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A new species of *Naushonia* Kingsley, 1897 (Decapoda: Thalassinidea: Laomediidae) from Vietnam and the Philippines with notes on the genus *Espeleonaushonia* Juarrero & Martínez-Iglesias, 1997

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Abstract

Naushonia carinata **n.sp.** is described from five specimens collected from burrows of the large-sized callianassid shrimp, *Glypturus armatus* (A. Milne-Edwards, 1870), in Nha Trang Bay, Vietnam, and Panglao I., Philippines. The new species differs from all other congeners by the presence of one median and two submedian carinae on first to fifth abdominal somites and broad propodi of the chelipeds. The genus *Espeleonaushonia* Juarrero & Martínez-Iglesias, 1997 is redefined and the cave inhabiting laomediid, *Naushonia manningi* Alvarez, Villalobos & Iliffe, 2000, from the Bahamas, is transferred to this genus.

Key words: *Naushonia*, *Espeleonaushonia*, new species, genus redefinition, Vietnam, Philippines, Laomediidae, Callianassidae, Indo-West Pacific

Introduction

The laomediid genus *Naushonia* Kingsley, 1897 is considered rare despite its occurrence in shallow waters. Eight species were considered to belong to *Naushonia* or have been described under this genus name: *Naushonia crangonoides* Kingsley, 1897 from the east coast of North America (Kingsley, 1897; Thompson, 1903; Goy & Provenzano, 1978, 1979; Williams, 1984); *N. portoricensis* (Rathbun, 1901) from Puerto Rico (Rathbun, 1901; Goy & Provenzano, 1979) and Dominican Republic (present study, see below); *N.*

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perrieri (Nobili, 1904) from the Gulf of Aden (Ngoc-Ho, 1996); *N. macginitiei* (Glassell, 1938) from southern California and Sonora, Mexico (Glassell, 1938; Goy & Provenzano, 1979); *N. panamensis* Martin & Abele, 1982 from the Pacific coast of Panama (Martin & Abele, 1982); *N. lactoalbida* Berggren, 1992 from Mocambique and Japan (Berggren, 1992; Komai, 2004); *N. manningi* Alvarez, Villalobos & Iliffe, 2000 from the Bahamas (Alvarez et al., 2000), and *N. japonica* Komai, 2004 from Japan (Komai, 2004).

During sampling in the Bay of Nha Trang, Vietnam, one of us (IM) collected several specimens of *Naushonia* from burrow openings of the large callianassid shrimp *Glypturus armatus* (A. Milne-Edwards, 1870). In 2004, the first author (PCD) participated in the Panglao Marine Biodiversity Project and collected numerous thalassinidean shrimps and associated fauna around the island of Panglao, southwest off Bohol, in the Philippines. One of the specimens collected–also from the burrow of *G. armatus*–was a *Naushonia*. Upon examination, the shrimps from Vietnam and Panglao proved to belong to the same, hitherto undescribed species.

Juarrero & Martínez-Iglesias in Juarrero, García & Martínez-Iglesias (1997) erected the genus *Espeleonaushonia* for *E. augudrea* Juarrero & García in Juarrero, García & Martínez-Iglesias, 1997, a laomediid found in a Cuban cave. Later, Alvarez et al. (2000) described another laomediid shrimp *N. manningi* Alvarez, Villalobos & Iliffe, 2000 from an anchialine cave on the Bahamas. Both species share several characters, which distinguish them from all other members of the genus *Naushonia*. We consider the genus *Espeleonaushonia* to be different from *Naushonia* and redefine it below to accomodate *N. manningi*.

Material and methods

Specimens were collected with a yabby pump, chilled on ice and preserved in 75 or 96% ethanol. Material has been deposited in the Zoological Museum of Moscow State University, Russia (ZMMU), the National Museum of the Philippines, Manila (NMCR) and the Naturhistorisches Museum Wien, Austria (NHMW). Size is expressed as total length (tl, in mm) from the tip of the rostrum to the end of the telson and as carapace length (cl, in mm) from the tip of the rostrum to the posterior median edge of the carapace. Other abbreviations are: A1, first antenna (antennule); A2, second antenna; Mxp1–3, maxilliped 1–3; P1–4, pereopod 1–4; Plp1–2, pleopod 1–2; coll., collected. Terminology of the epipodal structures follows Astall et al. (1997) and Batang et al. (2001).

Comparative material examined: *Naushonia portoricensis* (Rathbun, 1901), NHMW 20718 (1 female), Dominican Republic, Boca Chica, in mixed sand-coral rubble debris sediment, under large rock, near mangroves and patches of seagrass, depth 0.7–1 m, A. Anker & D. Poddoubtchenko coll., 5–6 January 2005. *Jaxea nocturna* Nardo, 1847, NHMW 299 (1 male, cl 22), Adriatic Sea, Pirano, AN 1887.I.27; NHMW 311 (1 female, cl 19), Adriatic Sea, Miramare, 6 April 1868. *Laomedia healyi* Yaldwyn & Wear, 1970,

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NHMW 19596/1 (1 female, cl 14.4), Australia, Victoria, Western Port Bay, Warneet, F. Bird & P. Dworschak coll., 25 July 2001.

Taxonomy

Family Laomediidae Borradaile, 1903

Subfamily Naushoniinae Chace, 1939

Espeleonaushonia Juarrero & Martínez-Iglesias, 1997

Diagnosis (amended after Juarrero et al. 1997): Eyes with more or less reduced corneal pigmentation. Third maxilliped with well developed exopod. First pereopods equal, robust, elongated, covered with small acute spines. Second pereopod small, not chelate, with brush of dense setae. Fifth pereopod with simple dactylus. Second to fifth abdominal pleura with serrated ventral margin. Uropodal endopods and exopods with complete suture.

Species included: *Espeleonaushonia augudrea* Juarrero & García in Juarrero, García & Martínez-Iglesias, 1997 (type species); *Espeleonaushonia manningi* (Alvarez, Villalobos & Iliffe, 2000) **n.comb.**

Remarks: *Espeleonaushonia* may be separated from *Naushonia* by the serrated ventral margins of the second to fifth abdominal pleura, the spinous mesial and lateral margins of the P1 propodus, as well as the presence of a brush of dense setae on the P2 dactylus. This last character is not explicitly mentioned in the original description of *E. manningi*, but seems to be present, as indicated by the drawings in Alvarez et al. (2000: figs 2a and 3g). Both *E. augudrea* and *E. manningi* were found in sea-side brackish caves, on silt-covered hard substrates, and so are ecologically different from *Naushonia* species that typically live in burrows in marine soft sediments. *Espeleonaushonia manningi* differs from *E. augudrea* mainly by the pigmented corneas, smooth lateral margin of the P1 dactylus and the coxa of P5 not covered by the posterolateral portion of the carapace.

Naushonia Kingsley, 1897

Homoriscus Rathbun, 1901
Coralliocrangon Nobili, 1904

Naushonia carinata n.sp.

Figures 1–6, Table 1

Material: Holotype (female, tl 19, cl 8 mm), ZMMU Ma 5471, South China Sea, Vietnam,

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Nha Trang, Nha Trang Bay, Dâm Bay of Tré Island, littoral, muddy sand, I. Marin coll., from holes of *Glypturus* sp., 5 June 2004.

Allotype (male, tl 15, cl 6.3 mm), ZMMU Ma 5472, same locality as holotype, intertidal fringed by mangroves, I. Marin coll., from burrows of *Glypturus armatus*, 5 June 2004.

Paratypes: (ovigerous female, tl 23, cl 9.4 mm, left cheliped missing, dissected), NHMW 21470, same data as holotype; (female, tl 18, cl 7.4), NHMW 21471, same locality as holotype, I. Marin coll., 17 June 2004.

Additional material: (female, tl 20, cl 8.8 mm, left cheliped missing), NMCR 27006, Philippines, Bohol, Panglao Island, Doljo Point, mixed intertidal platform, fringe mangrove, M5[M8]: 9° 35.5'N 123°44.3'E, P. Dworschak coll., with yabby pump from mound of *Glypturus armatus*, 2 June 2004 (PD16).

Description (combined material): Body (Fig. 1, 2a) moderately robust. Rostrum (Fig. 2b, 3a,b, 6a–c) strongly flattened dorsoventrally, rounded in dorsal view, reaching distal margin of second article of antennular peduncle; margins with row of numerous small spines increasing in size anteriorly; dorsal surface with shallow median depression extending posteriorly to just anterior to anterior end of median carina on carapace, and with small spines near lateral borders.

Carapace (Fig. 2a) subcylindrical, with pronounced linea thalassinica. Postorbital spine small, simple with one or several smaller spines mesially and several smaller spines along anterior border. Postantennal notch deep. Anterolateral margin spinulose, deeply notched just ventral to small branchiostegal spine. Branchiostegal spine supported by short ridge. Gastric region of carapace slightly convex, with five longitudinal carinae, including median carina interrupted by cervical groove; median carina high, irregular denticulate anteriorly, anterior section of median carina starting slightly posterior to level of postantennal notch; submedian carinae indistinct, short, minutely denticulate; lateral carinae distinct, minutely denticulate, slightly diverging posteriorly, each beginning from just level of postantennal notch, not extending to cervical groove. Posterior section of median carina extending to posterodorsal margin of carapace. Cervical groove conspicuous, short, not extending onto lateral face of carapace. Posterior part of dorsal surface with scattered minute granules laterally. Lateral surface ventral to linea thalassinica with scattered granules (granules more numerous in anterior part). Dorsal and lateral surface irregularly tuberculate, with dense short setae.

First abdominal somite (Fig. 1, 2a) unarmed on anterodorsal border; dorsal surface with faint transverse ridge and three longitudinal carinae. Second to fifth abdominal somites with three distinct longitudinal dorsal carinae each in posterior 3/4; pleura rounded ventrally. Sixth somite (Fig. 2a) without trace of median carina and with low, somewhat squamiform tubercles on mediodorsal line and on either side of mediodorsal line; pleuron smooth marginally; posterolateral process blunt.

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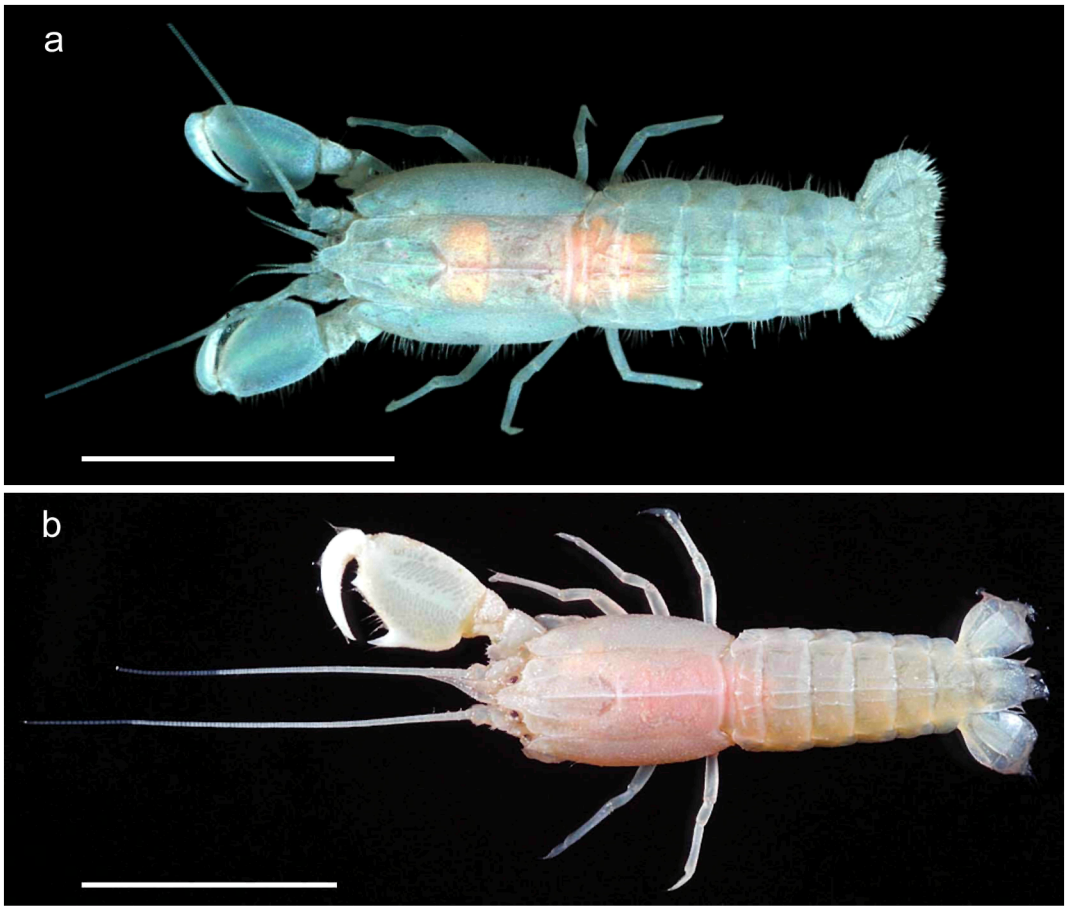

FIGURE 1. *Naushonia carinata* **n.sp.**, live specimens in dorsal view. a, holotype ZMMU Ma 5471 (photo: O. Savinkin); b, female from Panglao I. NMCR 27006 (photo: Tin-Yam Chan). Scale bar is 1 cm.

Telson (Fig. 3c) broadly rounded distally, with variable number of lateral spines on posterior half, 1.5 times longer than broadest part; small scale-like spines scattered on dorsal side, more dense on posterior half; posterior half with faint median groove, and numerous plumose and longer simple marginal setae distally, and some setae subdistally. Uropod with spiny, transverse suture. Exopod with variable numbers of lateral spines at distal half proximal to suture, ending in large spine; upper surface with low, branched ridge, lateral ending proximal to suture with several small spines, median ridge continuing to distal margin. Endopod with variable number of lateral spines proximal to suture, low middorsal ridge with several spines. Both exopod and endopod with numerous setae, including long plumose setae marginally, and shorter simple setae on ridges and dorsal surface.

Ocular peduncle (Fig. 3d,e) short, wider than long, armed with small tubercle at distomesial angle; cornea feebly pigmented, visible in dorsal view.

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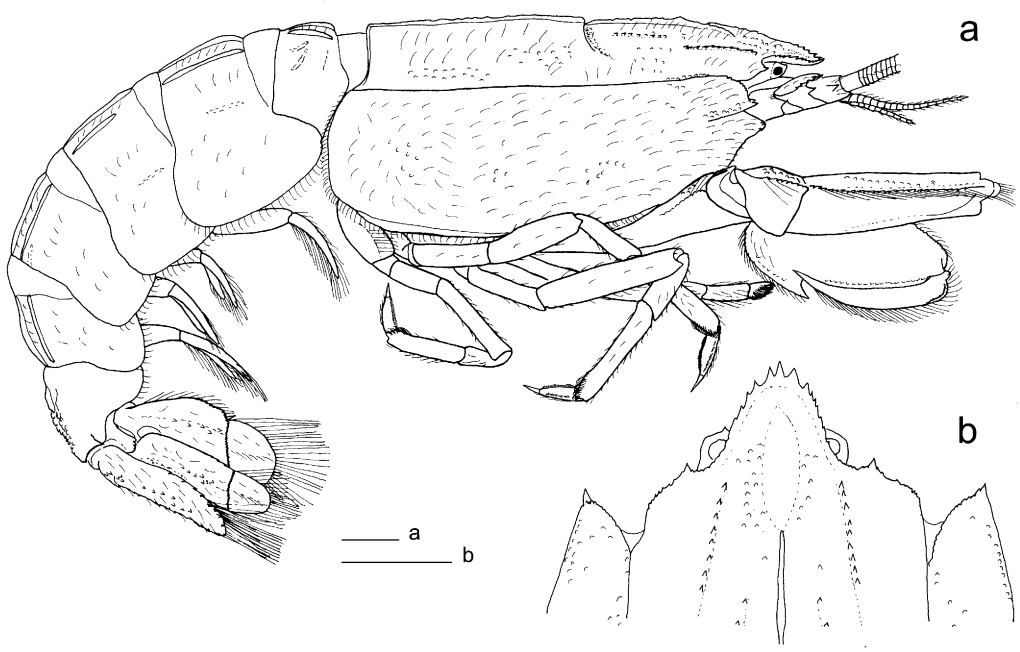

FIGURE 2. *Naushonia carinata* **n.sp.** holotype ZMMU Ma 5471. a, habitus, lateral aspect; b, front, dorsal aspect (setation omitted). Scale bar is 1 mm.

Antennular peduncle (Fig. 3f,g) short, reaching almost to distal margin of fifth article of antennal peduncle. Basal article not visible in dorsal view, with one conspicuous blunt spine on distolateral margin, a row of small spines and one larger median spine on distoventral margin, one spine on ventromesial margin; statolith opening on ventral side closed by plumose setae. Penultimate article armed with one distolateral spine. Ultimate article with distolateral angle unarmed. Lateral flagellum longer than peduncle, composed of 14–19 segments; mesial flagellum about 0.6 length of lateral flagellum, composed of 9–11 segments.

Antennal peduncle (Fig. 3h, i) stout. First article with unarmed margins. Second article armed with row of three small spines on ventrodistal margin and one strong spine on ventrolateral margin. Third article with one small ventromesial spine. Fourth and fifth articles each with one strong distolateral and one mesial spine. Flagellum somewhat shorter than body, stout, with dense annulation. Antennal scale broad, with strongly convex mesial margin with plumose setae; lateral margin convex, with four to eight spines increasing slightly in size over almost entire length; dorsal surface with low longitudinal carina and some setae.

Mandible (Fig. 4a,b,c) with molar and incisor processes fused, forming angle to fit palp; incisor process with two large and numerous smaller teeth, molar process with one strong tooth. Palp two-articulated (proximal two articles fused), scattered plumose setae on proximal article, distal article ending in rounded tip, with dense short, serrated setae.

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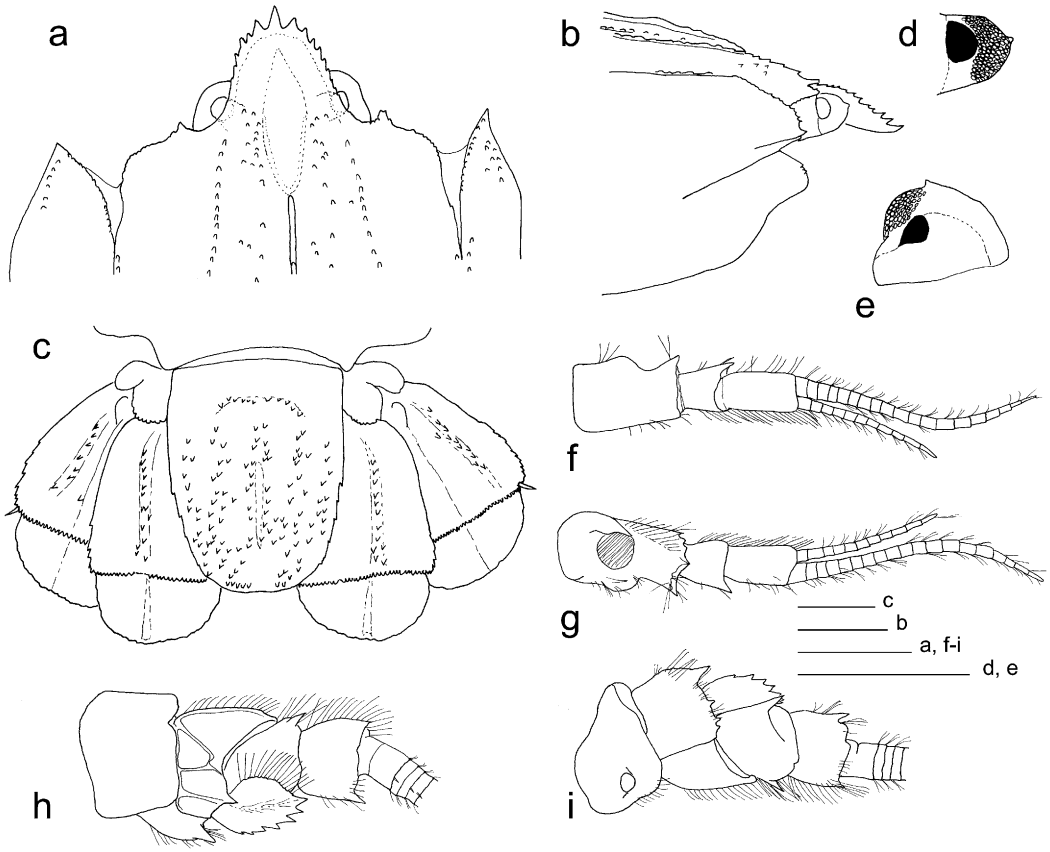

FIGURE 3. *Naushonia carinata* **n.sp.** paratype NHMW 21470. a, front, dorsal aspect (setation omitted); b, front, lateral aspect (setation omitted); c, tailfan, dorsal aspect (setation omitted); right eyestalk in lateral (d) and ventral (e) view; right antennula in dorsal (f) and ventral (g) view; right antennal peduncle in dorsal (h) and ventral (i) view. Scale bar is 1 mm.

Maxillule (Fig. 4d) with palp biarticulated, proximal article with four spiniform setae distally; distal article slender, cylindrical, devoid of setae. Proximal endite wide, anterior margin concave, short serrate setae on distal angle and dense plumose setae on anterior margin, long plumose setae on posterior margin; distal endite elongate, terminally truncate, armed with serrate setae on anterior margin, simple setae on anterolateral margin, and long plumose setae distally.

Maxilla (Fig. 4e) with elongate palp bearing lateral and distal setae; distal endite deeply bilobed, with setae, dorsal lobe wider than ventral, both lobes with simple setae; medial endite elongate, with apical setae; proximal endite large, square, with subterminal, terminal and lateral setae. Scaphognathite longer than wide, with marginal plumose setae; anterior lobe well developed, wide, rounded; posterior lobe trapezoid, with truncate distal tip furnished with very long setae.

First maxilliped (Fig. 4f) with bilobed basipod; both proximal and distal lobe with numerous marginal plumose setae and plumose setae on lateral face. Endopod

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biarticulated, with distal article expanded and triangular in shape. Exopod two-articulated, basal article expanded distally (caridean lobe), bearing long, plumose setae on lateral margin, second article elongate, devoid of setae; flagellum with long simple setae, about same length as second article. Epipod large, triangular, with small hooks on entire surface, including margins.

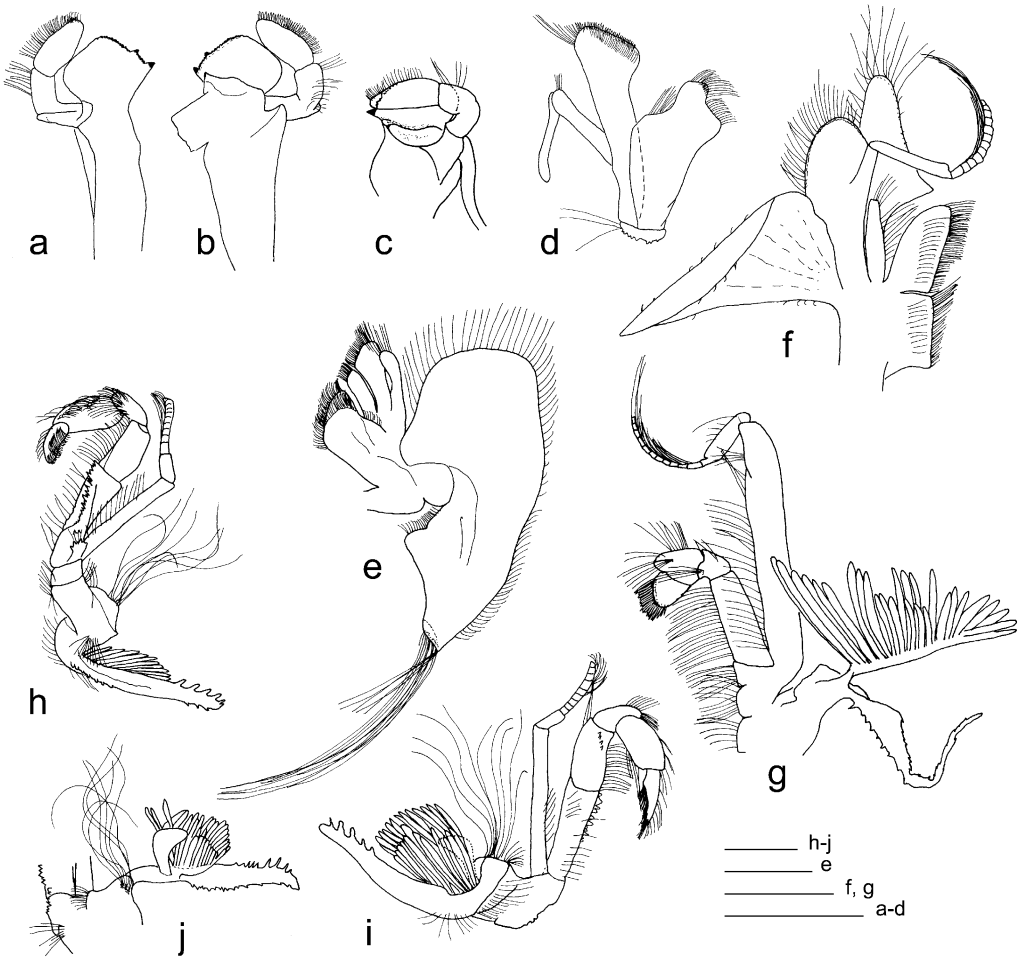

FIGURE 4. *Naushonia carinata* **n.sp.** paratype NHMW 21470. Right appendages, a, b, c, mandible; d, maxillula; e, maxilla; f, first maxilliped; g, second maxilliped; h, i, j, third maxilliped; a, c, h, lateral face; b, d, e, g, mesial face; i, posteriomesial view; c, dorsomesial view. Scale bar is 1 mm.

Second maxilliped (Fig. 4g) with five-articulated endopod; second article longest, basal and next two articles with long, plumose setae, distal two articles with stout serrate setae. Exopod two-articulated; proximal article 0.6 length of exopod, with plumose setae; distal article short, distinctly flexed against proximal article, flagellum longer than distal article, with long simple setae, increasing in size distally. Epipod long, narrow, with serrate margin and podobranch.

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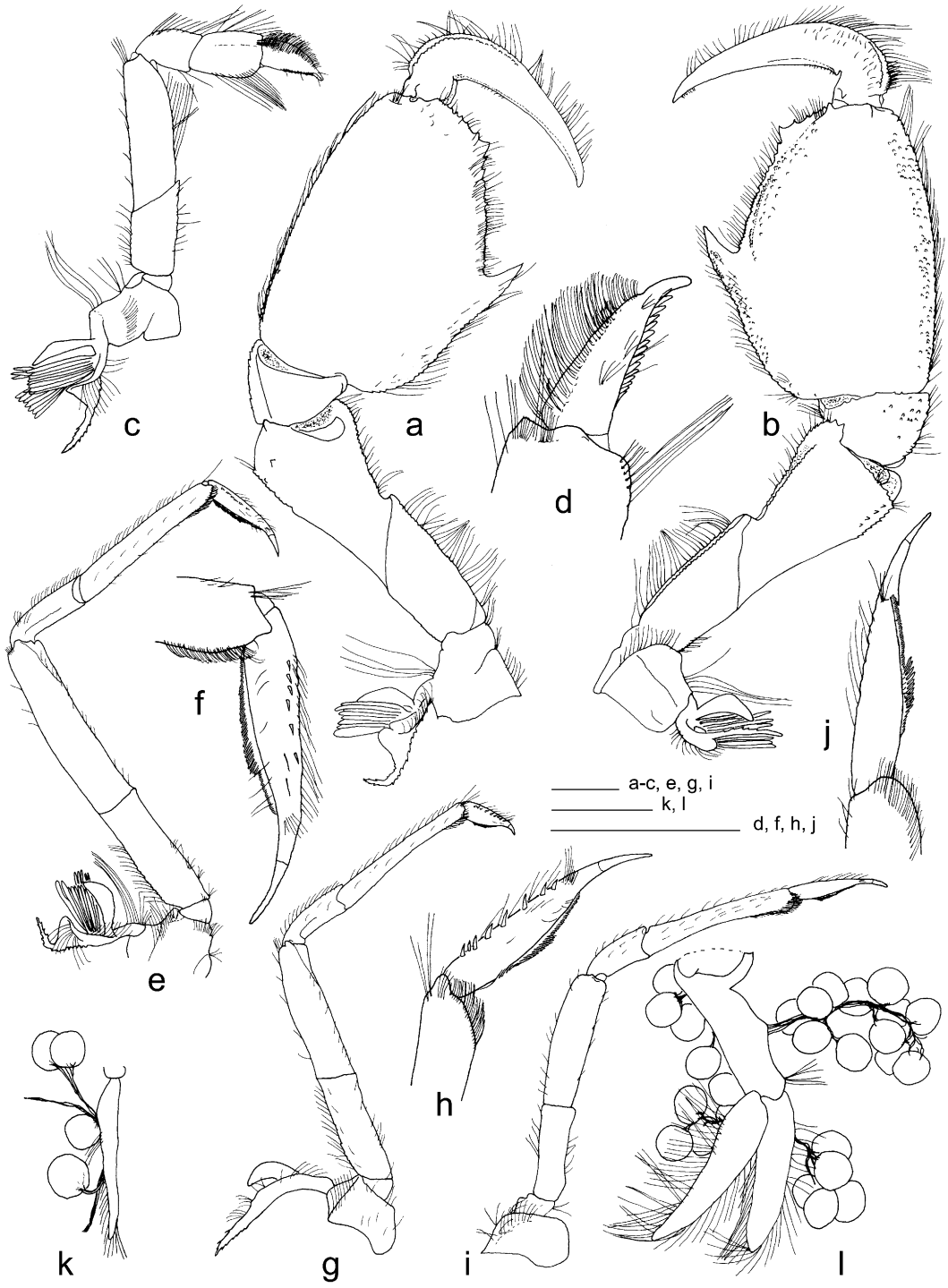

FIGURE 5. *Naushonia carinata* **n.sp.** paratype NHMW 21470. Right appendages, a, b cheliped; c, d, second pereopod; e, f, third pereopod; g, h, fourth pereopod; i, j, fifth pereopod; k, first pleopod; l, second pleopod; a, ventral face; b, dorsal face; c, e, g, i, lateral face; f, h, j, detail of dactylus in lateral view; k, l, posterior view. Scale bar is 1 mm.

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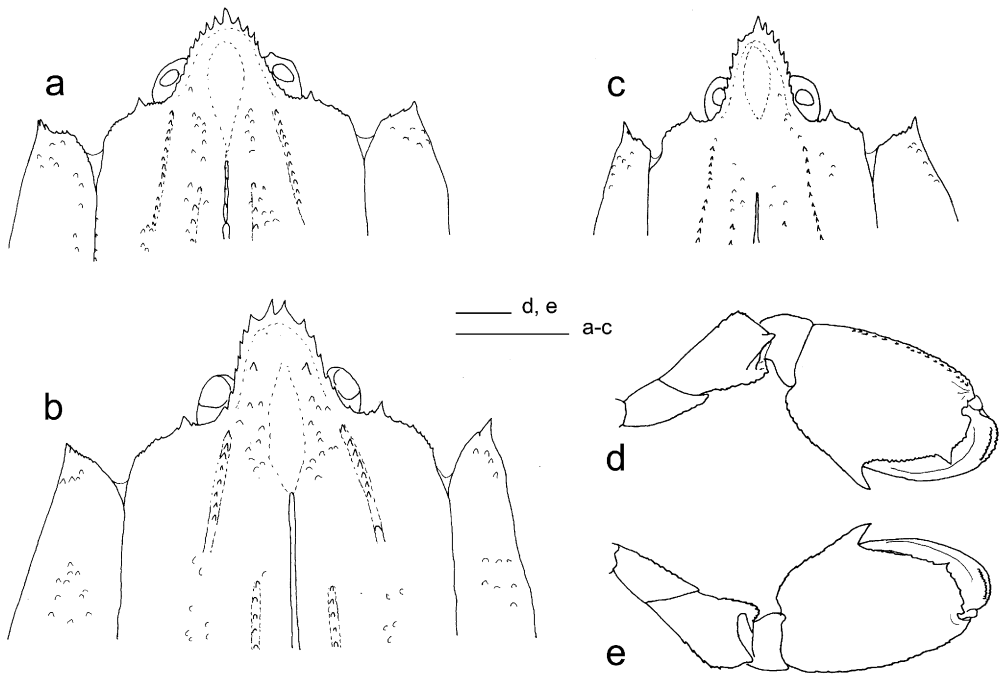

FIGURE 6. *Naushonia carinata* **n.sp.** a, NHMW 21471, front in dorsal view; b, NMCR 27006, front in dorsal view; ZMMU Ma 5472, front in dorsal view (c), left (d) and right (e) cheliped in ventral view. All setation omitted. Scale bar is 1 mm.

Third maxilliped (Fig. 4 h,i) with endopod composed of five articles; coxa with setobranch composed of numerous long setae; basis with row of spinules on ventromesial margin; ischium broadened distally, with low spinules on ventrolateral margin and row of acute, unequal teeth (crista dentata) on ventromesial margin; merus with few distal spinules on ventrolateral margin; carpus short, with dorsodistal margin somewhat projecting; propodus subequal in length to dactylus; dactylus with thick cluster of long setae extending to lateral face; exopod two-articulated, proximal article overreaching ischium, distal article very short, distinctly flexed against proximal article; flagellum short, but well-developed; epipod very large, with mastigobranch and denticulate dorsal margin (Fig. 4j); podobranch well developed.

First pereopods (Figs. 5a,b, 6c,d) strong, subchelate, equal in size, symmetrical in shape, flattened dorsoventrally. Ischium broadened distally, with row of small tubercles on ventromesial and dorsomesial margin. Merus broadened distally, section nearly triangular; dorsodistal margin with row of spinules laterally; distomesial angle produced in rounded lobe, bearing marginal spinules; lateral margin sharply carinate, minutely tuberculate, with row of spinules distodorsally; mesial face narrow, granular, dorsomesial margin delimited by row of minute granules extending onto dorsal surface distally, ventromesial margin delimited with row of spinules, continuing to distomesial lobe; ventral surface bluntly

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elevated along midline, ventrolateral face with short ridge distally. Carpus short, surfaces granular except for ventral surface; dorsolateral, ventrolateral and ventromesial margins well defined, dorsolateral and distal margins with spines. Propodus approximately elliptical in cross-section, 1.2 to 1.3 times as long as wide (including fixed finger), about same length as ischium and merus together; dorsal surface granular near margins, slightly elevated along midline; dorsolateral margin carinate, with two rows of tubercles, with sparse setae; ventromesial margin carinate, minutely tuberculate, with row of sparse setae; ventromesial margin with row of sharp teeth on distal half, proximal half minutely denticulate; fixed finger at midlength of propodus small, twice as long as wide at its base, directed distally. Dactylus slender, with noticeably expanded lateroproximal margin, closing completely against distomesial margin of propodus; mesial margin sharply carinate, lateral margin with two rows of turbercles proximally, row of setae becoming more sparse distally.

Second pereopod (Fig. 5c) shortest, stout, simple. Merus with row of long setae on ventral margin. Carpus about 0.3 times as long as merus. Propodus 1.5 times as long as carpus, with long setae on ventral surface. Dactylus (Fig. 5d) lanceolate, terminating in slender unguis; dorsal surface with dense, short to long serrate setae; ventral margin with comb of 11–13 corneous spinules.

Third to fifth pereopods (Fig. 5e,g,i) generally similar, but decreasing in length towards posterior. Third pereopod with some granules on dorsal margin of ischium; merus slightly narrowed distally, 4.2 times as long as greatest width, unarmed; carpus about half length of merus, unarmed; propodus with sparse setae on dorsal margin; dactylus (Fig. 5f) 0.6 times as long as propodus, 6.7 times as long as greatest width, terminating in slender corneous unguis, armed with 2–6 stout setae on lateral face adjacent to dorsal margin; dorsal margin of dactylus with row of setae; ventral margin with comblike, toothed lamella on proximal 3/4 of length, teeth successively becoming larger in first quarter, ending abruptly in about 0.4 width of dactylus, and continuing by numerous subequal teeth of about same size as most proximal teeth, from mid-length to about 2/3 dactylus length. Fourth (Fig. 5g) and fifth (Fig. 5i) pereopods similar to third but somewhat shorter, dactylus of fourth (Fig. 5h) with three to eight stout setae, dactylus of fifth (Fig. 5j) without stout setae.

Branchio-exopodal formula as shown in Table 1.

TABLE 1. Branchial formula for *Naushonia carinata* **n.sp.**

	Mxp1	Mxp2	Mxp3	P1	P2	P3	P4	P5
arthrobranchs	-	2	2	2	2	2	2	-
podobranchs	-	1	1	1	1	1	-	-
epipods	1	1	1	1	1	1	1	-
mastigobranchs	-	-	1	1	1	1	1	-
exopods	1	1	1	-	-	-	-	-

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First pleopod absent in male; in female small, simple and composed of only one article (Fig. 5k).

Second to fifth pleopods (5l) biramous, rami lanceolate, subequal, lacking appendix interna; appendix masculina absent on male second pleopod.

Ovigerous female (NHMW 21470) carries about 180 embryos with diameter ranging from 350 to 420 μm.

Variations. The number of spines of the antennal scale, the number of stout setae on dactyli of P2–P4, and the number of spines on lateral borders of the telson and uropods may vary slightly within individuals between the left and the right side, and also between individuals. Similar variation also exists for the serration of the anterior margin of the carapace and the spines and tubercles on dorsal surfaces of the carapace and telson. The shape of the rostrum is also variable: it is broad (width at base/length = 0.7–0.8) in females (Figs 2b, 3a, 6a, b) and narrow (width at base/length = 1.1) in the single male (Fig. 6c).

Etymology. The name *carinata* refers to the longitudinal dorsal carinae on the second to fifth abdominal somites.

Colour. Whitish, yellow-orange ovaries dorsally visible through semitransparent carapace and first abdominal somite (Fig. 1).

Type locality. Nha Trang Bay, Vietnam, South China Sea.

Distribution. Known only from the type locality and Panglao Island, Philippines.

Remarks. The new species differs from all members of the genus *Naushonia* by the carinae on the abdominal somites and the shape of the chelipeds which have a broad propodus with rounded lateral and mesial margins. The cheliped propodus has a length to width ratio (PL/PB including fixed finger) of 1.2–1.3, and is so much broader than in *N. perrieri* (PL/PB 1.5; Ngoc-Ho, 1996: figs 1c, d), *N. macginitiei* (PL/PB 1.5; Glassell, 1938: fig. 1), *N. crangonoides* (PL/PB 1.5–2.2; Thompson, 1903: pl.1 figs 1, 17; Goy & Provenzano, 1979: fig. 7A; Williams, 1984: fig. 132b), *N. portoricensis* (PL/PB 1.7; Chace, 1939: fig. 3), *N. japonica* (PL/PB 1.9; Komai, 2004:fig. 3C, D), *N. lactoalbida* (PL/PB 1.7–2; Berggren, 1992: fig. 5D, E; Komai, 2004: fig. 6A, B) and *N. panamensis* (PL/PB 2.3; Martin & Abele, 1982: fig. 3E). The new species can be separated from *N. perrieri*, *N. japonica* and *N. lactoalbida* by the armature of the dorsolateral margin of the propodus: this margin is smooth in the first two species and spiny in the last species, which also has strong spines on the margins of the P1 merus. With respect to the carapace, *N. carinata* **n.sp.** is most similar to *N. japonica*, but differs from it by the much larger teeth on the rostrum, less distinct submedian carinae and the telson dentition. The telson is similar to *N. lactoalbida*.

A comparison of gill formulae is difficult due to confusing terminology, especially in the definition of "mastigobranch". For *Laomedia astacina*, Sakai (1962: 31, pl. 7, fig. 23) used the term mastigobranch only for the proximal lobe on P4, calling the distal lobe "first epipodite" and the proximal lobe "second epipodite" in Mxp2 to P3. In *Naushonia crangonoides*, the term has been applied for the distal lobe of the epipod by Thompson

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(1903: 5, figs 9, 14–16) and Goy & Provenzano (1979: 347); the latter authors mention a "small anterior lobe" on Mxp3 only. Berggren (1992: 520, figs 5A, C) interpreted the small anterior lobe on Mxp 3 in *N. lactoalbida* as "unknown process or malformed branchia". In Caridea, the mastigobranch is equal to what is also known as strap-like epipod (e.g., Chace, 1988). When viewing the different species applying the terminology of Batang et al. (2001), defining the mastigobranch as the anterior (proximal) lobe, the gills seem to be very similar among the species of *Naushonia* and other laomediids. *Naushonia carinata* **n.sp.** and *N. portoricensis* differ from *N. crangonoides* by lacking an arthrobranch on Mxp1, this is present also in *Jaxea nocturna* (Astall et al., 1997; NHMW 299) and *Laomedia healyi* (Wear & Yaldwyn, 1966; NHMW 19596).

Unclear is the shape of the female first pleopod. Superficially it appears to be composed of two articles on the left side of the paratype female (NHMW 21470). Under the compound microscope, however, no articulation is visible, also in none of the other females and also not in *N. portoricensis* (NHMW 20718). Ngoc-Ho (1996), described the first female pleopod of *N. perrieri* as biarticulated. Thompson (1903) mentioned that in *N. crangonoides* this appendage is "uniramous, slender, tapering, one basal and several apical joints". For all other species the female Plp1 was neither described nor figured, although in some cases only males were available. In both *Laomedia healyi* (NHMW 19596/1) and *Jaxea nocturna* (NHMW 311), the female Plp1 consists of two articles. The same situation has been described for *Laomedia astacina* by Sakai (1962), whereas Ngoc-Ho & Yaldwyn (1997) described the female Plp2 of *L. barronensis* as "uniramous....with basis and articulated distal part", and Ngoc-Ho (1997) that of *L. paucispinosa* as biarticulated.

A variation in the number of stout setae on dactyli of P3 and P4, as well as that of the lateral margins of the telson, have been also observed in *N. crangonoides*, *N. portoricensis* and *N. macginitiei* (Goy & Provenzano, 1979). Alvarez et al. (2000) also remarked on the asymmetry in the number of spines on various regions of the carapace, uropods and telson in *N. lactoalbida* and *E. manningi*.

Members of the genus *Naushonia* are considered burrowing, like all the other laomediids. For instance, *N. crangonoides* has been found in sand in shallow water (Goy & Provenzano, 1979), *N. panamensis* on a mudflat near mangroves (Martin & Abele, 1982), *N. macginitiei* in the intertidal under stones (Glassell, 1938), *N. lactoalbida* in sand/ coral gravel (Berggren, 1992), and *N. portoricensis* under large rock on sand near seagrass and mangroves (present study). Komai (2004) reported *N. japonica* from a burrow under rock in sandy mud, in a depth of 7 m and *N. lactoalbida* from the intertidal, as well as from a burrow under coral rock in coral sand, in 8 m deep water.

Naushonia carinata **n.sp.** is the first laomediid species, which appears to be associated with another thalassinidean shrimp. All specimens were obtained always during the first sucking action exerted to the mound of the callianassid *Glypturus armatus*. It is unclear, however, whether the smaller *Naushonia* lives in the burrow of the much larger (body length up to 140 mm) *Glypturus*, has its own burrow connected to that of *Glypturus*, or

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was simply sucked up with all the sediment surrounding the *Glypturus* mound area. The specimen from Panglao was collected from a mound together with a specimen of the ocypodid crab *Macrophthalmus* sp. and a phenacolepadid gastropod. On the other hand, an independent finding of specimens of *N. carinata* **n.sp.** in Vietnam and the Philippines suggests that the first two possibilities are more likely. An example of a mudshrimp connecting its burrows to that of another mudshrimp is offered by *Wolffogebia phuketensis* Sakai, 1982 (Upogebiidae), which usually digs its burrow into the side walls of the particularly spacious and deep burrows of the mudlobster *Thalassina anomala* Herbst, 1804 (Thalassinidae) (Ng & Kang, 1988).

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