue latérale ; I, cinquième péréiopode, vue latérale ; J, dactyle et propode du cinquième péréiopode, vue latérale. Échelles : A-G, I = 1 mm ; H, J = 0,5 mm.*

subequal in length. Uropod (Fig. 2E) with small tubercle on proximomesial surface of protopod; both rami subequal in length, overreaching telson, elongate oval in shape; exopod with 7 minute teeth on lateral margin, including terminal tooth; dorsal surface of exopod with 1 sharp median carina; endopod with smooth lateral margin.

Fifty-two eggs still preserved, 1.4-1.6 ♂ 1.1-1.3 mm.

DESCRIPTION OF MALE. — Rostrum (Figs 5, 6A) 0.20 of carapace length, directed weakly downward; dorsal margin with 2 very small teeth; rostral tip truncate with 3 small, sharp teeth; ventrolateral ridge sharp, but unarmed; ventral surface also unarmed. Carapace somewhat inflated with convex, rounded dorsal surface; lateral surface entirely smooth; cervical groove very shallow, but reaching midline of carapace; pterygostomial margin somewhat produced, reaching antennal spine, minutely denticulate.

Thoracic sternum (Fig. 6B) weakly broadened posteriorly, with paired prominences on fifth to seventh somites; prominences on fifth somite spiniform; prominences on sixth and seventh somites slightly or weakly diverging posteriorly, showing as sharp triangular teeth; prominences on eighth somite clearly delineated, triangular.

Abdomen (Fig. 5) moderately flattened dorsoventrally. Posterodorsal margins of first and second somites weakly concave, those of third to fifth somites nearly straight. First somite with pleural margin rounded. Pleura of second to fourth somites truncate ventrally, each with very small tooth at anteroventral angle; posteroventral margin smooth in second, bearing 2 or 3 minute denticles in third and fourth; pleuron of fifth somite rounded, with 3 minute denticles. Sixth abdominal somite slightly widened posteriorly; lateral margins slightly concave; posterolateral process pointed; posteroventral process small, also pointed. Telson similar to that of female; submedian ridges on dorsal surface bearing 7 (right) or 9 (left) spines.

Abdominal sternites (Fig. 5) convex medially, those of second to fourth somites with 1 procurved median spine.

Eye (Fig. 5, 6A) similar to that of female, but comparatively larger; surfaces of eye-stalk unarmed.

Antennal peduncle (Fig. 6A) relatively longer than in female. Antennal scale (Fig. 6A) with 2 small denticles on slightly concave lateral margin proximal to distolateral tooth.

Antennular peduncle (Fig. 6A) similar to that of female, but relatively longer.

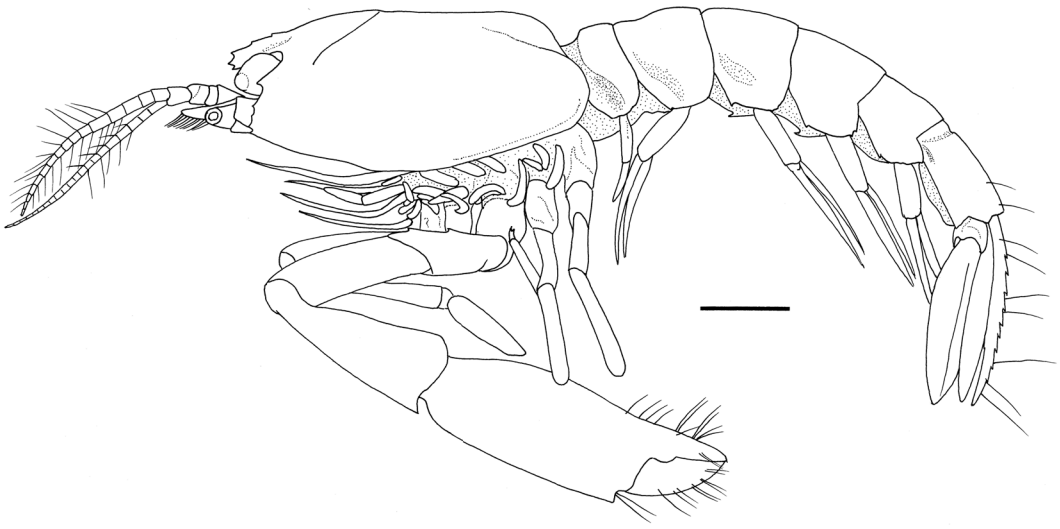

FIG. 5. *Globospongicola nudibranchus* n. gen., n. sp. Allotype male (CL 3.3 mm) from Kai Islands, Indonesia (MNHN-Na 15635). Entire animal in lateral view (third maxilliped and first pereopod broken off; setae on abdominal appendages and telson omitted). Scale bar = 1 mm.

FIG. 5. Globospongicola nudibranchus *n. gen., n. sp. Mâle allotype (CL 3,3 mm) des Îles Kai, Indonésie (MNHN-Na 15635). Animal entier en vue latérale (troisième maxillipède et premier péréiopode cassés ; soies sur les appendices abdominaux et le telson omises). Échelle = 1 mm.*

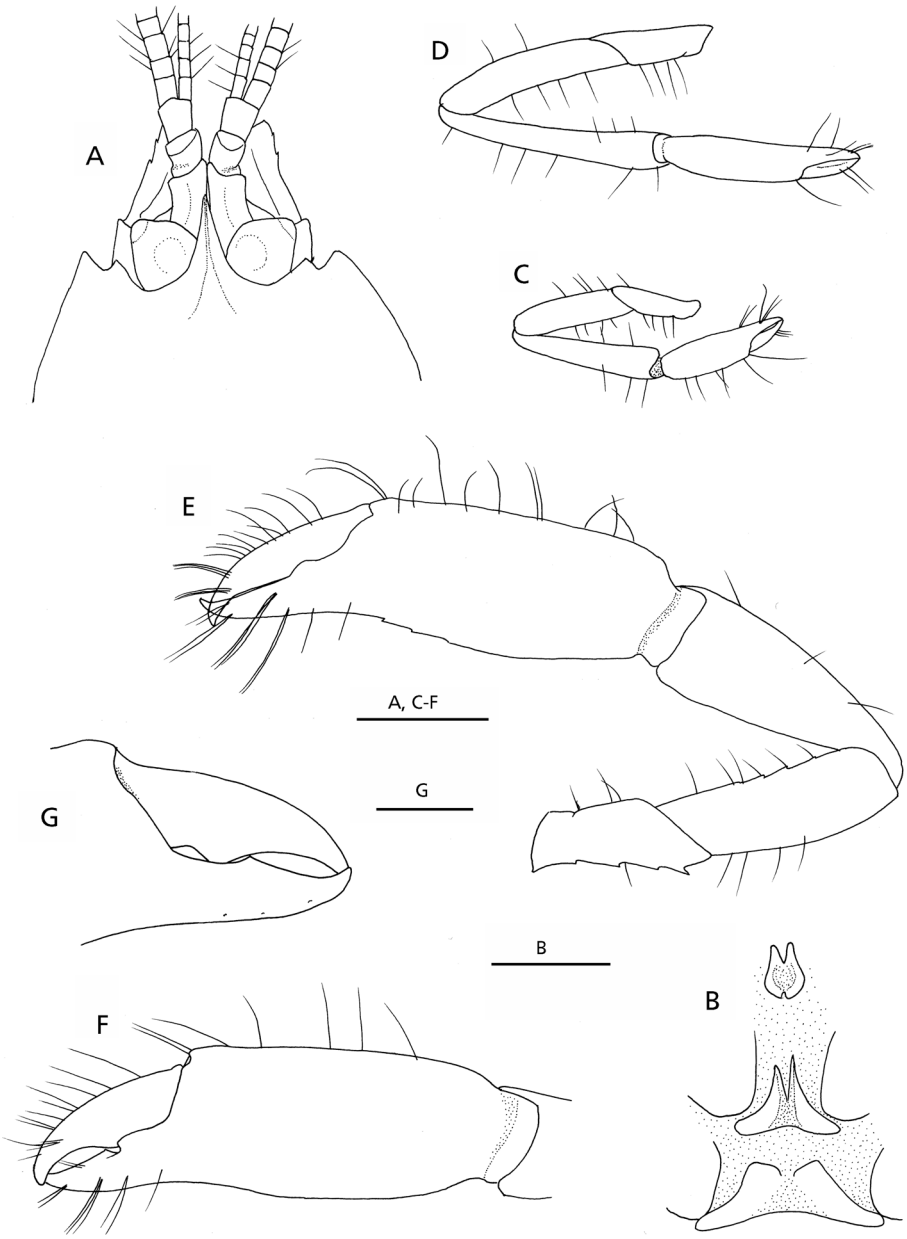

FIG. 6. *Globospongicola nudibranchus* n. gen., n. sp. Allotype male (CL 3.3 mm) from Kai Islands, Indonesia (MNHN-Na 15635). A, anterior part of carapace and cephalic appendages, dorsal view; B, thoracic prominences on fourth to seventh somites, ventral view; C, left first pereopod, lateral view; D, left second pereopod, lateral view; E, left third pereopod, lateral view; F, chela of left third pereopod, oblique lateral view; G, fingers of left third pereopod, mesial view. Scale bars: A, C-F = 1 mm; B, G = 0.5 mm.

FIG. 6. Globospongicola nudibranchus *n. gen., n. sp. Mâle allotype (CL 3,3 mm) des Îles Kai, Indonésie (MNHN-Na 15635). A, partie antérieure de la carapace et appendices céphaliques, vue dorsale ; B, proéminences thoraciques sur les quatrième et septième somites, vue ventrale ; C, premier péréiopode gauche, vue latérale ; D, second péréiopode gauche, vue latérale ; E, troisième péréiopode gauche, vue latérale ; F, pince du troisième péréiopode gauche, vue latérale oblique ; G, doigts du troisième péréiopode gauche, vue médiane. Échelles: A, C-F = 1 mm ; B, G = 0,5 mm.*

TABLE 2. Morphological differences between *Globospongicola nudibranchus* n. gen., n. sp. and *G. spinulatus* n. gen., n. sp. CL, postorbital carapace length.
TABLEAU 2. *Différences morphologiques entre* Globospongicola nudibranchus *n. gen., n. sp. et* G. spinulatus *n. gen., n. sp. CL, longueur postorbitaire de la carapace.*

	G. nudibranchus	*G. spinulatus*
Rostral length/carapace length		
female	0.14	0.24-0.28
male	0.20	0.30-0.37
Direction of rostrum	downward	forward
Terminal margin of rostrum	subtruncate and trifid	acuminate or bifid
Lateral surface of carapace	unarmed	armed with some spinules at least on anterolateral part
Abdomen	relatively narrow	relatively broad
Sixth abdominal somite of female	slightly longer than wide	wider than long
Eye-stalks	unarmed	with 1-4 spinules
Antennal scale		
female	0.13 of CL	0.25-0.28 of CL
male	0.20 of CL	0.25-0.30 of CL
Podobranch on second maxilliped	absent	rudimentary
Third maxilliped ischium	unarmed on ventral margin	armed with 3-4 long spines on ventral margin
Ischium of third pereopod in female	unarmed on dorsal margin	armed with 1-4 spinules on dorsal margin
Cutting edges of fingers of third chela	without row of small corneous teeth	with row of small corneous teeth
Palm of third chela	unarmed on mesial surface	with many scattered spinules on mesial surface
Fourth and fifth pereopods	short	relatively long
Lateral margin of exopod of uropod	only faintly serrate	distinctly serrate
Protopods of male second to fourth pleopods	unarmed	armed with some spinules on ventro-lateral margin

First pereopod (Fig. 6C) overreaching anterolateral margin of carapace by length of chela and carpus; all segments unarmed; chela about 0.90 of carpus length; dactylus about half length of palm. Second pereopod (Fig. 6D) generally similar to first pereopod in general structure, overreaching anterolateral margin of carapace by length of chela and carpus; chela about 0.90 of carpus length; dactylus 0.45 of palm length. Third pereopods (Figs 5, 6E-G) subequal, overreaching anterolateral margin of carapace by length of chela and carpus; ischium with 3 or 4 spinules on dorsal margin, but unarmed on ventral margin; merus about 2.60 times longer than high, with row of 5-6 very small denticles on ventral margin; carpus slightly longer than merus, broadened distally, about 2.40 times longer than distal width; chela about 1.80 of carpus length and about 1.10 length of carapace length, about 4.20 times longer than wide; palm with few minute tubercles on ventral surface mesially; cutting edge of fixed finger with shallow concavity accommodating tooth on dactylus proximal to low, but sharply pointed tooth at about midlength; dactylus about 0.60 of palm length, with low, blunt tooth proximal to midlength. Fourth and fifth pereopods similar to those of female, but comparatively longer.

Pleopods (Fig. 5) moderately narrow for spongicolids. First pleopod uniramous; protopod strongly flattened; ramus partially fused to protopod, spatulate. Protopods of second to fifth pleopods subquadrate in general outline in ventral view, moderately compressed; endopods and exopods subequal in length, moderately narrow. Uropod generally similar to that of female, but lateral margin of exopod more clearly serrate.

COLORATION. — White in preservative.

DISTRIBUTION. — Known only from the Banda Sea off Kai Islands, Indonesia, 268-210 m deep.

HOST. — Unknown.

REMARKS. — Differences between *Globospongicola nudibranchus* n. sp. and *G. spinulatus* n. sp. are summarized in Table 2. The armature on the fingers of the third chela easily distinguishes these two species from one another. In *G. nudibranchus* n. sp., the cutting edge of each finger is smooth distal to the major tooth, but in *G. spinulatus* n. sp, there is a row of small corneous teeth on the cutting edge distal to the major tooth. Furthermore, the podobranch of the second maxilliped is completely absent in *G. nudibranchus* n. sp, but it is still present in *G. spinulatus* n. sp, though rudimentary.

It is considered that *G. nudibranchus* n. sp is probably more highly derived than *G. spinulatus* n. sp because of the more swollen body, shortened rostrum and antennal peduncles, and the reduced general armature on the body and various appendages. These morphological traits represent general evolutionary trends of adaptation to a life using narrow spaces in host animals (Bruce 1976), and therefore *G. nudibranchus* n. sp likely inhabits in a confined space of host sponge.

ETYMOLOGY. — From the Latin *nudus* meaning naked, and *branchus* meaning gill, in reference to the gills completely lacking elements or filaments. Used as a noun in apposition.

Globospongicola spinulatus n. sp.

Figs 7-12

TYPE MATERIAL. — Vanuatu. MUSORSTOM 8: stn CP 1026, 17°50.35'S, 168°39.33'E, 437-504 m, 28.09.1994, ovigerous ♀ holotype. CL 7.2 mm (MNHN-Na 15636). Paratypes. MUSORSTOM 8: same data as holotype, 1 ♂ CL 6.2 mm (allotype; MNHN-Na 15637); stn CP 1129, Vanuatu, 16°00.73'S, 166°39.94'E, 1014-1050m, 10.10.1994, 1 ovigerous ♀ CL 7.5 mm (MNHN-Na 15638).

OTHER MATERIAL EXAMINED. — CALSUB, dive 06, N of Bay of Santal, Lifou, Loyalty Islands, 20°48'S, 167°02.4'E, 1150-400 m, 24.02.1989, 1 ♂ CL 5.0 mm (MNHN-Na 15639); BATHUS 3, stn CP 823, Norfolk Ridge, 23°23'S, 167°52'E, 980-1000 m, 29.11.1993, 1 ♂ CL 4.0 mm, 1 ♀ CL 4.8 mm (MNHN-Na 15640); BATHUS 4, stn CP 951, New Caledonia, 20°31.44'S, 164°54.97'E, 960 m, 10.08.1994, inhabited in *Semperella* sp., 1 ♂ CL 4.0 mm, 1 ovigerous ♀ CL 5.1 mm (MNHN-Na 15641).

DESCRIPTION OF ADULT FEMALES. — Rostrum (Figs 7, 8A, B) moderately short, 0.24-0.28 of carapace length (0.25 in holotype), somewhat compressed laterally, directed forward, triangular in dorsal view; dorsal margin sharply edged, with 2-7 small, occasionally rudimentary teeth; rostral tip sharply pointed or bifid (bifid in holotype); lateral face concave; ventrolateral ridge sharp, but unarmed, confluent with orbital margin; ventral margin with 1-4 teeth distal to midlength (1 tooth at middle position present in holotype). Carapace (Figs 7, 8A, B) inflated with markedly convex, rounded dorsal surface; anterior surface somewhat sloping toward rostrum; lateral surface nearly smooth except for few spinules present on postorbital region or anterolateral part of branchiostegite; cervical groove distinct, reaching midline of carapace; orbital margin concave; antennal spine small, simple or bifid (bifid in holotype); anterolateral margin somewhat produced, broadly convex with some denticles. distinctly overreaching antennal spine.

Thoracic sternum (Fig. 8C) notably broadened posteriorly, with paired, posteriorly widened prominences on fifth to seventh somites; anterior lobes of prominences on fifth to sixth somites terminating in blunt teeth, those on seventh somite broadly rounded; pair of small spines present on fourth sternite.

Abdomen (Figs 7, 8D) strongly flattened dorsoventrally, dorsal surface of each somite rounded. Posterodorsal margins of first and second somites concave, that of third somites nearly straight, and those of fourth and fifth weakly convex. First somite divided in two sections by distinct transverse ridge extending onto pleuron, anterior section depressed below;

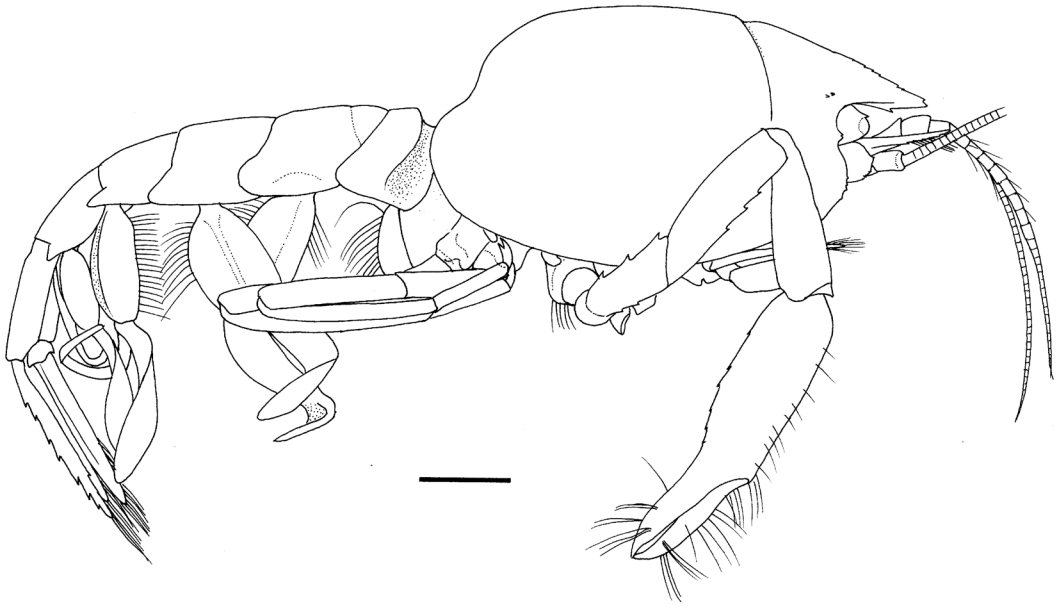

FIG. 7. *Globospongicola spinulatus* n. gen., n. sp. Holotype female (CL 7.2 mm) from Vanuatu (MNHN-Na 15636). Entire animal in lateral view (third maxilliped, first and second pereopods detached; setae on abdominal appendages partially omitted). Scale bar = 2 mm.

FIG. 7. Globospongicola spinulatus *n. gen., n. sp. Femelle holotype (CL 7,2 mm) de Vanuatu (MNHN-Na 15636). Animal entier en vue latérale (troisième maxillipède, premier et second péréiopodes détachés ; soies sur les appendices abdominaux partiellement omises). Échelle = 2 mm.*

pleural margin truncate with rounded angles. Pleura of second to fifth somites unarmed, ventral margins of second to fourth pleura straight or slightly convex; posterolateral parts of fourth and fifth pleura produced in subtriangular lobe. Sixth abdominal somite widened posteriorly; lateral margins parallel in anterior 0.40-0.50, and thereafter diverging posteriorly; posterolateral process rounded; posteroventral process large, broadly subtriangular. Telson (Fig. 8E) elongate subrectangular, 2.00-2.10 times longer than broad; lateral margins slightly constricted subproximally, and most part slightly convex, occasionally with 1 small spine at about midlength only on one side (in holotype, right lateral margin with 1 spine), terminating posteriorly in very small spine; posterior margin moderately produced, broadly rounded, with fringe of numerous long setae; dorsal surface with distinct submedian ridges slightly diverging posteriorly, each bearing 5-8 small spines (7 spines in holotype).

Abdominal sternites generally concave, all somites unarmed.

Eye (Fig. 8A, B) small, subglobose in general shape; cornea very small, slightly convex, non-faceted and non-pigmented; anteromesial face of eye-stalk armed with 1-4 spinules.

Antennular peduncle (Fig. 8A, B) short, but longer than that of *G. nudibranchus* n. sp. First segment slightly longer than distal two segments combined, with small, subtriangular stylocerite. Second segment longer than wide. Third segment almost as long as wide in dorsal view. Lateral flagellum uniramous, 0.60-0.70 length of carapace, composed of numerous articles, each article bearing many short to long setae on distal margin. Mesial flagellum subequal to but slenderer than lateral flagellum, but also setose.

Antennal peduncles (Fig. 8A, B) short, widely separated at base, thus antennular peduncles visible in ventral view. First segment with antennal gland opening on ventral surface and 1 or 2 small tubercles at anteromesial angle. Second segment stout, with small tubercle basally on ventral surface; dorsodistal and dorsolateral margins unarmed or with few very small denticles. Third segment with concave ventral surface. Fourth segment short and stout. Fifth segment also short and stout, not reaching midlength of antennal scale. Antennal scale (Fig. 8F) 0.25-0.28 length of carapace, 1.90-2.00 longer than wide, distinctly narrowed toward base; lateral margin concave, unarmed or armed with 1-6 small, occasionally obsolete,

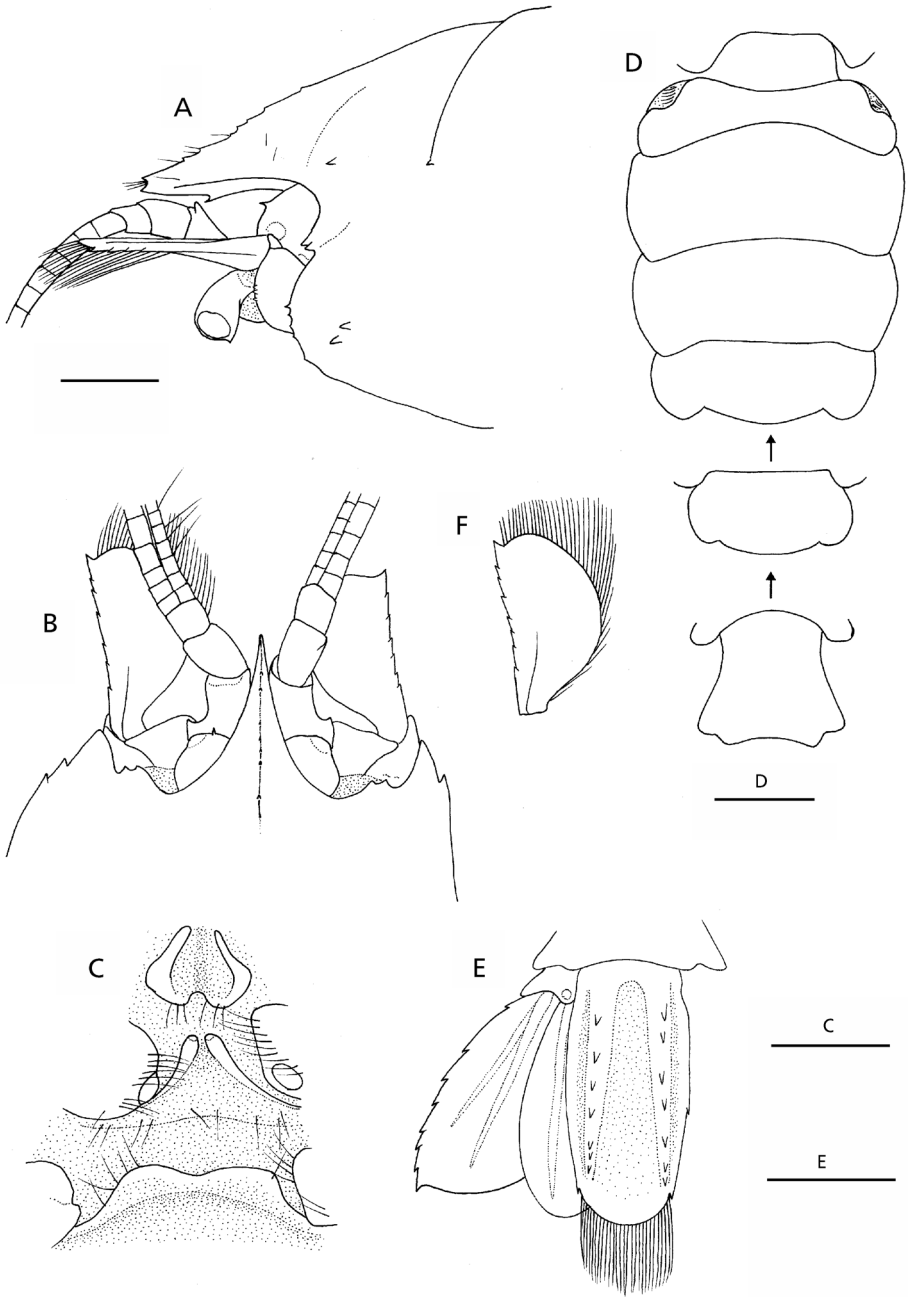

FIG. 8. *Globospongicola spinulatus* n. gen., n. sp. Holotype female (CL 7.2 mm) from Vanuatu (MNHN-Na 15636). A, anterior part of carapace and cephalic appendages, lateral view; B, same, dorsal view; C, thoracic prominences on fifth to seventh somites, ventral view; D, abdomen, dorsal view; E, telson and left uropod (marginal setae on uropod omitted); F, left antennal scale, dorsal view. Scale bars: A-C, F = 1 mm; D, E = 2 mm.

FIG. 8. Globospongicola spinulatus *n. gen., n. sp. femelle holotype (CL 7,2 mm) de Vanuatu (MNHN-Na 15636). A, partie antérieure de la carapace et appendices céphaliques, vue latérale ; B, le même en vue dorsale ; C, proéminences thoraciques sur les cinquième et septième somites, vue ventrale ; D, abdomen, vue dorsale ; E, telson et uropode gauche (soies marginales sur l'uropode omises) ; F, écaille antennaire gauche, vue dorsale. Échelles : A-C, F = 1 mm ; D, E = 2 mm.*

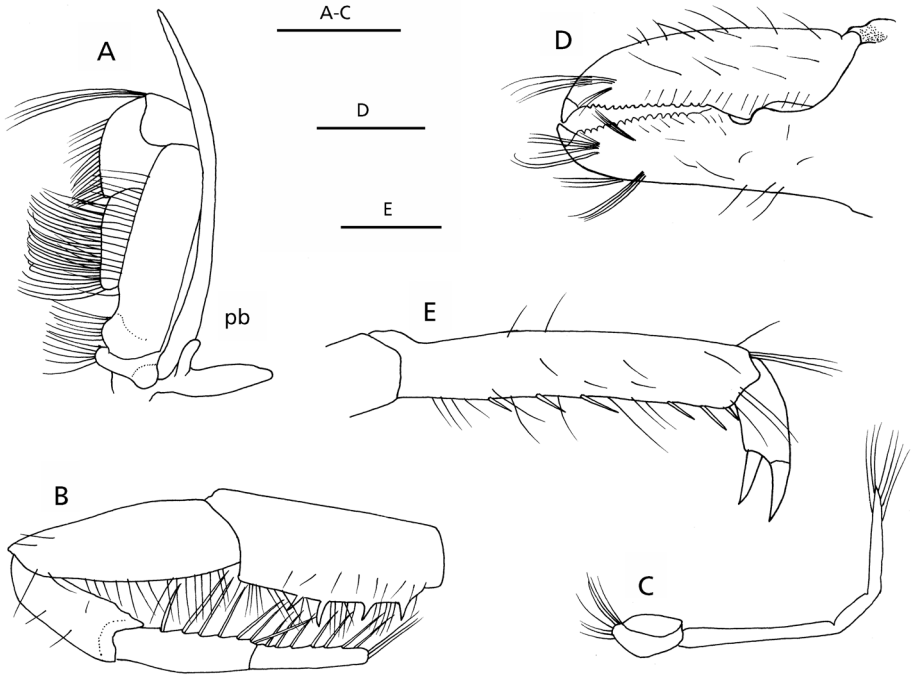

FIG. 9. *Globospongicola spinulatus* n. gen., n. sp. Holotype female (CL 7.2 mm) from Vanuatu (MNHN-Na 15636). A, left second maxilliped, outer view; B, left third maxilliped, lateral view; C, basis and exopod of left third maxilliped, ventral view; D, fingers of chela of right third pereopod, lateral view; E, dactylus and propodus of right fourth pereopod, lateral view. Scale bars: A-D, 1 mm; E, 0.5 mm.

FIG. 9. Globospongicola spinulatus *n. gen., n. sp. femelle holotype (CL 7,2 mm) de Vanuatu (MNHN-Na 15636). A, second maxillipède gauche, vue externe ; B, troisième maxillipède gauche, vue latérale ; C, basis et exopode du troisième maxillipède gauche, vue ventrale ; D, doigts de la pince du troisième péréiopode droit, vue latérale ; E, dactyle et propode du quatrième péréiopode droit, vue latérale. Échelles : A-D, 1 mm ; E, 0,5 mm.*

teeth or denticles, terminating in small distolateral tooth; distal margin of lamella broadly rounded; mesial margin strongly convex; fringe of many setae on distal to mesial margins. Flagellum longer than carapace, articles bearing short to long setae on distal margins.

Mouthparts not dissected, but generally similar to those of *G. nudibranchus* n. sp. Second maxilliped (Fig. 9A) with rudimentary podobranch. Third maxilliped (Fig. 9B, C) composed of 7 segments, overreaching antennal scale by length of dactylus when fully extended; ischium large, strongly compressed laterally, armed with 3 or 4 long spines on ventral margin; merus shorter and narrower than ischium, tapering distally; dactylus shorter than carpus or than propodus; exopod long, reaching midlength of merus.

Pereopods generally similar to those of male. First pereopod (missing in holotype) moderately stout, overreaching pterygostomial margin of carapace by length of carpus and chela; all segments unarmed; chela 0.43-0.67 of carpus length; dactylus about half length of palm. Second pereopod (missing in holotype) generally similar to first pereopod in general structure, but distinctly longer, overreaching pterygostomial margin of carapace by length of carpus and chela; propodus moderately elongate; chela 0.50-0.57 of carpus length; dactylus 0.45-0.50 of palm length. Third pereopods (Fig. 10A-D) equal or subequal, overreaching pterygostomial margin of carapace by length of chela and carpus; ischium with 1-3 (3 in holotype) small spinules on dorsal margin, unarmed on ventral margin; merus obliquely articulated to ischium, about 3.20-3.50 times longer than high, unarmed on dorsal margin, armed with 5 or 6 spinules on ventral margin; carpus distinctly shorter than ischium and merus combined, broadened distally, about 2.80 times longer than distal width; two conspicuous triangular lobes at distomesial angle of carpus; chela about twice length of carpus, about as long as carapace, and about 1.98-2.09 times longer than wide; palm with many scattered short setae on lateral surface and with several scattered spinules on mesial surface; fixed finger slightly deflexed, terminating in curved corneous claw crossing tip of

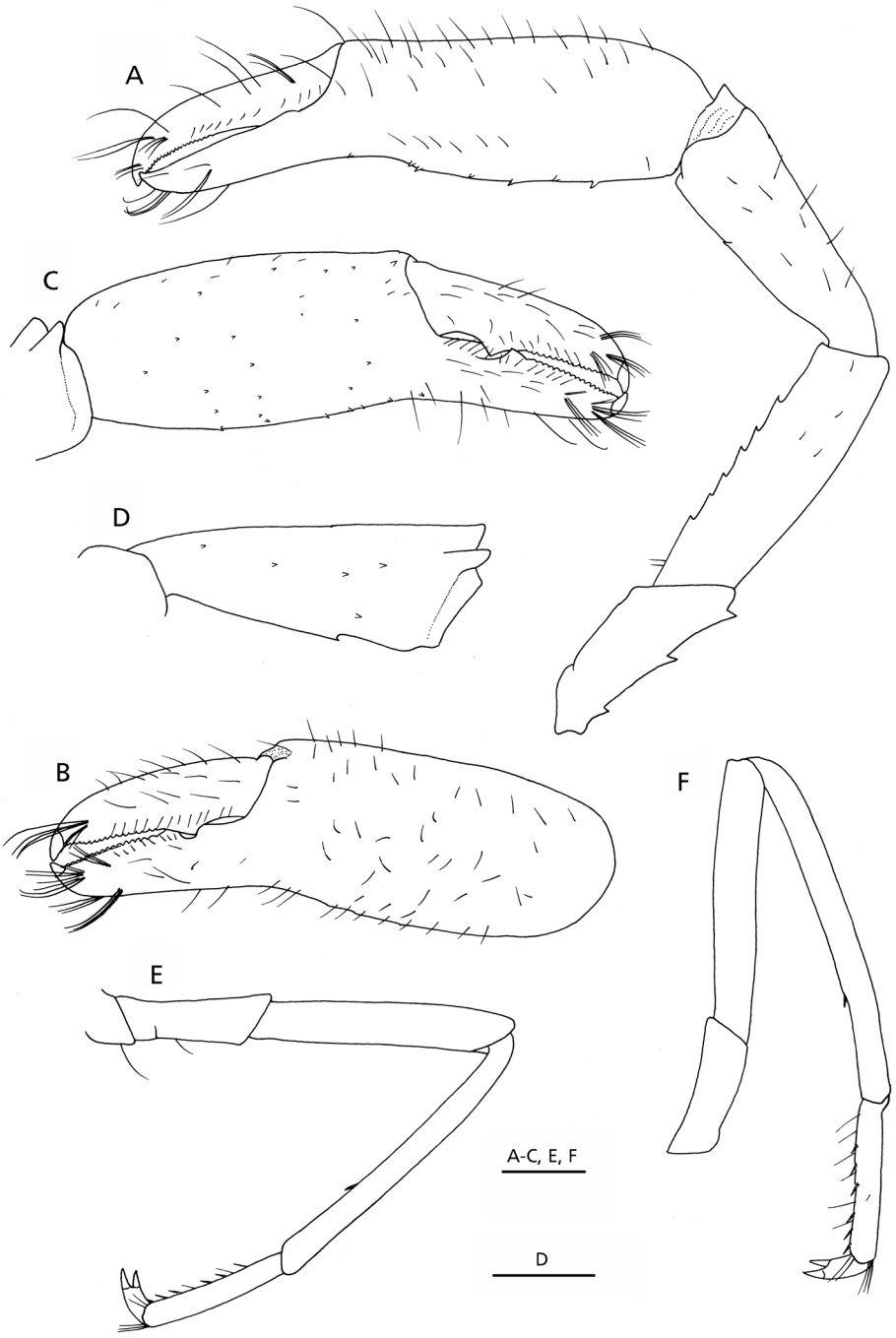

FIG. 10. *Globospongicola spinulatus* n. gen., n. sp. Holotype female (CL 7.2 mm) from Vanuatu (MNHN-Na 15636). A, right third pereopod, lateral view; B, chela of right third pereopod, oblique lateral view; C, same, mesial view ; D, carpus of right third pereopod, mesial view; E, right fourth pereopod, lateral view; F, right fifth pereopod, lateral view. Scale bars: 1 mm.

FIG. 10. Globospongicola spinulatus *n. gen., n. sp. femelle holotype (CL 7,2 mm) de Vanuatu (MNHN-Na 15636). A, troisième péréiopode droit, vue latérale ; B, pince du troisième péréiopode droit, vue latérale oblique ; C, le même, vue médiane ; D, carpe et troisième péréiopode droit, vue médiane ; E, quatrième péréiopode droit, vue latérale ; F, cinquième péréiopode droit, vue latérale. Échelles : 1 mm.*

dactylus; cutting edge of fixed finger with shallow concavity proximal to triangular tooth at about 0.40 and with row of small corneous or corneous-tipped teeth; dactylus about 0.70 of palm length, terminating in curved corneous claw, cutting edge with triangular tooth at about 0.25 length and row of small corneous teeth. Fourth and fifth pereopods (Figs 9E, 10E, F) similar; ischium and merus obliquely articulated; meri 5.40-5.70 times as long as wide; carpus and propodus combined longer than ischium and merus combined; carpi slightly longer than meri, each with 1 slender spine arising from distal one-third; propodi 0.45-0.50 of length of carpi, with row of 5-7 slender spines on ventral margins; dactyli 0.40-0.45 of length of propodi, clearly biunguiculate (ventral unguis shorter than dorsal unguis), both unguis clearly demarcated from corpus.

Pleopods (Fig. 7) broad. First pleopod uniramous; protopod subrectangular; ramus fused to protopod, lance-shaped. Protopods of second to fifth pleopods articulated at lateral extremity of sternum, oval and flat, about 1.80-2.00 times longer than wide; margins slightly upturned; lateral surfaces of protopods of second and third pleopods slightly concave on either side of blunt median ridge; those of fourth and fifth pleopods divided in two sections by sharp ridge adjacent to posterior margin, posterior section, possibly corresponding to ventral surface before modifying for spawning, deeply concave; endopods and exopods broad, subequal in length. Uropod with small tubercle on proximomesial surface of protopod; both rami subequal in length, overreaching telson, elongate oval in shape; exopod with 4-8 small, occasionally rudimentary teeth on lateral margin, including terminal tooth; dorsal surface of exopod with 2 distinct longitudinal ridges; endopod with smooth lateral margin.

Counts of preserved eggs 5-27; size 1.8-2.0 × 1.4-2.0 mm.

DESCRIPTION OF MALES. — Rostrum (Figs 11, 12A) 0.30-0.37 of carapace length, directed forward; dorsal margin with 4-8 small teeth; rostral tip acuminate or bifid; ventrolateral ridge sharp, but unarmed; ventral surface with 1-3 teeth in distal half. Carapace (Figs 11, 12A) weakly inflated with convex, rounded dorsal surface; lateral surface with some spinules on anterior part of branchiostegite, otherwise smooth; pterygostomial margin exceeding antennal spine, with row of some small teeth.

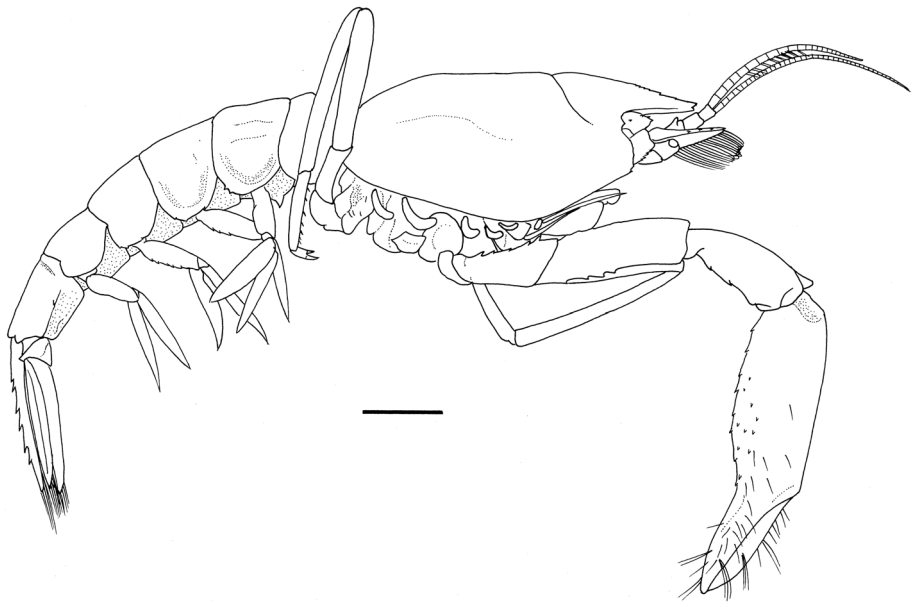

FIG. 11. *Globospongicola spinulatus* n. gen., n. sp. Allotype male (CL 6.2 mm) from Vanuatu (MNHN-Na 15637). Entire animal in lateral view (first and fourth pereopods detached; setae on abdominal appendages partially omitted). Scale bar = 2 mm.

FIG. 11. Globospongicola spinulatus *n. gen., n. sp. Mâle allotype (CL 6,2 mm) de Vanuatu (MNHN-Na 15637). Animal entier en vue latérale (premier et quatrième péréiopode détachés; soies sur les appendices abdominaux partiellement omises). Échelle = 2 mm.*

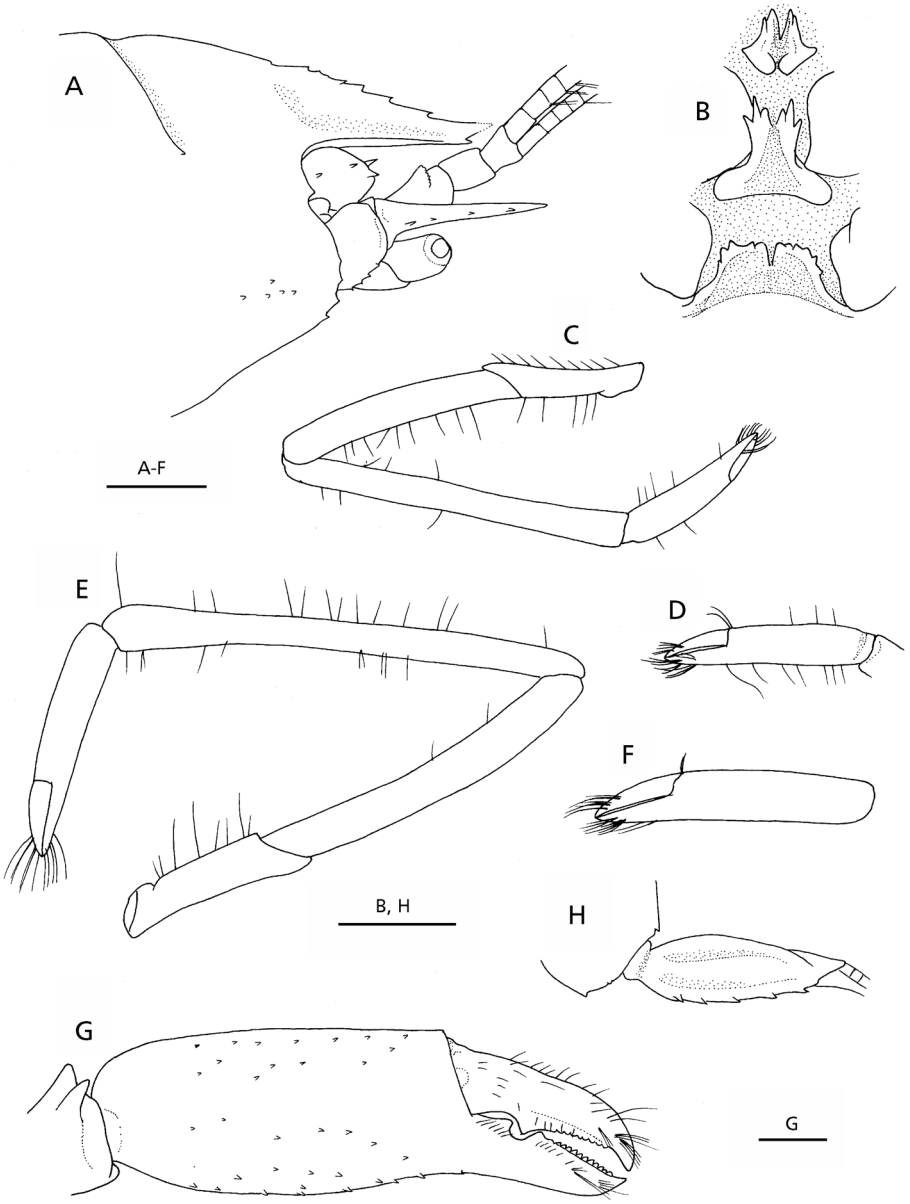

FIG. 12. *Globospongicola spinulatus* n. gen., n. sp. Allotype male (CL 6.2 mm) from Vanuatu (MNHN-Na 15637). A, anterior part of carapace and cephalic appendages, lateral view; B, thoracic prominences on fifth to seventh somites, ventral view; C, left first pereopod, lateral view; D, chela of left first pereopod, dorsolateral view; E, left second pereopod, lateral view; F, chela of left second pereopod, dorsolateral view; G, chela of left third pereopod, mesial view; H, propodus of right third pleopod, lateral view. Scale bars = 1 mm.

FIG. 12. Globospongicola spinulatus *n. gen., n. sp. Mâle allotype (CL 6,2 mm) de Vanuatu (MNHN-Na 15637). A, partie antérieure de la carapace et des appendices céphaliques, vue latérale ; B, proéminences thoraciques sur les cinquièmes et septièmes somites, vue ventrale ; C, premier péréiopode gauche, vue latérale ; D, pince du premier péréiopode gauche, vue dorsolatérale ; E, second péréiopode gauche, vue latérale ; F, pince du second péréiopode gauche, vue dorsolatérale ; G, pince du troisième péréiopode gauche, vue médiane ; H, propode du troisième pléopode droit, vue latérale. Échelles = 1 mm.*

Thoracic sternum (Fig. 12B) broadened posteriorly, with paired, posteriorly divergent prominences on fifth to eighth somites (that on eighth somite not figured); all prominences with anterior margins denticulate, particularly, those on sixth somite each with 2 prominent spines; pair of small spines present also on third somite.

Abdomen (Fig. 11) moderately flattened dorsoventrally. Posterodorsal margins of first and second somites slightly concave, those of third to fifth somites nearly straight. First somite divided in two sections by sharp transverse ridge extending onto pleuron and partially overhanging deeply depressed anterior section; pleural margin rounded. Pleura of second to fourth somites generally rounded, but faintly denticulate, lateral surfaces concave; pleuron of fifth somite truncate, margins faintly denticulate. Sixth abdominal somite widened posteriorly; lateral margins faintly denticulate, occasionally with 1 small spine; posterolateral process broadly rounded; posteroventral process triangular. Telson similar to that of female; each submedian ridge on dorsal surface bearing 5-8 spines.

Abdominal sternum (Fig. 11) convex, those of second to fifth somites each with 1 procurved median spine.

First pereopod (Fig. 12C, D) overreaching anterolateral margin of carapace by length of chela and carpus; all segments unarmed; chela 0.52-0.76 of carpus length. Second pereopod (Fig. 12E, F) overreaching anterolateral margin of carapace by length of distal 0.20 of merus, carpus and chela; chela about 0.44-0.72 of carpus length. Third pereopods (Fig. 11) equal, overreaching anterolateral margin of carapace by length of chela, carpus and distal 0.30 of merus; ischium with 1-4 small spines on dorsal margin, but unarmed on ventral margin; merus about 2.70 times longer than high, with row of 0-6 spinules on dorsal margin and with row of 5-6 spinules on ventral margin; carpus slightly longer than merus, broadened distally; chela (Fig. 12G) 2.13-2.37 of carpus length, about 1.20 of carapace length, and about 2.96-3.44 times longer than wide; palm with scattered spinules on mesial surface; fingers similar to those of females in general structure. Fourth and fifth pereopods similar to those of females, but comparatively longer.

Pleopods (Fig. 11) moderately narrow. First pleopod uniramous; protopod strongly flattened, its ventrolateral margin faintly denticulate; ramus partially fused to protopod, spatulate. Protopods of second to fifth pleopods subquadrate in general outline in ventral view, moderately compressed; ventrolateral margins with some spinules or small denticles (Figs 11, 12H); ventromesial margins with 1 small spine on second to fourth pleopods, unarmed on fifth pleopod. Endopods and exopods subequal in length, moderately narrow. Uropod generally similar to that of females.

DISTRIBUTION. — Loyalty Islands, New Caledonia and Vanuatu; 437-1150 m.

ECOLOGY. — The heterosexual pair from the station CP 951 of BATHUS 4 cruise was found to live in a cavity of hexactinellid sponge *Semperella* sp.

Three ovigerous specimens are available. The number of the preserved eggs varies among the specimens, five in the smallest female (CL 5.1 mm) from New Caledonia (BATHUS 4 station CP 951), 20 in the paratype female (CL 7.5 mm) from Vanuatu (MUSORSTOM 8 station CP 1129), and 27 in the holotype female (CL 7.2 mm).

REMARKS. — The specimens from New Caledonia are smaller than those from Vanuatu, although there are no morphological differences that warrant specific separation.

ETYMOLOGY. — From the Latin *spinulatus*, meaning spinulose, in reference to the presence of scattered spinules on the chela of the third pereopod.

ACKNOWLEDGEMENTS

We are indebted to Alain Crosnier for allowing us to study the rich and very interesting collections obtained during the French expeditions to various regions of the Pacific and Indian Oceans. His help and guidance while working at his laboratory at MNHN has been invaluable. The outstanding efforts of Bertrand Richer de Forges and his colleagues in collecting specimens are gratefully acknowledged. We also thank Dr. Tin-Yam Chan and an anonymous reviewer for critically reading the manuscript and offering valuable comments for improvements.

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