

Two new species of *Nematocarcinus* A. Milne-Edwards, 1881 (Crustacea, Decapoda, Caridea, Nematocarcinidae) from hydrothermal vents on the North and South East Pacific Rise

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ABSTRACT

Two new species of the caridean genus *Nematocarcinus* A. Milne-Edwards, 1881 are reported from deep-sea hydrothermal vents on the East Pacific Rise. *Nematocarcinus burukovskyi* n. sp. is provisionally assigned to *Nematocarcinus*, but is clearly distinguished from known congeners by several morphological characters. *Nematocarcinus ovalis* n. sp., described from a single ovigerous female, is similar to *N. faxoni* Burukovsky, 2001, also known from the Eastern Pacific. In addition, a single ovigerous female of an indeterminate species of the genus (*Nematocarcinus* sp.) is also mentioned. Although species of *Nematocarcinus* were commonly observed *in situ* at vents, they are not vent-endemic.

KEY WORDS

Crustacea,
Decapoda,
Caridea,
Nematocarcinidae,
Nematocarcinus,
hydrothermal vents,
East Pacific Rise,
new species.

RÉSUMÉ

Deux nouvelles espèces de *Nematocarcinus* A. Milne-Edwards, 1881 (Crustacea, Decapoda, Caridea, Nematocarcinidae) des sources hydrothermales de la dorsale du Pacifique oriental.

Deux nouvelles espèces de crevettes caridés du genre *Nematocarcinus* A. Milne-Edwards, 1881 sont signalées des sources hydrothermales profondes de la dorsale du Pacifique oriental. *N. burukovskyi* n. sp. est provisoirement assignée à *Nematocarcinus* et clairement distinguée par plusieurs caractères morphologiques des espèces congénériques connues. *Nematocarcinus ovalis* n. sp., décrite d'une seule femelle ovigère, est semblable à *N. faxoni* Burukovsky, 2001, également connue de la dorsale du Pacifique oriental. Bien que les deux nouvelles espèces soient communément observées *in situ*, elles ne sont pas endémiques des sources hydrothermales.

MOTS CLÉS

Crustacea,
Decapoda,
Caridea,
Nematocarcinidae,
Nematocarcinus,
sources hydrothermales,
dorsale du Pacifique oriental,
espèces nouvelles.

INTRODUCTION

Shrimps of the family Nematocarcinidae are common elements of the deep-water benthopelagic communities (Crosnier & Forest 1973; Chace 1986; Burukovsky 2003). The family consists of 39 species (Burukovsky 2003) distributed among three genera: *Nematocarcinus* A. Milne-Edwards, 1881, *Lipkius* Yaldwyn, 1960, and *Nigmatullinus* Burukovsky, 1991. Collections of nematocarcinids from hydrothermal vents or cold seeps are rare, although shrimps of the family Alvinocarididae dominate in these extreme environments (e.g., Martin & Hessler 1990; Kim & Ohta 1991; Gebruk *et al.* 1997; Shank *et al.* 1999; Hashimoto *et al.* 2001; Watabe & Hashimoto 2002; Van Dover *et al.* 2003; Webber 2004; Komai & Segonzac 2005). Hessler & Smithey (1983) observed shrimps resembling species of *Nematocarcinus* at the Galapagos Rift, but their specific identity remains unclear. Ohta *et al.* (1995) reported *N. productus* Bate, 1888 from cold seeps at Enshu-nada, off the coast of central Japan, although they did not collect voucher specimens. Information on the occurrence of nematocarcinids at the vent sites is available from an internet web site (<http://atiniui.nhm.org/gallery/album05>), although species identifications have not been made.

In the present paper, we report two new species of *Nematocarcinus*, *N. burukovskyi* n. sp. and *N. ovalis* n. sp. from four distant hydrothermal vent areas on the East Pacific Rise (EPR-13°N, 17°S, 23°S and 31°S) (Fig. 1). *Nematocarcinus burukovskyi* n. sp. is described based on three specimens collected at 17°S during the French cruise BIOSPEEDO in 2004 (Jollivet *et al.* 2004) and at 23° and 31°S during the American PAR5 (Pacific Antarctic Ridge-2005) cruise. *Nematocarcinus ovalis* n. sp. is described based on a single ovigerous female collected at EPR-13°N during HOPE 99 cruise (Lallier *et al.* 1999). A single ovigerous female collected at EPR-13°N during HOT 96 cruise (Gaill *et al.* 1996) has been also examined, although the specific identity of the specimen remains indeterminate because of the poor condition. Notes on the ecology are

provided for the two new species and the indeterminate specimen.

MATERIAL AND METHODS

Specimens of *Nematocarcinus* species examined in this study were collected during four diving cruises along the East Pacific Rise: HOT 96, RV *L'Atalante* and DSV *Nautile* (Chief scientist F. Gaill, CNRS, Paris VI; Gaill *et al.* 1996); HOPE 99, RV *L'Atalante* and DS *Nautile*, 9 April to 22 May 1999 (Chief scientist F. H. Lallier, CNRS, Roscoff; Lallier *et al.* 1999); BIOSPEEDO, RV *L'Atalante* and DS *Nautile*, 31 March to 13 May 2004 (Chief scientist D. Jollivet, CNRS, Roscoff; Jollivet *et al.* 2004), and PAR5, RV *Atlantis* and DS *Alvin*, 12 March to 6 April 2005 (Chief scientist R. Vrijenhoek, MBARI, California, USA). The sampling gears were slurp gun (HOT 96, BIOSPEEDO and PAR5), grab of submarine (BIOSPEEDO) or remotely monitored trawl (HOPE 99).

For detailed observation of the surface structure on the integument, the specimens (including removed appendages) were stained with methylene blue. The ecological observations were made during the dives; videos and photograph documents taken *in situ* by the submarines were also analyzed. The photographs were taken by DS *Alvin* (Fig. 7C; PAR5 cruise, dive 4094, SEPR, Fred's Fortress site, 31°09'S, 111°55'W, 2330 m) or by DS *Nautile* (Fig. 7D; BIOSPEEDO cruise, dive PL 1575, Krasnov site, SEPR, 21°33'S, 114°17'W, 2838 m).

ABBREVIATIONS

CBM	Natural History Museum and Institute, Chiba;
EPR	East Pacific Rise;
MBARI	Monterey Bay Aquarium Research Institute;
MNHN	Muséum national d'Histoire naturelle, Paris;
NEPR	North East Pacific Rise;
NHM	Natural History Museum, London;
PAR5	Pacific Antarctic Ridge – 2005;
SEPR	South East Pacific Rise;
USNM	National Museum of Natural History, Washington DC;
cl	postorbital carapace length;
tl	total length.

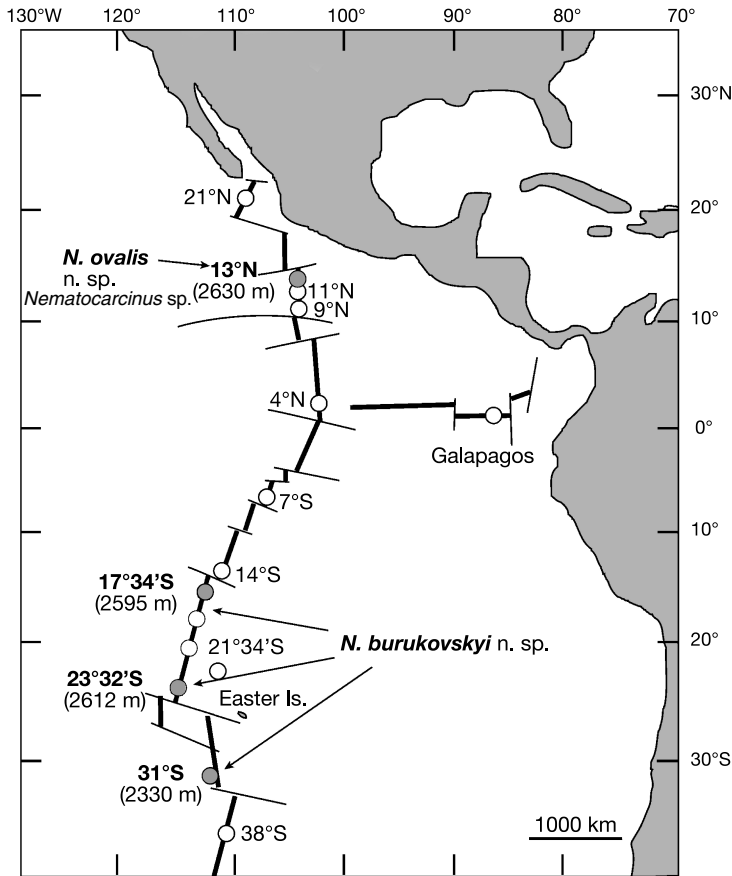


FIG. 1. — Map of the East Pacific and Antarctic Pacific Rises, showing sampling locations of specimens of *Nematocarcinus burukovskiyi* n. sp., *N. ovalis* n. sp., and an indeterminate species.

MATERIAL OF *NIGMATULLINUS ACANTHITELSONIS* (PEQUEGNAT, 1970) AND SELECTED SPECIES OF *NEMATOCARCINUS* EXAMINED FOR COMPARISON

Nigmatullinus acanthitelsonis (Pequegnat, 1970). — BIÖCAL, RV *Jean-Charcot*, beam trawl CP 05, New Caledonia, 21°16'S, 166°44'E, 2340 m, 11.VIII.1985, 2 ♂♂ cl 24.3, c. 38.5 mm, 1 ♀ cl 17.7 mm, (MNHN-Na 15771). — EUMELI 2, beam trawl CPH 007, NE Atlantic, West Africa, 18°30.13'N, 21°01.53'W, 3120 m, 10.II.1991, 1 ♂ cl 45.2 mm (MNHN-Na 15772).

Nematocarcinus ensifer (Smith, 1882). — WALDA, beam trawl CW 03, eastern Atlantic, Gulf of Guinea, 03°59'N, 03°42.9'E, 3225 m, 14.VIII.1991, 1 ♂ cl 22.2 mm (MNHN-Na 4123); beam trawl CY 07, SE Atlantic, 22°53.3'S, 11°56.2'E, 2840 m, 17.VI.1971, 3 ♀♀ cl 15.0-31.0 mm (MNHN-Na 15764).

Nematocarcinus faxoni Burukovsky, 2001. — *Albatross*, beam trawl, stn 3424, off Maria Cleofas Island, Marias Islands, Mexico, 21°15.00'N, 106°23.00'W, 1236 m, 18.IV.1891, 4 ♂♂ cl 19.5-22.6 mm, 34 ♀♀ cl 21.3-29.5 mm (USNM 21139).

Nematocarcinus gracilis Bate, 1888. — SW of Shionomisaki, Kii Peninsula, Japan, 33°23.9'N, 135°38.9'E, 700 m, 2.X.1997, dredge, coll. S. Nagai, 1 ♂ cl 15.7 mm (CBM-ZC 3862).

Nematocarcinus lanceopes Bate, 1888. — JARE 35, RV *Shirase*, beam trawl, stn E2, off Kromprins Olav Kyst, Enderby Land, Antarctica, 67°43.0'S, 41°13.1'E, 2430-2230 m, 12.II.1994, coll. I. Takeuchi, 1 ♂ cl 26.8 mm (CBM-ZC 1110), 2 ♂♂ cl 25.2, 25.3 mm, 2 ♀♀ cl 26.5, 30.2 mm (CBM-ZC 1111).

Nematocarcinus longirostris Bate, 1888. — *Challenger*, trawl, stn 237, off Boso Peninsula, Japan, 34°37'N,

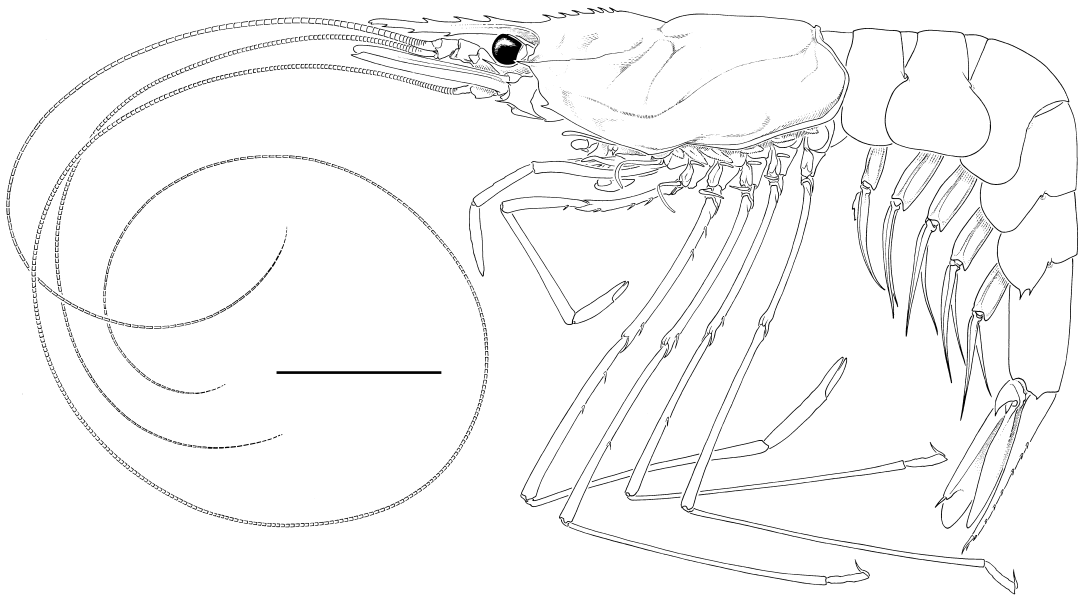


FIG. 2. — *Nematocarcinus burukovskyi* n. sp., holotype subadult ♂, Wormwood vent site, SEPR, cl 18.6 mm (MNHN-Na 15768), entire animal in lateral view. Scale bar: 10 mm.

140°32'E, 3470 m, 17.VI.1875, paralectotypes, 2 ♂♂ cl 17.0, 25.9 mm, 4 ♀♀ cl 27.5-33.6 mm (NHM 1888: 22); same station, syntype of *N. proximatus*, 1 ♀ cl 26.8 mm (NHM 1888: 22).

SYSTEMATICS

Family NEMATOCARCINIDAE S. I. Smith, 1884
Genus *Nematocarcinus* A. Milne-Edwards, 1881

Nematocarcinus burukovskyi n. sp.
(Figs 1-7)

HOLOTYPE. — BIOSPEEDO, DS *Nautile* dive PL1587, basket 1, SEPR, Garrett Segment, Wormwood site, marker BS 15, 17°34.91'S, 113°14.68'W, 2595 m, 28.IV.2004, subadult ♂ cl 18.6 mm, tl c. 63 mm (MNHN-Na 15768).

PARATYPES. — PAR5, DS *Alvin*, dive 4094, slurp gun, SEPR, Fred's Fortress site, 31°09.06'S, 111°55.88'W, 2330 m, 29.III.2005, 1 young cl 13.8 mm (CBM-ZC 8360); dive 4096, slurp gun, SEPR, Serpulid Mound site, 23°32.07'S, 115°34.17'W, 2612 m, 01.IV.2005, 1 ♀ cl 25.2 mm (USNM).

ETYMOLOGY. — Named in honor of Rudolf N. Burukovsky, who published an essential revision of the Nematocarcinidae.

DISTRIBUTION. — Known from the South East Pacific Rise 17°S, Garrett Segment, 2595 m (type locality) and south of Easter Island at 23°S, 2612 m, and 31°S, 2330 m (Fig. 1).

DESCRIPTION

Holotype

Body (Fig. 2) moderately slender; integument soft, not membranous, surface smooth, shiny. Rostrum (Fig. 3A, B) slender, slightly falling short of anterior margin of antennal scale, 0.62 of carapace length; dorsal margin armed with three fixed teeth, distal 0.35 unarmed; ventral margin with four fixed teeth, subterminal small; tip weakly deflexed; lateral surface with blunt lateral ridge confluent with orbital margin. Carapace (Fig. 3A, B) with six post-rostral, basally articulated spines, most anterior spine widely separated from most posterior tooth on rostrum proper, most posterior spine arising at 0.28 of carapace length; post-rostral ridge low, sharp, extending to

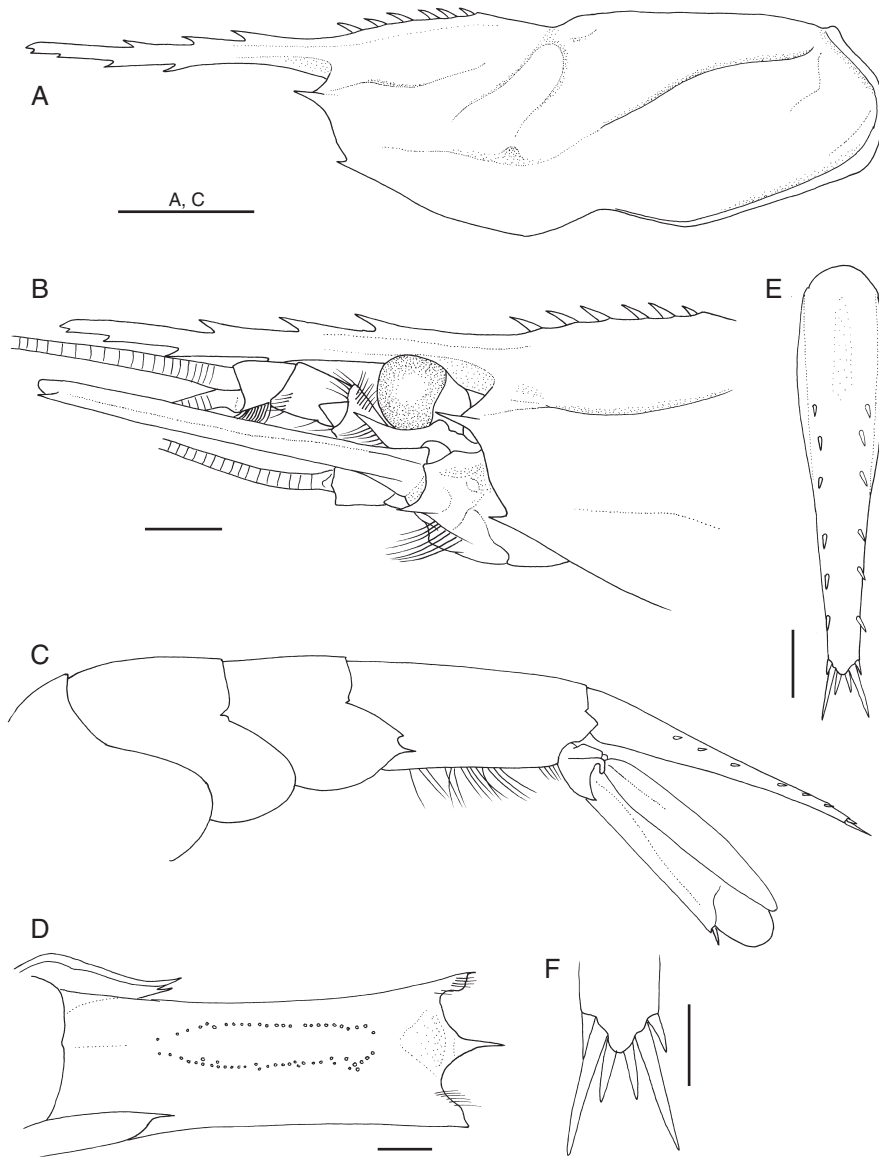


FIG. 3. — *Nematocarcinus burukovskyi* n. sp., holotype subadult ♂, Wormwood vent site, SEPR, cl 18.6 mm (MNHN-Na 15768); **A**, rostrum and carapace, lateral view (setae omitted); **B**, rostrum, anterior part of carapace and cephalic appendages, lateral view; **C**, posterior part of third abdominal somite to telson and left uropod, lateral view; **D**, sixth abdominal somite and posterior part of pleuron of fifth somite, slightly obliquely ventral view (setae omitted); **E**, telson, dorsal view; **F**, posterior part of telson, dorsal view. Scale bars: A, C, 5 mm; B, D, E, 2 mm; F, 1 mm.

about 0.40 of carapace length; lateral surface well sculptured with distinct postorbital, cervical, post-cervical, hepatic, branchiocardiac grooves; cervical groove across midline of carapace, shal-

low but conspicuous notch on dorsal surface; branchiocardiac groove without sharply delineated ridge; orbital margin evenly rounded, without suborbital lobe; antennal spine well developed,

reaching level of anterior margin of basicerite, acuminate; pterygostomial spine smaller than antennal spine; anterolateral margin between antennal, pterygostomial spines oblique, slightly sinuous.

Thoracic sternum (Fig. 4I) with three bilobed prominences on sixth to eighth somites; lobes of prominence on sixth somite each terminating in acute spine; lobes of posterior two prominences rounded.

Abdomen (Fig. 2) dorsally smooth. Pleura of anterior four somites broadly rounded. Posterodorsal margin of third somite only weakly produced, rounded posteriorly (Fig. 6A). Fifth somite (Fig. 3C) with two acute posteroventral teeth on left (dorsal tooth distinctly smaller than ventral tooth) (Fig. 6B), with slender posteroventral tooth on right (Fig. 6C); inner surface of posterior part of pleuron smooth, without tubercle or ridge-like structure (Fig. 3D). Sixth somite (Fig. 3C, D) moderately elongated, 1.94 times longer than fifth somite, 2.26 times longer than anterior depth; posterolateral process subtriangular, subacutely pointed; posteroventral angle blunt; ventral surface with single row of long setae on either side of midline, almost parallel except for anterior, posterior parts curving toward midline; paired posteroventral spots absent (Fig. 3D); pre-anal tooth (Fig. 3D) directed posteriorly. Telson (Fig. 3C, E) moderately long, 4.70 times longer than greatest width, reaching posterior margin of exopod of uropods (except for terminal spines), gradually tapering posteriorly to blunt terminal lobe; dorsal surface with shallow median sulcus in anterior one-third, with six pairs of small dorsolateral spines; all dorsolateral spines aligned; terminal margin with three pairs of spines, second pair longest (about 3.0 of length of lateralmost pair).

Eye (Fig. 3B) subpyriform with well developed, faceted cornea; cornea moderately large for nematocarcinid, its width about 0.10 of carapace length; eye-stalk distinctly shorter than corneal width.

Antennular peduncle (Fig. 3B) stout, reaching midlength of antennal scale. First segment subequal in length to distal two segments combined;

stylocerite slightly falling short of distal margin of first segment, acuminate, weakly upturned in lateral view. Flagellar length exceeding twice that of carapace length (Fig. 1).

Antennal peduncle (Figs 3B, 4H) with basicerite stout, armed with acute ventrolateral distal tooth; ventral surface of basicerite provided with low, rounded tubercle. Fifth segment (carpocerite) short, stout, reaching distal margin of first segment of antennular peduncle. Antennal scale 0.56 of carapace length, 4.00 times longer than wide; lateral margin very slightly sinuous; distolateral tooth reaching broadly rounded lamella. Flagellum longer than body (Fig. 1).

Mouthparts typical of genus. Mandible (left) (Fig. 4A-C) with broad incisor process terminating in five strong, corneous teeth; molar process with finely ridged, dentate distal margin; anterior surface of molar process with transverse rows of stiff setae, narrow space present between setal row, surface of molar process; mesial face of molar process obliquely truncate, ornamented with numerous rows of minute setules; inner distal angle with two tufts of short setae; palm curved mesially, consisting of three articles, distal article longer than proximal two articles combined, with numerous stiff setae on margins. Maxillule (Fig. 4D) with coxal endite tapering distally, with some slender spines distally, stiff short setae marginally, outer surface also with short setae in distal part; basal endite somewhat curved mesially, distal margin truncate, armed with two rows of slender spines, stiff setae; endopod strongly curved, bilobed distally, inner lobe with long apical bristle, outer lobe with short subapical seta. Maxilla (Fig. 4E) with coxal endite rounded, very unequally bilobed (distal lobe very small, rudimentary); mesial margin of coxal endite double edged; basal endite well exceeding coxal endite, deeply bilobed (distal lobe slightly longer than proximal lobe); endopod basally stout, strongly curved mesially, with three long apical setae; scaphognathite narrow, posterior lobe elongated triangular, with row of very long setae on mesial margin extending to tip. First maxilliped (Fig. 4F) with basal endite rounded subtriangular in outline; outer surface of basal

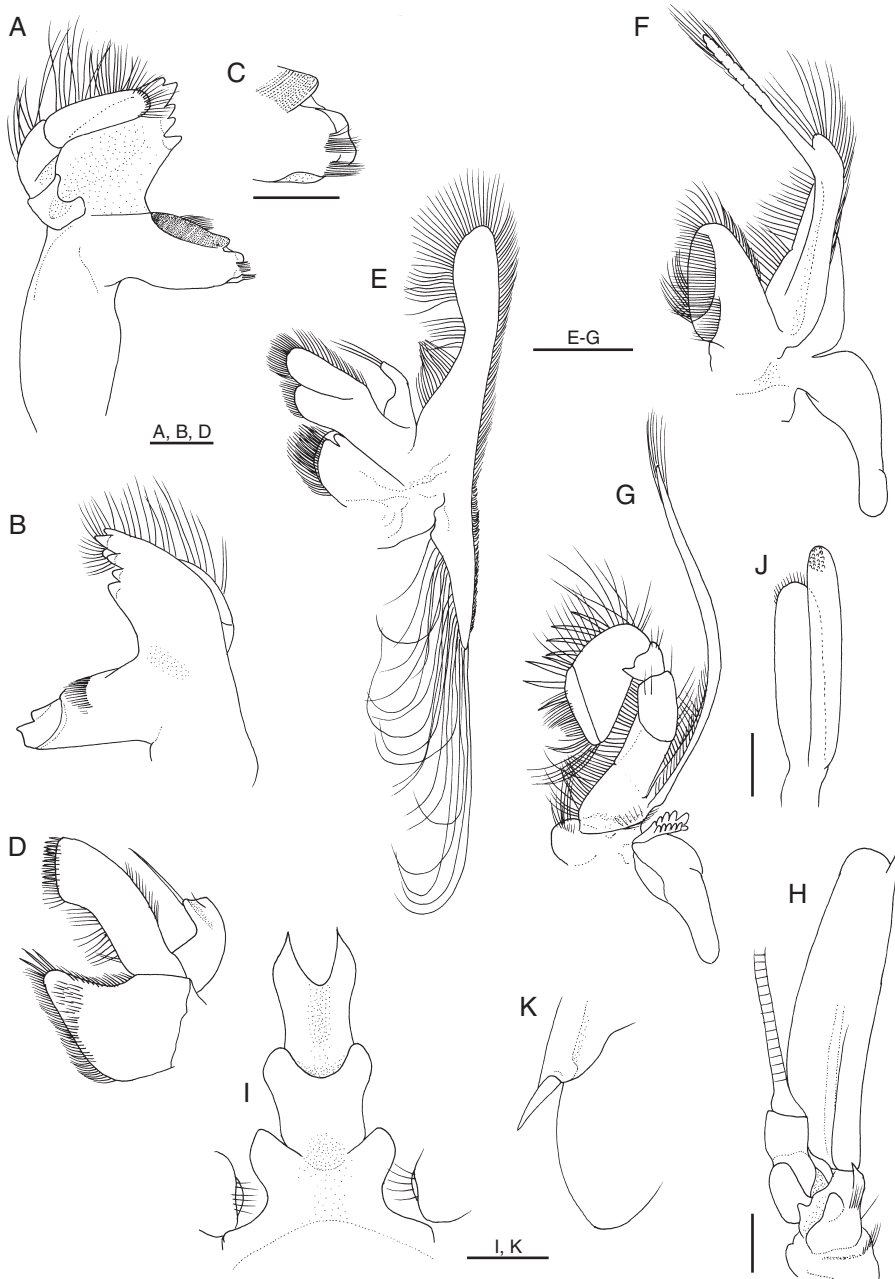


FIG. 4. — *Nematocarcinus burukovskyi* n. sp., holotype subadult ♂, Wormwood vent site, SEPR, cl 18.6 mm (MNHN-Na 15768), appendages dissected from left; **A**, mandible, dorsal view; **B**, same, ventral view; **C**, same, distal part of molar process, dorsal view; **D**, maxillule, ventral view (coxal endite partly broken); **E**, maxilla, ventral view; **F**, first maxilliped, ventral view (coxal endite broken); **G**, second maxilliped, ventral view; **H**, antenna, ventral view; **I**, prominences on sixth to eighth thoracic sternites, ventral view; **J**, appendix masculina and appendix interna of second pleopod, mesial view; **K**, posterolateral part of exopod of uropod, dorsolateral view. Scale bars: A-D, J, 0.5 mm; E-I, 2 mm; K, 1 mm.

endite convex, with two separate longitudinal rows of setae, each row extending proximally toward mesial margin; coxal endite broken off; endopod simple, distinctly overreaching distal margin of basal endite, with row of numerous setae on mesial margin; exopod with narrow caridean lobe, long flagellum; epipod large, deeply bilobed, posterior lobe elongated. Second maxilliped (Fig. 4G) with endopod strongly flexed at articulation between propodus, carpus, composed of six segments, but vestigial suture between ischium, basis discernible; dactylus narrow, with four long spines distomesially; propodus with row of four long spines on mesial margin; carpus with sharp tooth at distomesial angle; coxa somewhat produced mesially; exopodal flagellum long, slender; epipod large, with small, but distinctly lamellate podobranch. Third maxilliped (Fig. 5A) with endopod not reaching distal margin of antennal scale, consisting of four segments; ultimate segment somewhat compressed laterally, lance shaped, with terminal cluster of small, setulose spines (Fig. 5B); mesial face of ultimate segment (Fig. 5C) with numerous transverse or obliquely transverse tracts of short to stiff setae of various length, forming grooming apparatus; carpus (penultimate segment) subequal in length to ultimate segment, with scattered tufts of short to moderately long setae on surfaces; antepenultimate segment (merus-ischium-basis fused segment) flattened dorsoventrally, sinuous in dorsal view, with row of four spinules on lateral surface (including spinule at ventrolateral distal angle), with prominent tufts of long setae on dorsal surface proximally; epipod consisting of rounded dorsal process situated on lateral face of coxa, strap-like ventral projection, latter without terminal hook (Fig. 6D); exopod about 0.60 length of antepenultimate segment.

First to fifth pereopods (Figs 1; 5D, F, H-J) slender, posterior four pereopods elongated, but degree of slenderness and elongation lesser compared with other congenetics; articulations between merus, ischium strongly oblique, typical for nematocarcinids.

First pereopod (Figs 5D, E; 6E) overreaching antennal scale by length of chela; dactylus 0.70

of palm length, terminating in acute, curved claw, cutting edge with two rows of spinules, short setae; fixed finger also terminating in curved claw, crossing dactylus, with tuft of setae at midlength of lateral surface, cutting edge with two rows of short stiff setae. Palm with tuft of long setae at articulation to dactylus, patch of grooming setae on ventromesial surface. Carpus widened distally, 1.88 of chela length. Merus-ischium combined 1.25 of carpus length, 0.65 of carapace length; merus slightly widened distally, with one small ventrolateral spine subproximally; ischium subequal in length to merus, armed with two widely spaced spines ventrolaterally. Exopod short, reaching midlength of ischium, with several short marginal setae.

Second pereopod (Fig. 5F, G) longest among five pairs of pereopods, overreaching antennal scale by length of chela and carpus. Chela large for genus, 0.42 of carapace length. Dactylus 0.62 of palm length, terminating in acute, curved claw, cutting edge with two rows of spinules, short setae; fixed finger also terminating in curved claw, crossing dactylus, with two tufts of setae at midlength of lateral, ventral surfaces, cutting edge with two rows of short stiff setae. Palm with tuft of long setae at articulation to dactylus; carpus elongated, widened distally, 2.15 of chela length. Merus-ischium combined 1.37 of carpus length, 1.33 of carapace length; merus slightly widened distally, with two small, widely spaced ventral spines in proximal half; ischium subequal in length to merus, armed with three widely spaced spines (one subdistal, two subproximal) ventrolaterally. Exopod very short, reaching proximal 0.20 of ischium, with few very short terminal setae.

Third to fifth pereopods similar in length and structure. Third pereopod (Fig. 5H) overreaching antennal scale by full length of distal three segments. Dactylus (Fig. 6F-H) 0.50 of propodus length, peculiar in shape, flattened dorsoventrally, abruptly narrowed at proximal one-third; proximal part with convex lateral, mesial margins, lateral margin forming thick keel; ventral surface of proximal part excavate; distal part

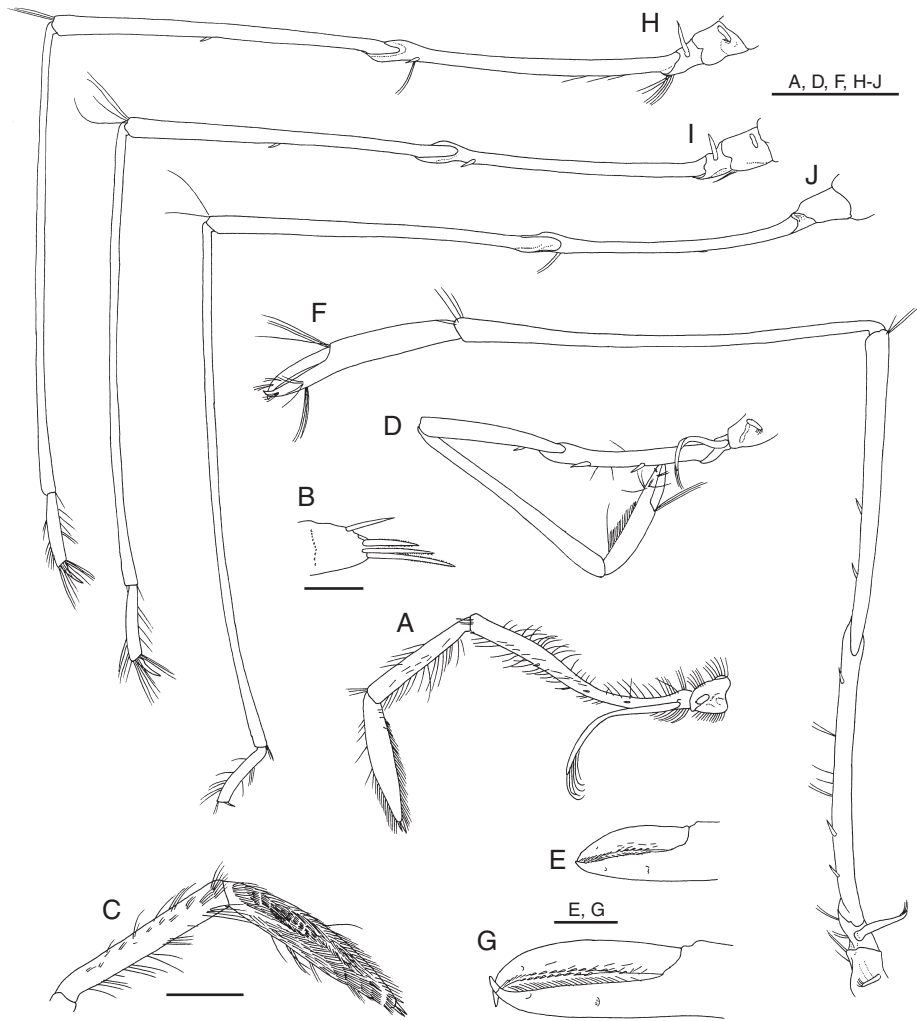


FIG. 5. — *Nematocarcinus burukovskiy* n. sp., holotype subadult ♂, Wormwood vent site, SEPR, cl 18.6 mm (MNHN-Na 15768), left thoracic appendages; **A**, third maxilliped, lateral view; **B**, tip of ultimate segment of third maxilliped, mesial view; **C**, distal two segments of third maxilliped, mesial view; **D**, first pereopod, lateral view; **E**, fingers of first pereopod, lateral view; **F**, second pereopod, lateral view; **G**, fingers of second pereopod, lateral view; **H-J**, third to fifth pereopods, lateral view. Scale bars: **A**, **D**, **F**, **H-J**, 5 mm; **B**, 0.5 mm; **C**, 2 mm; **E**, **G**, 1 mm.

notably curved mesially, terminating in slender, acuminate unguis, with tuft of setae on dorsal surface. Propodus (Fig. 6F, G) very short, subcylindrical, slightly widened distally, with row of individual or tufts of setae on dorsal, ventral surfaces; distal margin obliquely truncate, with row of long stiff setae dorsally and row of five or six slightly curved spines, some of them longer than

dactylus. Carpus 6.24 of propodus length. Merus-ischium combined 1.23 of carapace length; articulation between merus and ischium notably inflated; merus with one ventral spine at midlength, ischium with one ventrolateral spine subdistally. Exopod short. Fourth pereopod (Figs 5I; 6I) overreaching antennal scale by 0.85 of carpus length; dactylus 0.40 of propodus

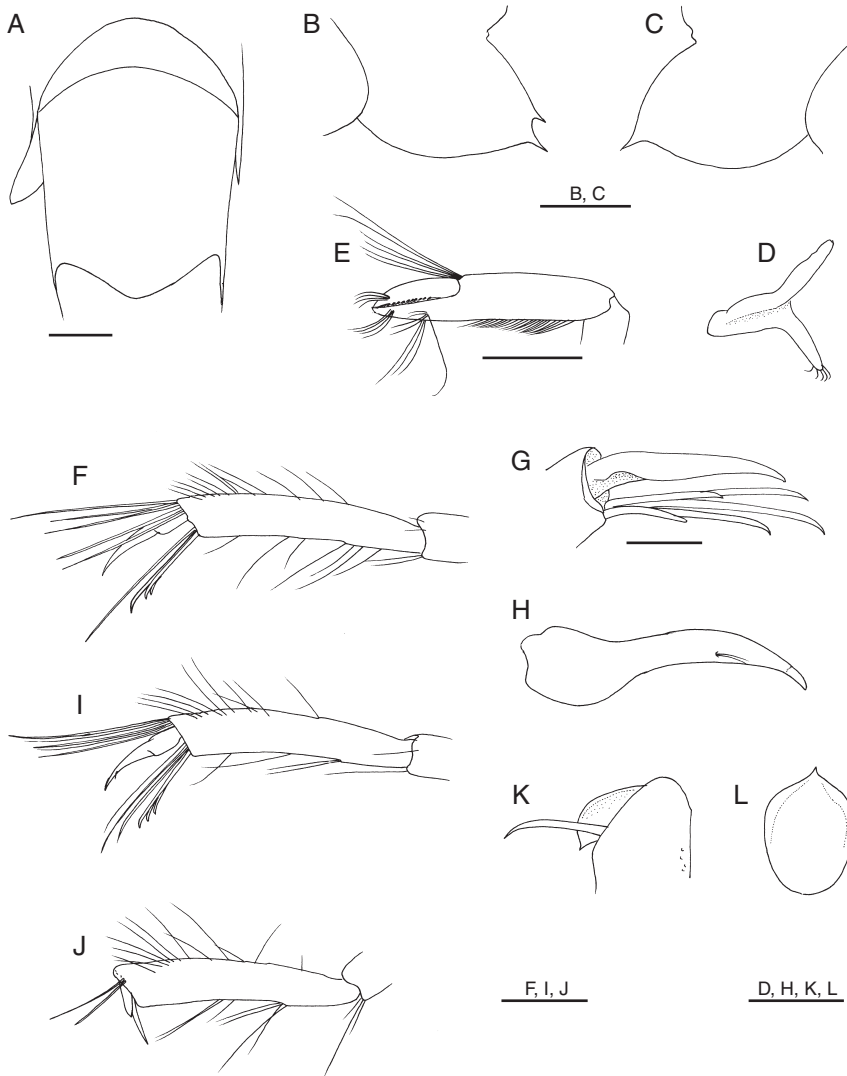


FIG. 6. — *Nematocarcinus burukovskyi* n. sp., holotype subadult ♂, Wormwood vent site, SEPR, cl 18.6 mm (MNHN-Na 15768); **A**, third abdominal somite, dorsal view; **B**, left fifth pleuron, lateral view (setae omitted); **C**, right fifth pleuron, lateral view; **D**, epipod on third maxilliped, lateral view; **E**, chela of first pereopod, lateral view; **F**, **I**, **J**, dactyli and propodi of third to fifth pereopod, lateral view; **G**, dactylus and distal part of propodus of third pereopod, lateral view (dorsodistal distal setae propodus omitted); **H**, dactylus of third pereopod, dorsal view; **K**, dactylus and distal part of propodus, proximolateral view; **L**, dactylus of fifth pereopod, dorsal (extensor) view. Scales: A, B, C, 2 mm; E, F, I, J, 1 mm; G, D, H, K, L, 0.5 mm.

length; merus-ischium combined 1.22 of carapace length; exopod rudimentary, shorter than that of third pereopod. Fifth pereopod (Fig. 5J) overreaching antennal scale by 0.30 of carpus length; dactylus (Fig. 6J-L) very short, flattened, strongly appressed to obliquely truncate distal

margin of propodus, rounded in dorsal (extensor) view, terminating in small acute point; margins of dactylus sharply edged; propodus (Fig. 6J, K) generally similar to those of third, fourth pereopods (most spines on ventrodistal margin missing); carpus 7.8 of propodus length; merus-ischium

combined 1.24 of carapace length, both segments unarmed; exopod absent.

Gill formula typical of genus, summarized in Table 1. Epipods on first to fourth pereopods all strap-like, but non-hooked (Fig. 5A, D, F, H, I). First pleopod with endopod elongated oval, with small appendix interna arising at distal 0.25. Second to fifth pleopods (Fig. 1) each with well developed appendix interna. Appendix masculina of second pleopod (Fig. 4J) shorter than appendix interna, narrow, with row of very short setae on rounded terminal margin. Exopods moderately long, that of third pleopod longest, 0.42 of carapace length. Uropod (Fig. 3C) with stout protopod terminating posterolaterally in acute tooth; exopod slightly longer than endopod, with distinct suture; lateral margin of exopod straight, terminating in very small, acute tooth, long movable spine arising just mesial to posterolateral tooth (Fig. 4K).

Notes on paratypes

The two paratypes, a female (cl 25.2 mm; USNM) and a juvenile of undetermined sex (cl 13.8 mm; CBM-ZC 8360), agree well with the holotype. Rostrum (partly broken in female paratype) armed with three dorsal and four ventral teeth; distal 0.40 of dorsal margin unarmed; tip weakly deflexed as in holotype. Carapace with six (young specimen) or seven (female) postrostral teeth, only posterior four with basal suture in female, all with basal suture in young specimen. In both specimens, left fifth abdominal pleuron with one posteroventral tooth, right with two posteroventral teeth. Sixth abdominal somite with single (young) or double (female) row of setae on ventral surface either side of midline. First pereopod with three ventrolateral spines on ischium. Second pereopod with one or two lateral spines on merus. Propodus of fifth pereopod with several long spines on ventrodiscal margin.

Coloration in life (Fig. 7A, B)

Body light orange, yellowish hepatopancreas visible through integument. Cornea of eye brown, but reflective; eye-stalk dark orange. Pereopods nearly colorless.

TABLE 1. — *Nematocarcinus burukovskyi* n. sp, branchial formula. r, rudimentary.

Thoracic somites	1	2	3	4	5	6	7	8
	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Pleurobranchs	–	–	–	+	+	+	+	+
Arthrobranchs	–	–	2	1	1	1	1	–
Podobranchs	–	+	–	–	–	–	–	–
Epipods	+	+	+	+	+	+	+	–
Setobranchs	–	–	–	–	–	–	–	–
Exopods	+	+	+	+	+	+	r	–

Size

The largest specimen is a female cl 25.2 mm, tl c. 97 mm.

REMARKS

The holotype is a male, having a fairly well differentiated appendix masculina (Fig. 4J). Nevertheless, the appendix masculina is rather narrow and shorter than the appendix interna; the endopod of the first pleopod is devoid of grooves or ridges on the surfaces. Generally in *Nematocarcinus*, the appendix masculina is broad and longer than the appendix interna, and the endopod of the first pleopod has sculptured surfaces. It is thus thought that the holotype is a subadult. It was not possible to determine the sex of the smallest paratype (cl 13.8 mm), because differentiation of the gonopores was not evident. Nevertheless, the three specimens are quite well consistent in every diagnostic aspects discussed below.

The new species is assigned to *Nematocarcinus* with some hesitation because of the existence of some particular characters. It is characterized by: 1) conspicuous cervical and branchiocardiac grooves on the carapace; 2) absence of paired posteroventral spots on the sixth abdominal somite; 3) small podobranch on the second maxilliped; 4) the dorsal teeth on the rostrum clearly separated in two groups; 5) long posteroventral tooth of the fifth abdominal pleuron; 6) second pereopod is the longest among the five pereopods and has a relatively large chela; and 7) short exopods on the

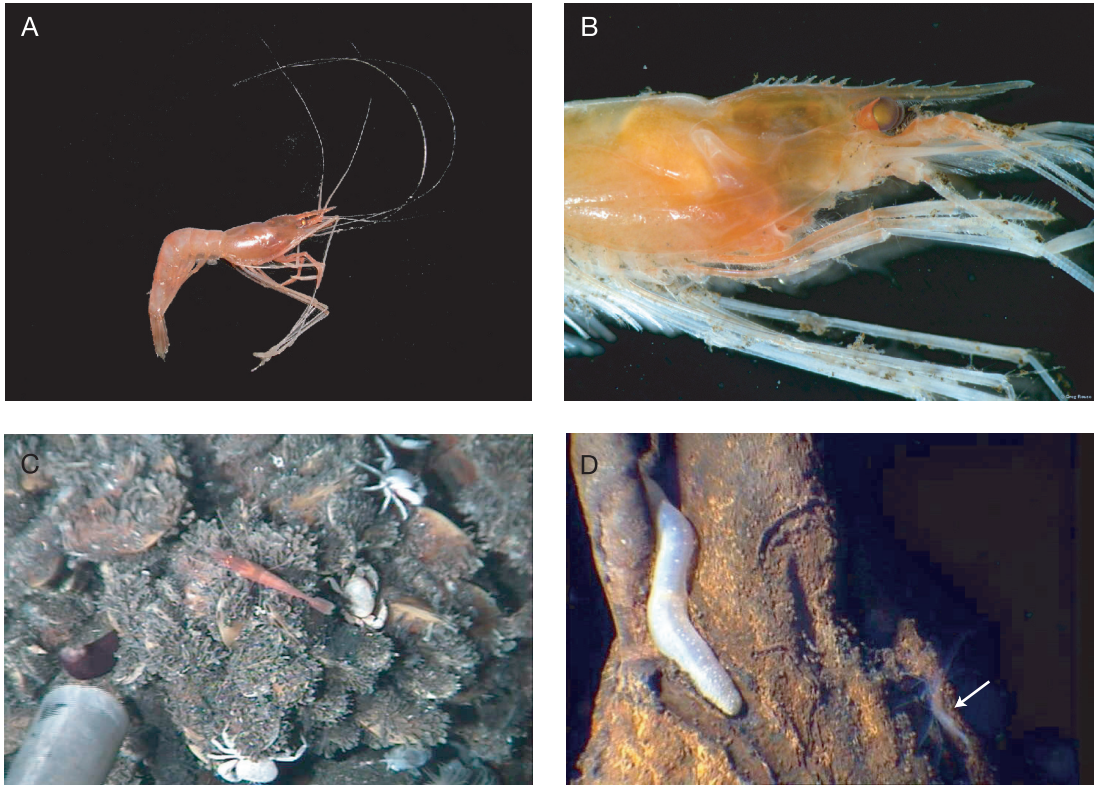


FIG. 7. — *Nematocarcinus burukovskyi* n. sp.; **A**, holotype subadult ♂, Wormwood vent site, SEPR, cl 18.6 mm (MNHN-Na 15768), photograph taken on board, just after collection (photo: Ifremer/BIOSPEEDO/P. Briand); **B**, paratype juvenile from Fred's Fortress vent site, SEPR, cl 13.8 mm (CBM-ZC 8630), photograph taken on board, just after collection (photo: MBARI/PAR5/G. Rouse); **C**, photograph showing an individual *in situ*, taken at site Fred's Fortress vent site, SEPR during PAR5 cruise by DS *Alvin*, dive 4094, on mussel bed of *Bathymodiolus* sp., with bythograeid crabs *Bythograea vrijenhoeki* (photo: MBARI/PAR5/R. Vrijenhoek); **D**, photograph showing an individual lying close to a holothurian *Chiridota hydrothermica*, taken at Krasnov vent site during BIOSPEEDO cruise by DS *Nautille* dive 1575 (photo: Ifremer/BIOSPEEDO/D. Jollivet).

pereopods, in particular that on the fourth pereopod being rudimentary. The first three characters initially led us to suspect that the new species may be closely related to *Nigmatullinus acanthitelsonis*, because both species share these characters. Distinct cervical and branchiocardiac grooves are also seen in *Nematocarcinus ovalis* n. sp., *N. faxoni*, and *N. longirostris*, and therefore the development of the carapace grooves is not significant at the generic level. The presence of the paired posteroventral spots on the sixth abdominal somite needs to be verified in *Nematocarcinus altus* Bate, 1888 (cf. Burukovsky 2003). The shape and structure of the podobranch on the

second maxilliped remains to be described for many *Nematocarcinus* species, although the podobranch of the species examined is larger than that of the new species. The other characters appear to be unique for the new species. In *Nigmatullinus acanthitelsonis* and other *Nematocarcinus* species, the dorsal rostral series is continuous, although the distance between the teeth may become greater distally (Burukovsky 2003). The posteroventral tooth on the fifth abdominal somite is variable in shape, but not elongate as in *N. burukovskyi* n. sp.; the fifth pleuron is unarmed in *N. acanthitelsonis*. The second pereopod is shorter than the posterior three pereopods,

as far as known. The exopods on the pereopods are better developed, all flagellum-like. Future study may eventually reveal that *N. burukovskyi* n. sp. is generically distinct.

ECOLOGY

The holotype of *N. burukovskyi* n. sp. was collected at the Wormwood vent site, Garrett Segment, SEPR (Jollivet *et al.* 2004), at the base of a 10 m high chimney, diffusing milky fluid, above beds of the mytilid *Bathymodiolus thermophilus* Kenk & Wilson, 1985 (of which shells were sometimes covered with white filamentous bacteria), close to small clumps of the giant siboglinid worm *Riftia pachyptila* Jones, 1981, and among the clumps of tube worm many individuals of bythograeid crabs (*Bythograea thermydron* Williams, 1980, and *B. microps* de Saint Laurent, 1984), and galatheid squat lobsters (*Munidopsis subsquamosa* Henderson, 1885). Ophiidiid fishes, two or three octopus *Vulcanoctopus* cf. *hydrothermalis* Gonzales, Guerra, Pascual & Briand, 1998, and clouds of amphipods also occurred at this site during the observation. At the Hobbs site (17°35.19'S, 113°14.68'W, 2595 m), about 500 m south from the Wormwood site, several individuals of nematocarcinid shrimp, probably representing *N. burukovskyi* n. sp., were also observed. Shrimps were swimming around the vent community of mytilid bivalves, siboglinid worms, bythograeid crabs and fish. This new species was common at the these two sites, although only the specimen designated as the holotype could be collected.

The paratype specimen collected during the PAR5 cruise (*Alvin* dive #4094, 31°S) was observed on mytilid mussel beds (*Bathymodiolus* sp., identified by R. von Cosel), among bythograeid crabs *Bythograea* spp., some rare alvinocaridid shrimps resembling species of *Chorocaris*, gastropods *Eosipho auzendei* Warén & Bouchet, 2001, and white sea anemones (Fig. 7C). The other paratype was collected during the same cruise (*Alvin* dive #4096, 23°S). This site, named Serpulid Mound, is characterized by an abundance of serpulid polychaete *Laminatubus hydrothermica* Ten Hove &

Zibrowius, 1986, otherwise shelters a depauperate vent fauna.

The photograph taken at the Krasnov vent site (21°33.59'S, 114°17.88'W, 2839 m) (Fig. 7D), located 7 km south of the Wormwood site (SEPR, 21°33'S, 114°17'W, 2839 m), shows a specimen presumably belonging to this new species standing close to a holothurian *Chiridota hydrothermica* Smirnov, Gebruk, Galkin & Shank, 2000 lying on an extinct chimney of oxidized sulphide.

The occurrence of *N. burukovskyi* n. sp. at the hydrothermally influenced areas indicates that it tolerates hydrothermal discharge at low temperature between 2 and 7 °C above the mussel beds (data taken during the BIOSPEEDO cruise).

Nematocarcinus ovalis n. sp.

(Figs 8-10)

HOLOTYPE. — HOPE 99, EPR 13°N, RMT (remotely monitored trawl) 1, stn 54803#3, 20.IV.1999, 12°45.50'N, 103°55.80'W, 2558-2619 m (c. 120 m above bottom), 1 ovigerous ♀ cl 27.5 mm (MNHN-Na 15765).

ETYMOLOGY. — The Latin *ovalis* (oval) refers to the distinctly oval shaped posteroventral spots on the sixth abdominal somite.

DISTRIBUTION. — Known with certainty only from the type locality at EPR 13°N, 2558-2619 m.

DESCRIPTION OF HOLOTYPE

Body moderately slender; integument soft, fragile, not membranous, surface smooth, shiny.

Rostrum (Fig. 8A, B) moderately slender, distal part broken off, preserved part nearly reaching anterior margin of antennal scale; preserved dorsal margin armed with 23 small teeth, including nine on carapace posterior to orbital margin, posterior 13 teeth with complete basal suture, others with incomplete basal suture or fixed; distance between teeth becoming wider distally; lateral surface with blunt lateral ridge confluent with orbital margin; ventral margin of preserved part unarmed. Carapace (Fig. 8A, B) with post-rostral ridge low, sharp, extending to about 0.40 of carapace length, ending slightly anterior to cervical

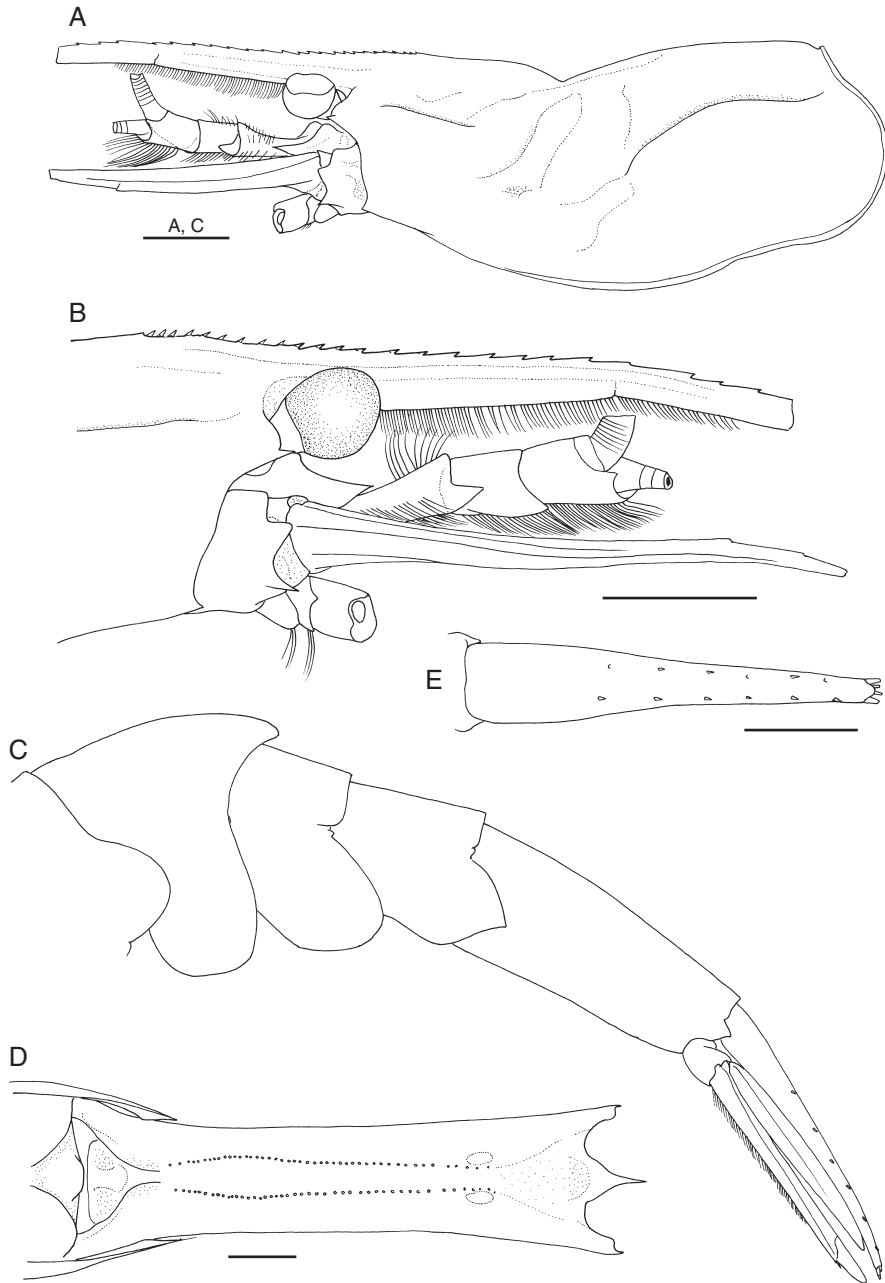


FIG. 8. — *Nematocarcinus ovalis* n. sp., holotype ovigerous ♀, HOPE 99, stn 54803#3, NEPR, cl 27.5 mm (MNHN-Na 15765); **A**, rostrum, carapace and cephalic appendages, lateral view (distal part of rostrum, left eye and distal part of left antennal scale broken off; carapace somewhat deformed, thus dorsal notch more accentuated than real); **B**, anterior part of carapace, rostrum and cephalic appendages, lateral view; **C**, third abdominal somite to telson and left uropod, lateral view; **D**, posterior part of fifth abdominal somite and sixth somite, ventral view; **E**, telson, dorsal view. Scale bars: A-C, 5 mm; D, E, 2 mm.

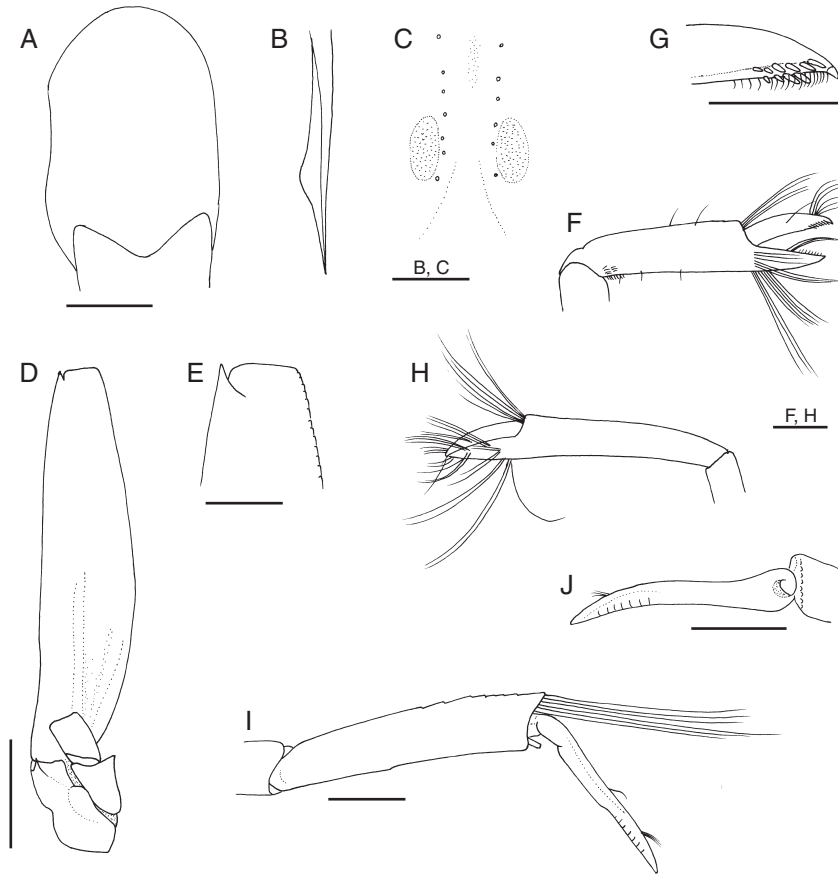


FIG. 9. — *Nematocarcinus ovalis* n. sp., holotype ovigerous ♀, HOPE 99, stn 54803#3, NEPR, cl 27.5 mm (MNHN-Na 15765); **A**, third abdominal somite, dorsal view; **B**, posterior part of left fifth abdominal pleuron, ventral view, showing inner ridge; **C**, posteroventral spots and posterior setal pits of sixth abdominal somite, ventral view (setae omitted); **D**, right antenna, ventral view (setae omitted); **E**, distal part of left antennal scale, ventral view; **F**, chela of right first pereopod, lateral view; **G**, distal part of dactylus of right first pereopod, lateral view; **H**, chela of left second pereopod, lateral view; **I**, dactylus and propodus of right third pereopod, lateral view; **J**, dactylus of right third pereopod, obliquely ventral view. Scale bars: A, D, 5 mm; B, C, F, H, I, J, 1 mm; E, 2 mm; G, 0.5 mm.

groove; lateral surface rather well sculptured with distinct postorbital, cervical, post-cervical, hepatic, branchiocardiac grooves; cervical groove across midline of carapace, thus shallow, conspicuous notch present on dorsal surface; branchiocardiac groove deep, not accompanied with sharply delineated ridge; orbital margin sinuous, with broadly rounded suborbital lobe; antennal spine short, falling short of level of anterior margin of basicerite; pterygostomial spine broader than antennal spine; anterolateral margin between antennal, pterygostomial spines oblique, slightly sinuous.

Thoracic sternum with three bilobed prominences on sixth to eighth somites; lobes of prominence on sixth somite each terminating rounded; lobes of posterior two prominences also rounded, not prominently elevated.

Abdomen (Fig. 8C) dorsally smooth. Pleura of anterior four somites broadly rounded. Postero-dorsal margin of third somite somewhat produced posteriorly, rounded (Figs 8C; 9A). Fifth somite (Fig. 8C) with one small posteroventral teeth, not markedly produced; inner surface of posterior part of pleuron with low, distinct short ridge (Figs 8D; 9B). Sixth somite (Fig. 8C, D)

moderately elongated, 2.22 times longer than fifth somite, 2.50 times longer than anterior depth; posterolateral process subtriangular, acutely pointed; posteroventral angle blunt; ventral surface with two single, subparallel rows of long setae extending to level of posterior margin of posteroventral spots; posteroventral spots (Figs 8D, 9C) small, longitudinally elongate suboval in outline, surfaces minutely punctate; pre-anal tooth (Fig. 8D) directed posteriorly. Telson (Fig. 8E) long, slender, 5.00 times longer than greatest width, reaching posterior margin of exopods of uropods (except for terminal spines), gradually tapering posteriorly to blunt terminal lobe; dorsal surface flat, with six pairs of small dorsolateral spines; all dorsolateral spines aligned; terminal margin with two pairs of spines, lateral pair strongest (tips of spines broken off).

Eye (Fig. 8B) subpyriform with well-developed, faceted cornea; cornea moderately large for nematocarinid, its width about 0.10 of carapace length; eye-stalk slightly shorter than corneal width.

Antennular peduncle (Fig. 8B) stout, reaching midlength of antennal scale. First segment subequal in length to distal two segments combined; stylocerite only reaching midlength of basal peduncular segment, acuminate, directed forward in lateral view. Flagella broken off.

Antennal peduncle (Figs 8B, 9D) with basicerite stout, armed with small ventrolateral distal tooth; ventral surface of basicerite provided with low, rounded tubercle. Fifth segment (carpocerite) short, stout, reaching level of midlength of first segment of antennular peduncle. Antennal scale 0.83 of carapace length, 4.10 times longer than wide; lateral margin slightly sinuous; distolateral tooth reaching truncate distal margin of lamella (Fig. 9E). Flagellum missing.

Mouthparts not dissected, but generally similar to those of *N. burukovskyi* n. sp. Third maxilliped (Fig. 10A) with endopod not reaching distal margin of antennal scale, consisting of four segments; ultimate segment somewhat compressed laterally, lance shaped, terminal spines missing; mesial face of ultimate segment with numerous transverse or obliquely transverse

tracts of stiff setae of various length, forming grooming apparatus; carpus (penultimate segment) 1.33 of ultimate segment length, with some tufts of short to moderately long setae on surfaces; antepenultimate segment (merus-ischium-basis fused segment) flattened dorsoventrally, sinuous in dorsal view, with row of 10 spinules on longitudinal ridge on lateral surface, margins or surfaces setose; coxa with rudimentary epipod (not figured; broken during dissection); exopod about 0.80 length of antepenultimate segment.

Pereopods with articulations between merus and ischium strongly oblique, typical for nematocarinids.

First pereopod (Fig. 10B) moderately slender, overreaching antennal scale by length of chela and 0.10 of carpus; dactylus (Fig. 9F, G) 0.47 of palm length, terminating in acute, curved claw, cutting edge with two rows of blunt corneous spinules and short curved setae in distal 0.30; fixed finger also terminating in curved claw, crossing dactylus, with prominent tuft of long setae subproximally, cutting edge with two rows of short curved setae. Palm with tuft of long setae at articulation to dactylus and small patch of grooming setae on ventromesial surface. Carpus widened distally, 3.85 of chela length. Merus-ischium combined 1.06 of carpus length, 0.75 of carapace length; merus slightly widened distally, with one small ventrolateral spine arising from proximal 0.30; ischium subequal in length to merus, armed with three spines ventrolaterally (subproximal two spines close, third spine at midlength).

Second pereopod (Fig. 10C, D) long, filiform, shorter than posterior three pereopods. Chela moderately small. Dactylus (Fig. 8H) 0.42 of palm length, terminating in acute, curved claw obscured by numerous short setae, cutting edge with two rows of short curved setae; fixed finger also terminating in curved claw obscured by short setae, crossing dactylus, with two prominent tufts of setae at midlength of lateral and ventral surfaces, cutting edge with two rows of short stiff setae. Palm with tuft of long setae at articulation to dactylus; carpus strongly elongated, slightly

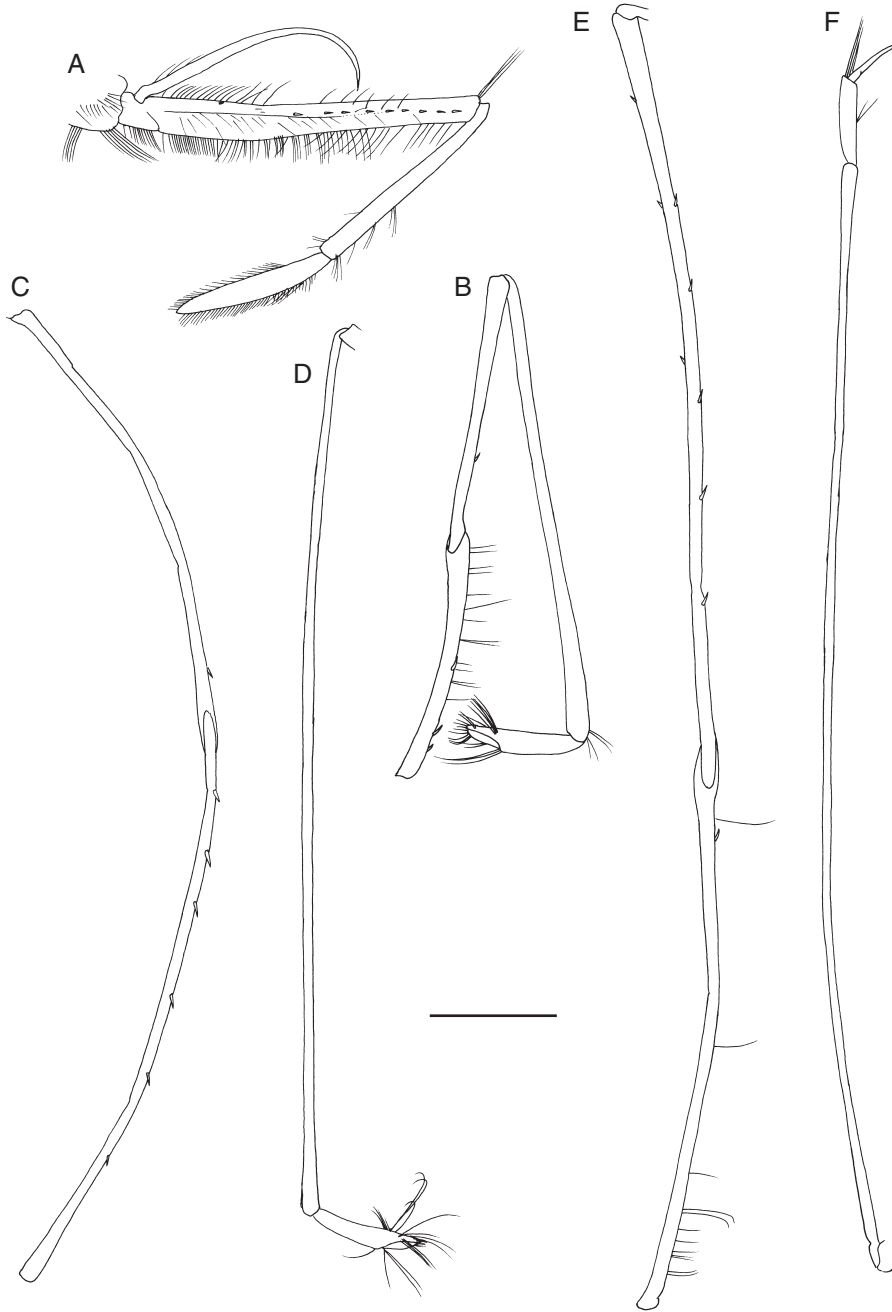


FIG. 10. — *Nematocarcinus ovalis* n. sp., holotype ovigerous ♀, HOPE 99, stn 54803#3, NEPR, cl 27.5 mm (MNHN-Na 15765); **A**, right third maxilliped, lateral view; **B**, right first pereopod, lateral view; **C**, merus and ischium of left second pereopod, lateral view; **D**, chela and carpus of left second pereopod, lateral view; **E**, merus and ischium of right third pereopod, lateral view; **F**, dactylus, propodus and carpus of right third pereopod, lateral view. Scale bar: 5 mm.

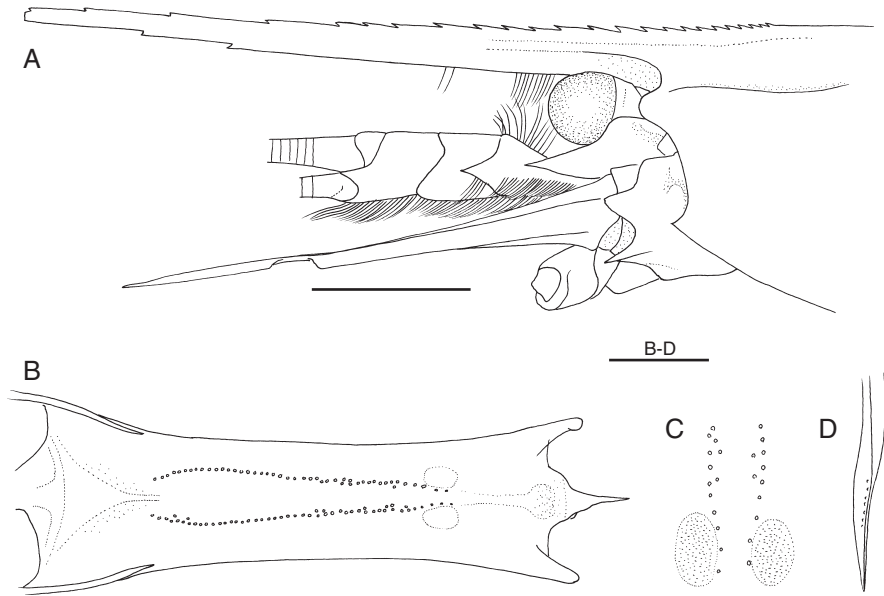


FIG. 11. — *Nematocarcinus faxoni* Burukovsky, 2001, paratype ♀, off Marias Island, Mexico, cl 25.6 mm (USNM 21139); **A**, rostrum, anterior part of carapace and cephalic appendages, lateral view; **B**, posterior part of fifth abdominal somite and sixth somite, ventral view (setae omitted); **C**, posteroventral spots and posterior setal pits on sixth abdominal somite, ventral view; **D**, posterior part of right fifth abdominal pleuron, ventral view. Scale bars: A, 5 mm; B, 2 mm; C, D, 1 mm.

widened distally, 7.90 of chela length. Merus-ischium combined 0.95 of carpus length, 1.56 of carapace length; merus slightly widened distally, with six small, widely spaced ventrolateral spines; ischium shorter than merus, armed with one sub-distal spine ventrolaterally. Exopod moderately short.

Third to fifth pereopods greatly elongated, fili-form, similar in length and structure. Third pereopod (Fig. 10E, F) overreaching antennal scale by about 0.40 of merus length. Dactylus (Fig. 9I, J) about 0.75 of propodus length, slightly sinuous in ventral view, tapering distally, with short ridge on lateral margin proximally and with faint annulations in distal 0.40; basal part somewhat widened. Propodus (Fig. 9I) very short, subcylindrical, slightly widened distally, with row of individual or tufts of setae on dorsal and ventral surfaces; distal margin obliquely truncate, with row of long stiff setae dorsally; armament of ventrodistal margin missing. Carpus very thin, greatly elongated, about 13 of propodus length.

Merus-ischium combined 1.90 of carapace length; articulation between merus and ischium notably inflated; merus with five ventrolateral spines, six mesial spines, spines widely separated; ischium with one ventrolateral spine subdistally. Exopod moderately long. Fourth pereopod (overreaching antennal scale by about 0.25 of merus length; merus with two ventrolateral and four mesial spines; exopod short. Fifth pereopod overreaching antennal scale by about 0.25 of merus length; dactylus missing; merus unarmed; exopod absent.

Number of gills and epipods identical to that of *N. burukovskyi* n. sp. (Table 1). Exopods on pereopods notably decreasing in length posteriorly; length of each exopod moderate for genus. Epipods similar to those of *N. burukovskyi* n. sp. Uropod (Fig. 8C) with protopod terminating posterolaterally in small acute tooth; exopod slightly longer than endopod, with distinct suture; lateral margin of exopod straight, terminating in small movable spine.

Coloration

Generally reddish.

Size

Ovigerous female: cl 27.5 mm; tl c. 108 mm.

REMARKS

Nematocarcinus ovalis n. sp. closely resembles *N. faxoni* in the dorsal armament of the rostrum, the shape of the posterodorsal margin of the third abdominal somite and the relatively small posteroventral tooth of the fifth abdominal pleuron. *Nematocarcinus ovalis* n. sp. can be distinguished from *N. faxoni* by the relatively small, more elongately oval-shaped posteroventral spots on the sixth abdominal somite (cf. Fig. 8D and Fig. 11B) and by the distinct inner ridge on the fifth abdominal pleuron (Fig. 8B). The inner ridge of the fifth abdominal pleuron is very low, sometimes rudimentary in *N. faxoni* (Fig. 11D). There is only a single setal row on either side of the midline of the ventral surface of the sixth abdominal somite in *N. ovalis* n. sp. (Fig. 8D), whereas it is partially doubled in *N. faxoni* (Fig. 11B). The body integument of *N. ovalis* n. sp. is soft, but that of *N. faxoni* is rather solid. The preserved part of the rostrum of *N. ovalis* n. sp. is unarmed on the ventral margin (Fig. 8B), whereas the rostrum of *N. faxoni* is usually armed with one or two teeth between the levels of the distal margin of the antennular peduncle and the distal margin of the antennal scale (Fig. 11A). *Nematocarcinus ovalis* n. sp. and *N. faxoni* are found at different depths; the holotype of *N. ovalis* n. sp. was collected at a depth of 2558–2619 m, *N. faxoni* at 898–1839 m, most abundantly at 1100–1300 m (Burukovsky 2001, 2003). Other than *N. faxoni*, two species of *Nematocarcinus* have been reported from the Eastern Pacific, i.e. *N. agassizii* Faxon, 1893, and *N. ensifer* Smith, 1882 (Faxon 1895; Burukovsky 2001). *Nematocarcinus ovalis* n. sp. is distinguished from *N. agassizii* by characters of the rostrum and the sixth abdominal somite (Faxon 1895; Burukovsky 2003). The dorsal margin of the rostrum is armed with moderately spaced teeth over the entire length in *N. ovalis* n. sp.,

whereas it is armed with closely set teeth restricted proximally to the level of the distal margin of the antennular peduncle in *N. agassizii*. The longer axis of each posteroventral spot on the sixth abdominal somite is parallel to the midline in *N. ovalis* n. sp., rather than diverging posteriorly in *N. agassizii*. The strongly produced, subacutely pointed posterodorsal margin of the third abdominal somite and the strong, ventrally curved posteroventral tooth on the fifth abdominal pleuron distinguish *N. ensifer* from *N. ovalis* n. sp.

An additional specimen (MNHN-Na 15763) from hydrothermal vents on the EPR 13°N, collected during the HOT 96 cruise (Gaill *et al.* 1996) (DS *Nautile*, dive 1070, 21.II.1996, at about 300 m of the hydrothermal site Genesis, EPR, 12°48.64'N, 103°56.43'W, 2630 m, slurp gun) was examined. It is an ovigerous female (cl 21.4 mm), but its condition is poor. The rostrum was missing during collection. The specimen is similar to the holotype of *N. ovalis* n. sp., but is different from the latter in some features. The posterodorsal margin of the third abdominal somite is more strongly produced in the HOT 96 specimen than in the holotype of *N. ovalis* n. sp. (cf. Fig. 12A, B and Figs 8C; 9A). The posteroventral spots on the sixth abdominal somite are less elongated in the HOT 96 specimen than in the holotype of *N. ovalis* n. sp. (cf. Fig. 12E and Fig. 9C). Each setal row only extends to the anterior margin of the posteroventral spot in the HOT 96 specimen (Fig. 12E), rather than extending to the level of the posterior margin of it in the holotype of *N. ovalis* n. sp. (Fig. 9C). It has been shown that the complex structure of the setal rows and posteroventral spots is constant among the species of *Nematocarcinus* (Burukovsky 2003), and therefore the observed differences may be species specific. The fifth abdominal pleuron of the HOT 96 specimen is armed with a sharp, more slender posteroventral tooth and an additional, minute denticle on the posterolateral margin dorsal to the posteroventral tooth in both right and left (Fig. 12C). In the holotype of *N. ovalis* n. sp., the posteroventral tooth is less produced and there is no additional

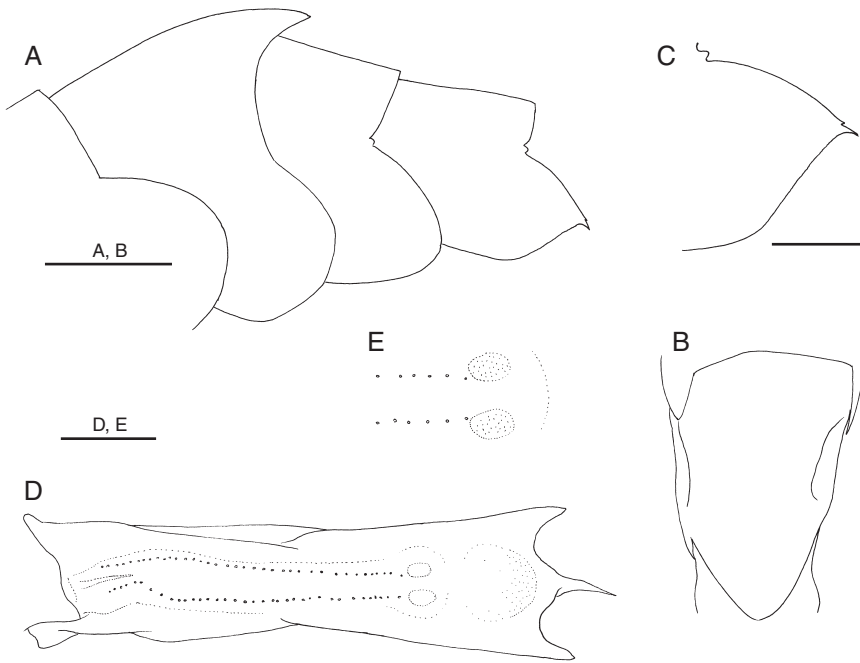


FIG. 12. — *Nematocarcinus* sp., ovigerous ♀, site Genesis, HOT 96, DS *Nautila* dive 1070, cl 21.4 mm (MNHN-Na 15763); **A**, third to fifth abdominal somites, lateral view (setae omitted); **B**, third abdominal somite, dorsal view; **C**, left fifth abdominal pleuron, lateral view; **D**, sixth abdominal somite, ventral view (setae omitted); **E**, posteroventral spots and posterior setal pits, ventral view. Scale bars: A, B, 5 mm; C, D, 2 mm; E, 1 mm.

denticle on the posterolateral margin (Fig. 8C). Furthermore, the HOT 96 specimen is smaller than the holotype of *N. ovalis* n. sp. (cl 21.4 mm versus cl 27.5 mm), although they are both ovigerous. A suite of the above characters also distinguishes the HOT 96 specimen from known congeneric species, as well as the other four Eastern Pacific species, *N. agassizii*, *N. ensifer*, *N. faxoni* and *N. burukovskyi* n. sp. The poor condition of the HOT 96 specimen prevents making further comparisons, but the observed differences would seem to suggest that the HOT 96 specimen represent an undescribed species. A formal description of a new species should be deferred until additional specimens are collected.

ECOLOGY

The holotype of *N. ovalis* n. sp. was collected by a trawl sampling in the water column about 120 m above the bottom, and about 300 m distant from

the hydrothermal vent site Genesis (Gaill *et al.* 1996). The trawl catches of the trawl operation contained typically bathypelagic animals, and lack any obvious components derived from vent fauna.

Individuals of *Nematocarcinus* shrimp were frequently observed at and around the Genesis site (Gaill *et al.* 1996). The indeterminate HOT 96 specimen was collected at a location 300 m from the Genesis site by slurp gun on pillow lavas, where the fauna is rather poor. Only holothurians and sponges *Caulophacus cyanae* Boury-Esnault & de Vos, 1988 were sparsely found at the location.

DISCUSSION

About 30 caridean species have been recorded from vent or seep sites in the world oceans

(Martin & Shank 2005; Komai & Segonzac 2005; Komai *et al.* in press), although there are some undescribed or unidentified species. The occurrence of some of the caridean species at vents or seeps, in particular pelagic oplophorids (Desbruyères & Segonzac 1997; Ohta *et al.* 1995; Martin 2003; de Saint Laurent 1984), is considered to be merely opportunistic, as these species are widely distributed in meso- or bathypelagic zone of world oceans (Crosnier & Forest 1973; Chace 1986). Species of *Nematocarcinus* are widely distributed in deep-waters, and most known species are not associated with chemosynthetic habitats. Although the occurrence of nematocarcinids was sometimes very frequent at vent sites on EPR, the two new species described in the present paper are not obligatorily associated with hydrothermal vents. Individuals were often encountered even in areas far from hydrothermally influenced areas. Furthermore, the mouthparts of the two new species are similar to those of other congeners, and show no specialization as is found in alvinocaridid species (Komai & Segonzac 2003).

The present study increases the caridean species known from EPR hot vents to five, including *Alvinocaris lusca* Williams & Chace, 1982 (Alvinocarididae), *Lebbeus carinatus* de Saint Laurent, 1984 (Hippolytidae) and *Systellapsis braueri* Balss, 1914 (Oplophoridae), in addition to the two new species of *Nematocarcinus*. Furthermore, Dr Joel W. Martin kindly informed us that an undescribed species of *Chorocaris* was discovered from the SEPR at 17°S (Martin & Shank 2005).

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