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DEEP-SEA SHRIMP (CRUSTACEA: DECAPODA: CARIDEA) FROM THE ANTARCTIC SEA COLLECTED DURING THE JARE-35 CRUISE

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Abstract: This paper reports on four deep-sea species of caridean shrimp collected during the JARE-35 cruise in the Indian Ocean Sector of the Antarctic Ocean: *Nematocarcinus lanceopes* BATE, 1888 (Nematocarcinidae); *Chorismus antarcticus* (PFEFFER, 1887) (Hippolytidae); *Lebbeus antarcticus* (HALE, 1941) (Hippolytidae); *Notocrangon antarcticus* (PFEFFER, 1887) (Crangonidae). A small collection taken during the JARE-26 cruise, containing *C. antarcticus* and *N. antarcticus*, is also included. The identification of the present specimens with *N. lanceopes* was confirmed in comparison with the syntypes. Eight of 40 syntypes of *Acanthephyra antarctica* BAGE, 1938 were also reexamined, and its identity with *N. lanceopes* was confirmed. Three syntypes, one male and two females, of *N. lanceopes*, which are now in poor condition, were redescribed; and other material enabled us to complete the description of *N. lanceopes*. Three other species were also described and illustrated in detail to supplement previous knowledge on morphology of these species.

1. Introduction

Ten benthic decapods, including one unidentified *Nematocarcinus*, have hitherto been known from the Antarctic zone (Table 1). All but three belong to the infraorder Caridea: one polychelid lobster, *Stereomastis shumi* BATE, 1878 (TIEFENBACHER, 1994), and two anomuran, *Paralomis birshteini* MACPHERSON, 1988 (previously identified with *Paralomis spectabilis* HANSEN, 1908, by BIRSHTEIN and VINOGRADOV (1967)) and *Lithodes murrayi* HENDERSON, 1888 (KLAGES *et al.*, 1995) are Antarctic representatives of the Reptantia.

In the 1993–94 austral summer, during the 35th Japanese Antarctic Research Expedition (JARE), beam trawl sampling was conducted at six stations in the Indian Ocean sector by the icebreaker SHIRASE (Table 2). The decapod material comprises 26 specimens taken from three stations in depths ranging between 322 and 2430 m. Four species belonging to three families and four genera of caridean shrimp have been identified: *Nematocarcinus lanceopes* BATE, 1888 (Nematocarcinidae); *Chorismus antarcticus* (PFEFFER, 1887) (Hippolytidae); *Lebbeus antarcticus* (HALE, 1941) (Hippolytidae); *Notocrangon antarcticus* (PFEFFER, 1887) (Crangonidae). Material collected in the Breid Bay and Gunerus Bank during the JARE-26 cruise is also included (Table 2).

Table 1. List of benthic decapod Crustacea previously known from the Southern Ocean southward to the Antarctic Convergence.

Infraorder/Family/Species
Infraorder Caridea
Family Nematocarcinidae
Nematocarcinus lanceopes BATE, 1888
N. antarcticus (BAGE, 1938)
N. longirostris BATE, 1888 (recorded by ZARENKOV, 1968)
N. sp. (recorded by ZARENKOV, 1968)
Family Hippolytidae
Chorismus antarcticus (PFEFFER, 1878)
Lebbeus antarcticus (HALE, 1941)
Eualus kinzeri TIEFENBACHER, 1990a
Family Crangonidae
Notocrangon antarcticus (PFEFFER, 1878)
[Synonym: *Notocrangon antarcticus* var. *gracilis* BORRADAILE, 1916]
Infraorder Palinuridea
Family Polychelidae
Stereomastis suhmi BATE, 1878 (recorded by TIEFENBACHER, 1994)
Infraorder Anomura
Family Lithodidae
Paralomis birshteini MACPHERSON, 1988
[previously assigned to *P. spectabilis* HANSEN, 1908, by BIRSHTEIN and VINOGRADOV (1967)].
Lithodes murrayi HENDERSON, 1888 (recorded by KLAGES *et al.*, 1995)

Table 2. List of sampling data. Asterisks indicate stations where no decapod Crustacea were collected.

Station	Locality	Position	Depth (m)	Date	Local time
JARE-35 cruise					
E1	off Kronprins Olav Kyst, Enderby Land	67°59.1′ S, 41°55.6′ E/ 67°59.3′ S, 41°56.0′ E	363–342	12 Feb. 1994	1040–1054
E2	off Kronprins Olav Kyst, Enderby Land	67°43.0′ S, 41°13.1′ E/ 67°43.0′ S, 41°14.9′ E	2430–2230	12 Feb. 1994	1527–1549
E3*	off Kronprins Olav Kyst, Enderby Land	67°37.0′ S, 40°42.3′ E/ 67°36.3′ S, 40°39.7′ E	3060–3170	13 Feb. 1994	1331–1423
E4*	off Kronprins Olav Kyst, Enderby Land	67°43.4′ S, 44°28.6′ E/ 67°43.5′ S, 44°29.0′ E	345–322	15 Feb. 1994	1336–1343
A1*	Amundsen Bay	66°46.2′ S, 49°50.4′ E	1263–1212	20 Feb. 1994	1118–1144
P1	Prytz Bay	69°11.8′ S, 75°29.5′ E/ 69°12.2′ S, 75°29.9′ E	634–550	3 March 1994	0949–1009
JARE-26 cruise					
B7	Breid Bay	70°09.1′ S, 24°01.9′ E	295–310	27 Dec. 1984	–
B8	Breid Bay	70°08.5′ S, 24°16.8′ E	270	29 Dec. 1984	–
B9	Breid Bay	70°13.7′ S, 24°25.7′ E	276–289	11 Feb. 1985	–
G9	Günnerus Bank	68°23.5′ S, 34°07.5′ E	281–282	25 Feb. 1985	–

The taxonomy of the Indo-Pacific and Southern Ocean members of *Nematocarcinus* has remained little understood in spite of the existence of several recent studies (MACPHERSON, 1984; CHACE, 1986; TIEFENBACHER, 1990b; BURUKOVSKY, 1991). To clarify the systematic status of *N. lanceopes*, we have examined three syntypes deposited in the Natural History Museum, London. There is little doubt that our specimens belong to *N. lanceopes*. Further, the examination of eight of 40 syntypes of *Acanthe-*

phyra antarctica BAGE, 1938, has confirmed that this taxon is synonymous with *N. lanceopes*, as HALE (1941) suggested. These materials now enable us to complete the description of *N. lanceopes*. For the other three species, we also present detailed descriptions and illustrations to understand the morphology of each species adequately.

2. Materials and Methods

The sampling data are summarized in Table 2. The Agassiz-type beam trawl of 2 m opening was used for sampling during the JARE-35 cruise. It was improved by weighting with 220 kg; an iron chain of 7 m and carrying 4 iron balls 30 cm in diameter, totally 200 kg, was inserted between a wire and trawl; an iron ball of 20 cm diameter with chains of 0.5 m length, totaling 20 kg, was attached to the cod end of the trawl. This improvement enabled benthic sampling to be conducted to the abyssal depth of at least 3170 m, letting out only 3450 m length of wire.

Of six trials off Enderby Land and in Prytz Bay, three sites yielded 28 specimens of caridean shrimp. All but two specimens were immediately fixed in 10 % neutralized seawater formalin; two specimens of *Notocrangon antarcticus* were preserved in an ultra low temperate freezer for future chemical analysis. After returning to Japan, the specimens were transferred to 75% ethanol. They are deposited in the National Science Museum, Tokyo (NSMT) and Natural History Museum and Institute, Chiba (CBM). The postorbital carapace length (CL) was used as an indication of the size of specimens.

To clarify the taxonomic status of *Nematocarcinus lanceopes*, the three syntypes of *N. lanceopes* and eight syntypes of *Acanthephyra antarctica* were borrowed from the Natural History Museum (BM) and the Australian Museum (AM), respectively.

3. Systematics

Family Nematocarcinidae

Nematocarcinus lanceopes (BATE, 1888)

(Figs. 1–5)

Nematocarcinus lanceopes BATE, 1888: 804, pl. 131; HALE, 1941: 258; KIRKWOOD, 1984: 35, fig. 42; MACPHERSON, 1984: 72, fig. 17; TIEFENBACHER, 1990b: 232 (part), figs. 2, 3.

Acanthephyra antarctica BAGE, 1938: 6, pl. 4 fig. 1, 1a, b.

Not *Nematocarcinus lanceopes*: STEBBING, 1914: 44; CALMAN, 1925: 15. [=*Nematocarcinus sigmoideus* MACPHERSON, 1984)].

? *Nematocarcinus* sp.: ZARENKOV, 1968: 158.

? *Nematocarcinus* sp. (larvae): IWASAKI and NEMOTO, 1987: 16, fig. 5.

Material examined

Syntypes of *N. lanceopes*: 1 male (CL 27.8 mm), 2 ovigerous females (CL 28.2, 30.0 mm); Antarctic Ocean, 60°52′ S, 80°20′ E, 2268 m; 11 February 1874; Challenger Stn. 152; BM 1888: 22. Syntypes of *Acanthephyra antarctica* BAGE, 1938: 1 male (CL 24.4 mm), 7 females (CL ca. 25.5–31.0 mm; 1 specimen was too badly damaged to measure); Commonwealth Bay, Adélie Land, 67°S, 142°36′ E, 1463 m; 14 January 1914; Austra-

lian Antarctic Expedition, 1911–1914, Stn. AAE 6; AMP 11310. JARE-35 material: 1 male (CL 26.8 mm), off Kromprins Olav Kyst, Enderby Land, Stn. E2, CBM-ZC 1110; 2 males (CL 25.2 mm, 25.3 mm), 2 females (CL 26.5, 30.2 mm), same station, CBM-ZC 1111; 1 male (CL 27.4 mm), 1 female (CL 30.5 mm), same station, NSMT-Cr 11460.

Redescription of syntypes

Integument firm, glabrous.

Rostrum (Fig. 1A, D) damaged in all specimens; proximal part preserved in male specimen (proximal to level of distal end of antennular peduncle preserved) and fragments indicating presence of double row of pits on ventral surface; in male specimen, proximal part of rostrum without ventral tooth (Fig. 1D), but fragment broken off from female specimen (CL 30.0 mm) indicating posteriormost ventral tooth situated at level of articulation between distal and intermediate segments of antennular peduncle (Fig. 1A). Carapace (Fig. 1A) with slightly sinuous dorsal profile in lateral view; postrostral carina reaching to anterior two-fifths of carapace, bearing series of 4 or 5 basally articulated teeth posterior to level of orbital margin; postorbital ridge slightly curved ventrad, accompanying groove moderately deep; cervical and branchiocardiac grooves not particularly deep. Antennal and pterygostomial spines well developed, acute; anterolateral margin between antennal and pterygostomian spines slightly sinuous.

Abdomen (Fig. 1B) with pleura rounded on four anterior somites; third somite somewhat produced posteromedially; fifth somite with pleuron bearing sharp posteroventral tooth; sixth somite without tubercle on ventral surface. Telson (intact only in female specimen with CL 28.2 mm; Fig. 1G) 1.07 times as long as sixth abdominal somite, reaching distal margin of uropodal exopod, armed with 11 or 12 dorsolateral spines including 1 spine at posterolateral corner on either side, arranged in single row; posterior margin produced into blunt point, posterior spines missing.

Eyes generally subpyliform with cornea about as broad as long (Fig. 1D).

Antennular peduncle (Fig. 1A, D) with stylocerite reaching beyond level of about midlength of proximal segment, not particularly sharply notched in lateral view.

Antenna with scaphocerite (Fig. 1C) 0.71 or 0.78 times as long as carapace and 4.1 or 4.2 times as long as wide, distal margin of blade slightly overreaching distolateral tooth, lateral margin slightly sinuous.

Third to fifth pereopods missing in all specimens.

Male first pleopod (Fig. 1F) with endopod tapering distally, distal margin rounded; mesial margin strongly convex in general, with shallow notch at level of distal one-fourth of its length, adhesive hooks distributed distal to level of widest portion; ventral surface with conspicuous ridge running subparallel with posteromesial margin.

Sternal lobes of sixth thoracic somite in male (Fig. 1E) with lateral margins moderately well expanded; terminal spur very short in male, absent in females. Sternal lobes of seventh thoracic somite with lateral margins well expanded, strongly convex. Sternal lobes of eighth thoracic somite directed anterolaterally, with strongly convex lateral margin in male, less developed in females.

Supplemental description based on additional material

Rostrum (Fig. 2) slightly curving dorsad, typically far overreaching distal end of antennular peduncle, about as long as carapace (distal part broken off); dorsal margin

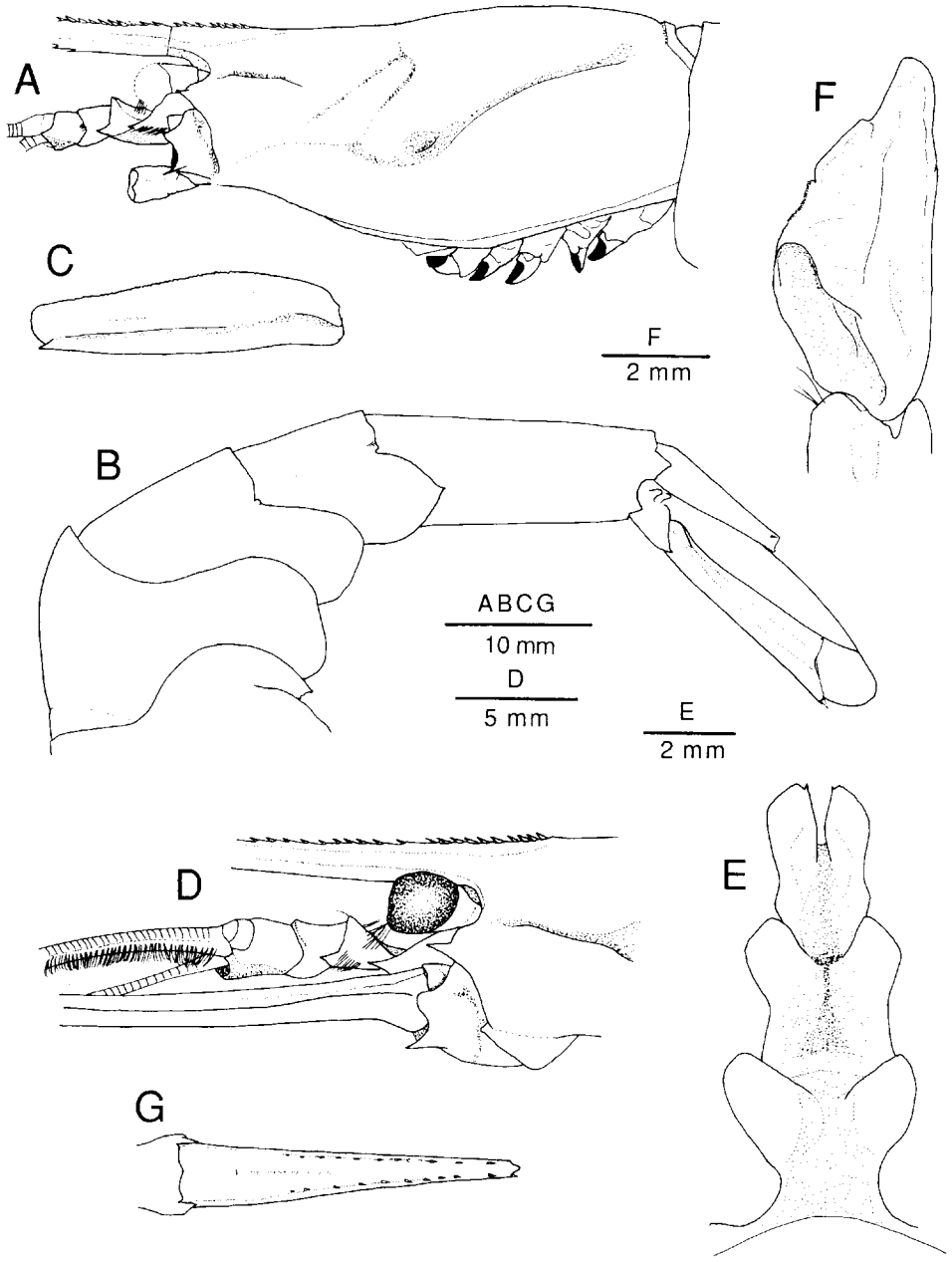

Fig. 1. Nematocarcinus lanceopes *BATE, 1888. Syntypes (BM 1888: 22). A–C, female (CL 30.0 mm); D–F, male (CL about 27.5 mm); G, female (CL 28.2 mm). A, carapace and cephalic appendages, lateral, corneal region of eye damaged and scaphocerite detached; B, posterior four abdominal somites, lateral, pleopods omitted, posterior part of telson broken off; C, left scaphocerite detached, dorsal; D, anterior part of carapace and cephalic appendages, lateral, branchiostegal area damaged, distal part of scaphocerite broken off; E, thoracic sternites of sixth to eighth somites, ventral; F, endopod of first pleopod, ventral; G, telson, dorsal.*

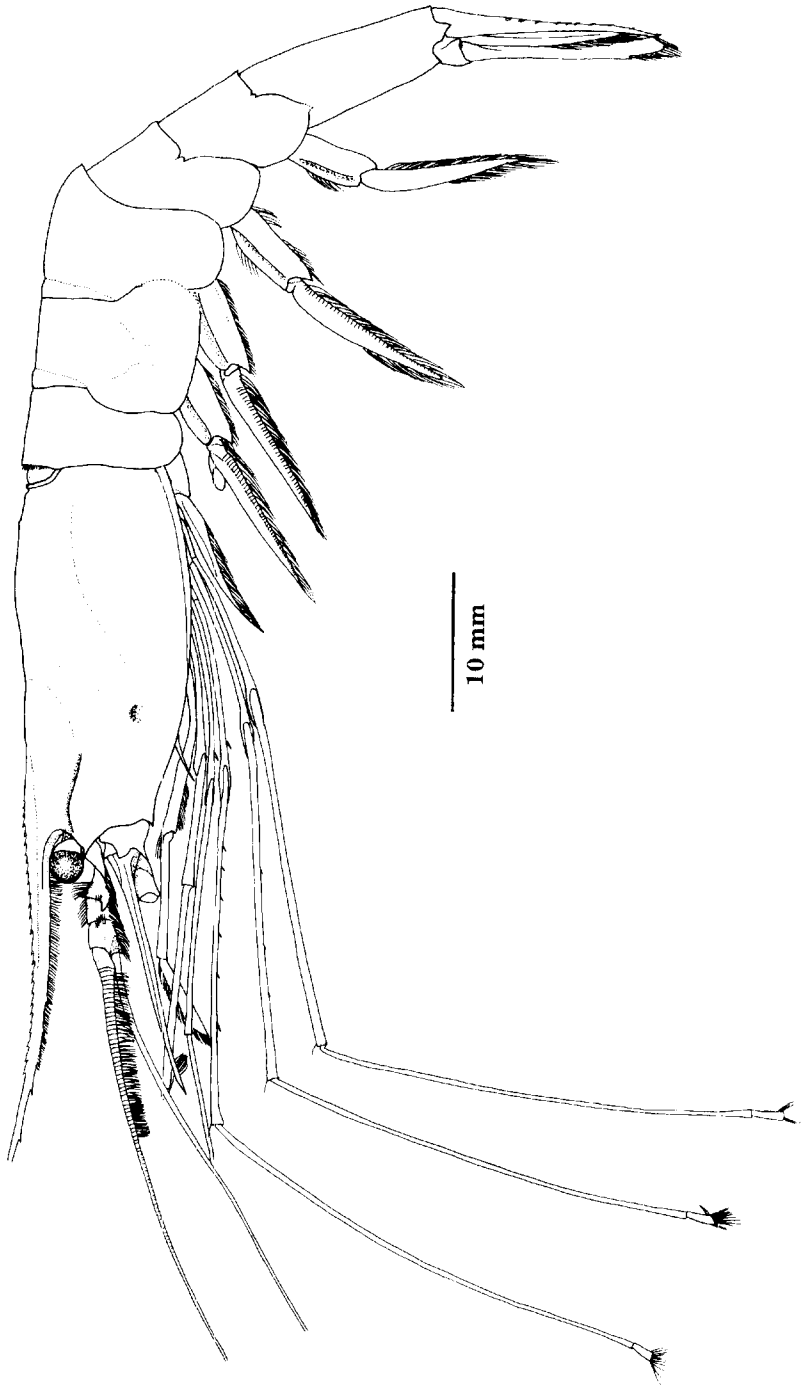

Fig. 2. Nematocarcinus lanceopes *BATE, 1888. Male from JARE-35 Stn. E2 (CL 26.8 mm; CBM-ZC 1110). Entire animal in lateral view.*

armed at least with 27 small, basally articulated teeth except for several distal ones without basal suture, becoming more widely spaced anteriorly, including 3 or 4 (rarely 5) teeth on carapace posterior to level of orbital margin; ventral margin armed at least with 4 or 5 teeth, posteriormost tooth situated distal to level of intermediate or distal segment of antennular peduncle, and with double row of setae extending to level of distal end of antennular peduncle.

Telson (Fig. 2) slightly falling short of or reaching beyond distal end of exopod of uropod, 1.03–1.12 times as long as sixth abdominal somite, armed typically with 11–13 dorsolateral spines including 1 spine at posterolateral corner on either side, arranged in single row (5 examples available); posterior margin produced into blunt point, with 2 pairs of spines, lateral pair more than twice as long as mesial pair.

Antenna with scaphocerite (Fig. 2) 0.69–0.79 times as long as carapace and 3.9–4.4 times as long as wide.

Mandible (Fig. 3A) with well developed incisor process bearing some 10 teeth on mesial margin; molar process massive, mesial surface oblique, with 2 sharp ridges, proximal ridge with fringe of setae, terminal margin toothed; palp three-articulated, well flexed. Maxillule (Fig. 3B) with proximal endite very broad, with cluster of spines at distal margin, anterior margin strongly sinuous, with row of setae; distal endite strongly curved mesially, distal margin subtruncate; palp weakly bilobed terminally, internal lobe with 1 apical spine and 1 seta. Maxilla (Fig. 3C) with proximal endite distinctly bilobed; distal endites much broader than proximal endite; palp falling far short of anterior margin of distal endite, with 2 apical and 2 subapical setae; scaphognathite with posterior lobe considerably elongate, with row of setae becoming noticeably long posteriorly. First maxilliped (Fig. 3D) with proximal endite thickened; distal endite ovate in general, mesial margin strongly twisted, with concave row of setae on external surface; palp long, reaching level of anterior margin of caridean lobe; caridean lobe perpendicular to horizontal plane of appendage, moderately broad; exopod well developed; epipod large, distinctly bilobed. Second maxilliped (Fig. 3E) with endopod seven-articulated; exopod well developed; epipod with well developed podobranch. Third maxilliped (Fig. 3F) slightly falling short of distal end of scaphocerite; ultimate segment approximately 0.9 times as long as penultimate segment, strongly compressed laterally; antepenultimate segment with row of 9 or 10 small spines ventrolaterally or laterally and with 2 subdistal spines on ventral corner; exopod well developed.

First pereopod (Fig. 3G) with merus-carpus articulation slightly falling short of or reaching distal end of proximal segment of antennular peduncle, overreaching distal end of scaphocerite by length of chela. Chela (Fig. 3H) 0.25–0.33 times as long as carpus, with dactyl approximately half length of palm. Merus armed with 1or 2 ventrolateral spines subproximally. Ischium armed with 3 lateral spines, 1 subdistal and 2 subproximal.

Second pereopod (Fig. 5A) detached from all specimens examined. Chela (Fig. 5 B) 0.18–0.20 times as long as carpus, with dactyl slightly exceeding half length of palm. Carpus 1.24–1.50 times as long as merus. Merus armed with 3–5 lateral spines in proximal three-fifths. Ischium with 4 lateral spines, 1 subdistal and 3 subproximal.

Third to fifth pereopods (Fig. 2) moderately long for genus. Third pereopod (Fig. 4A) with merus slightly overreaching distal end of scaphocerite and with merus-ischium

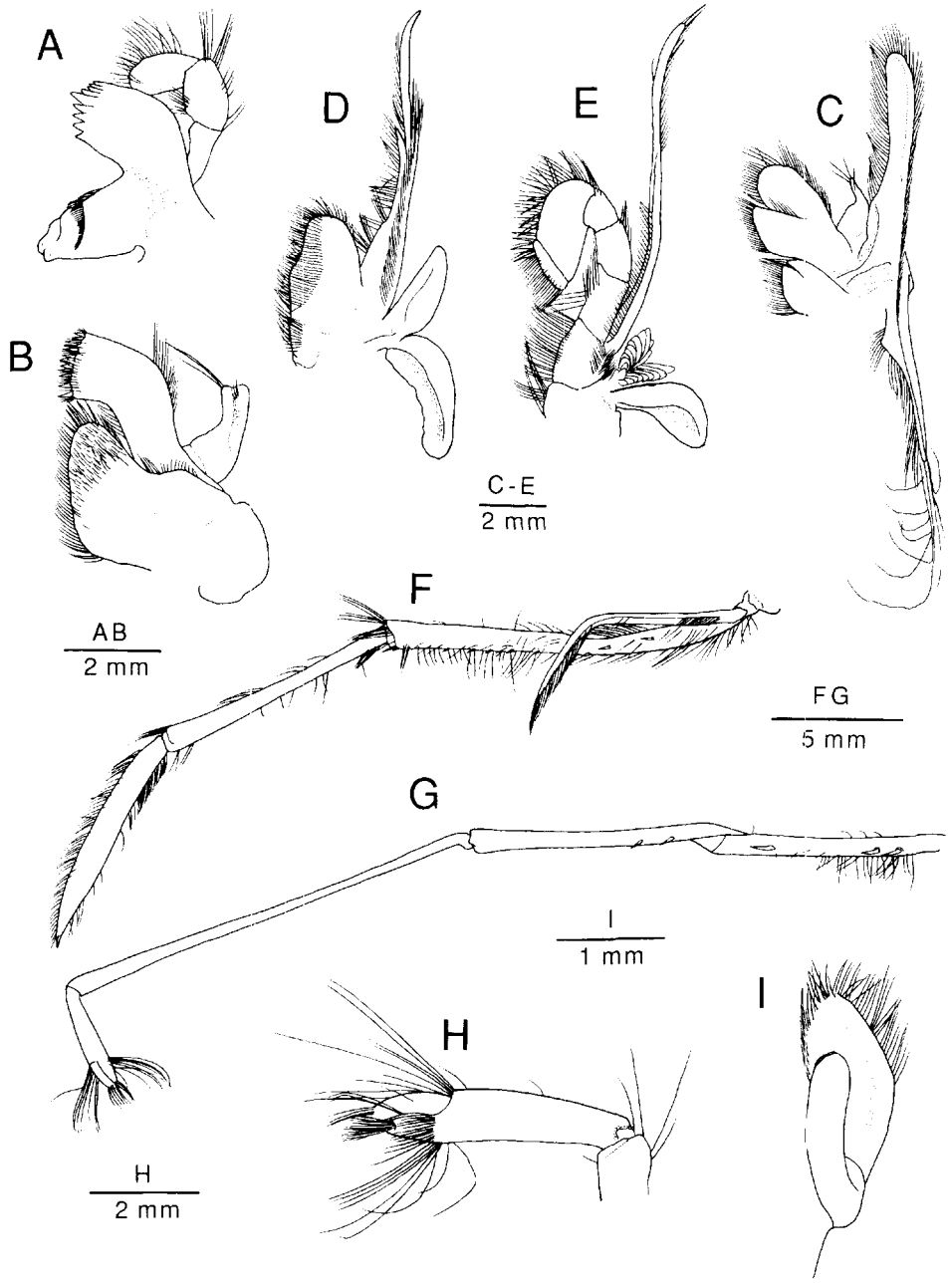

Fig. 3. Nematocarcinus lanceopes *BATE, 1888. Male from JARE-35 Stn. E2 (CL 26.8 mm; CBM-ZC 1110). All appendages dissected from left side. A, mandible, external; B, maxillule, external; C, maxilla, external; D, first maxilliped, external; E, second maxilliped, external; F, third maxilliped, lateral; G, first pereopod, distal four segments, lateral; H, same, chela, lateral; I, appendix interna and appendix masculina, mesial.*

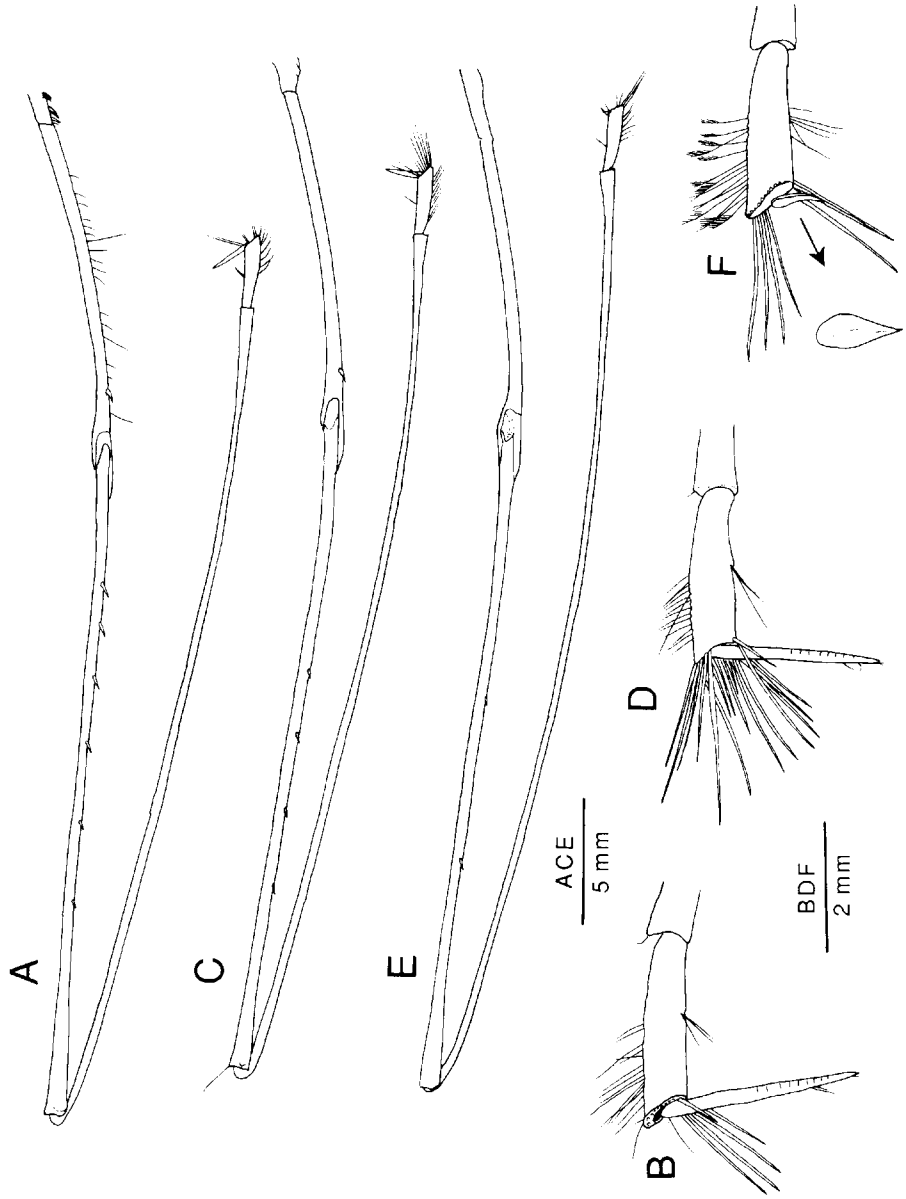

Fig. 4. Nematocarcinus lanceopes *Bate, 1888. Male from JARE-35 Stn. E2 (CL 26.8 mm; CBM-ZC 1110). All appendages dissected from left side. A, third pereopod, lateral; B, same, dactyl and propodus, lateral; C, fourth pereopod, lateral; D, same, dactyl and propodus, lateral; E, fifth pereopod, lateral; F, same, dactyl and propodus, lateral.*

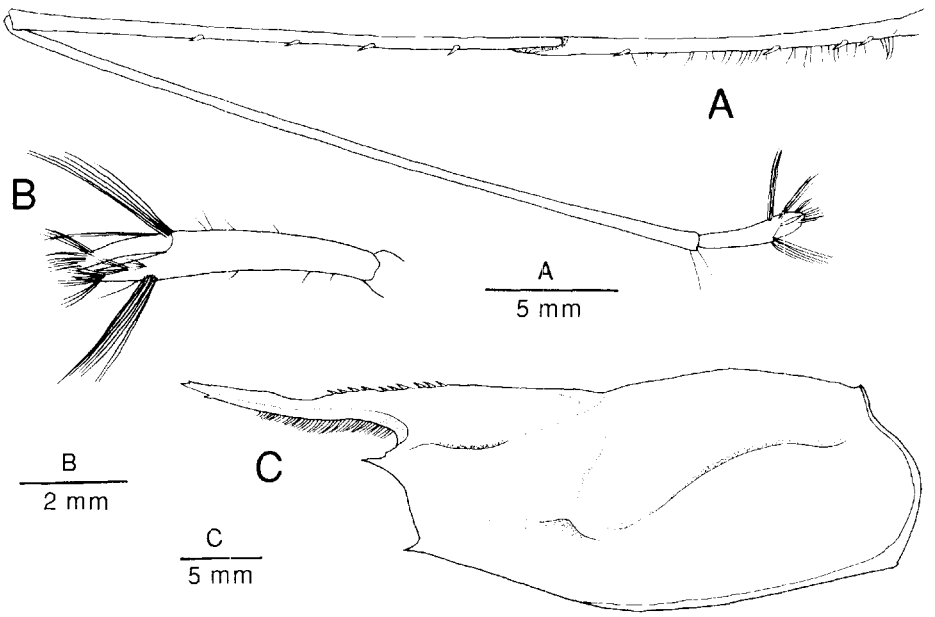

Fig. 5. Nematocarcinus lanceopes *BATE, 1888. Specimens from JARE-35 Stn. E2. A, second pereopod detached, lateral, specimen not specified; B, same, chela, lateral; C, carapace of female (CL 26.5 mm; CBM-ZC 1110).*

articulation somewhat falling short of pterygostomian angle of carapace; dactyl (Fig. 4 B) slender, straight, subequal to propodus in length; propodus (Fig. 4B) with obliquely truncate distal end, distal margin with stout setae partially obscuring dactyl, dorsal margin with row of plumose setae in distal half, ventral margin with tuft of setae at level of midlength; carpus 1.25–1.30 times as long as merus; merus armed with 5–8 lateral spines; ischium with 1 subdistal spine and sometimes with 1 subproximal spine. Fourth pereopod (Fig. 4C) with merus reaching distal margin of scaphocerite and with merus-ischium articulation reaching beyond level of gastric depression of carapace; dactyl and propodus (Fig. 4D) similar to third pereopod; carpus 1.28–1.32 times as long as merus; merus armed with 2–5 lateral spines; ischium armed with 1 subdistal spine. Fifth pereopod (Fig. 4E) with merus somewhat falling short of distal end of scaphocerite and with merus-ischium articulation reaching level of gastric depression of carapace; dactyl (Fig. 4F) very short, lanceolate in extensor view, recurved; propodus (Fig. 4F) similar to that of third or fourth pereopod; carpus 1.40–1.57 times as long as merus; merus unarmed or armed with 1or 2 lateral spines; ischium usually unarmed, rarely armed with 1 subdistal spine.

Exopod present on first to fourth pereopods, diminishing in length posteriorly, those on anterior three pairs well developed, setose, that on fourth pereopod very short, without setae.

Male second pleopod with appendix masculina (Fig. 3I) exceeding appendix interna, broad with convex ventral margin, bearing row of stiff setae in distal half; appendix interna moderately broad, slightly curved.

Coloration in life

Entirely scarlet, proximal half of rostrum and anterior carapace somewhat paler. Cornea of eye darkly pigmented.

Abnormality

The male specimen from the JARE-35 Stn. E2 (CL 26.2 mm; Fig. 5C) differs from the other specimens from the same station in having a relatively short rostrum with few dorsal and ventral teeth. The rostrum slightly overreaches the end of the antennular peduncles, with an acute apex. The dorsal margin is armed with 10 basally articulated teeth including four on the carapace posterior to the level of the orbital margin and one small subapical tooth, and most of the distal two-thirds is devoid of armature; a slight concavity around the midlength. The ventral margin bears only one subterminal tooth. In other respects, the specimen closely agrees with other specimens of *Nematocarcinus lanceopes,* and therefore this condition is assumed to be aberrant. This abnormality may be a result of injury and degeneration of the rostrum. Similar abnormality in rostral length and armature also has been known in other species of *Nematocarcinus* (see BARNARD, 1950; CHACE, 1986).

Habitat

The JARE-35 Stn. E2, where this species was collected, is situated on the middle of the continental slope descending from about 200 to 3000 m deep. The bottom substrates were soft mud.

Distribution

Known with certainty only from the Antarctic Ocean southward to the Antarctic Convergence; Indian Ocean Sector, 60°52′S, 80°20′E, 2268 m (BATE, 1888); Commonwealth Bay, Adélie Land, 1463 m (BAGE, 1938); off Enderby Land, 1266 m (HALE, 1941); off Knox Land, 2260 m (HALE, 1941); Weddell Sea, 243–2037 m (TIEFENBACHER, 1990b).

Remarks

Three nominal and one unidentified species of *Nematocarcinus* have been known from the Antarctic Ocean (Table 1): *N. lanceopes* BATE; *N. antarcticus* (BAGE) (erroneously assigned to *Acanthephyra* by the original author); *N. longirostris* BATE (ZARENKOV, 1968); and *N.* sp. (ZARENKOV, 1968). HALE (1941) suggested that *N. lanceopes* and *N. antarcticus* are synonymous.

Six JARE-35 specimens are identified with little doubt as *N. lanceopes,* the identification verified by examination of the three syntypes in the collection of the Natural History Museum, London (BM 1888: 22). All syntypes are now in poor condition, with rostra badly damaged and lacking all pereopods. Also eight of 40 syntypes of *Acanthephyra antarctica* BAGE in the collection of the Australian Museum have been examined. We confirmed the identity of BAGE's taxon with *N. lanceopes,* as HALE (1941) suggested.

The ornamentation of the rostrum and morphology of the dactyls of the third and fourth pereopods described by BATE (1888: 804) are not correct. Although Bate stated that the rostrum lacks a ventral fringe of setae, our observations under high magnification of the part attached to the carapace and the loose fragments clearly indicate the presence of a double row of pits on the ventral surface, which represent basal pockets of setae. However, these pits may be easily overlooked. BATE stated that the dactyls of the posterior three pairs of pereopods are "lanceolate"; this is true for the fifth pereopod but

not for the third and fourth pereopods. The dactyls of the third and fourth pereopods prove to be actually slender and simple, not lanceolate. In a subsequent paragraph, BATE (1888: 805) stated as follows: "This species was originally named from a belief that the posterior three pairs of legs terminated in a dactylos that was short and lanceolate in form, but the specimens are damaged, and although in my original notes I have recorded the three pairs as being so shaped, my note at the time observed that the posterior pair in many and probably all species is rudimentary, so as to make it a distinction of generic value. The dactylos in this pair is short, broad, and lost among a mass of stiff hairs that fringe the distal margin of the propodus; it is lanceolate in form, but whether the preceding two are so or not I cannot determine."

In addition, the shape of the posterodorsal margins of the fourth and fifth abdominal somites and the length of the scaphocerite illustrated by BATE are also incorrect. According to his figure, the posterodorsal margins of the fourth and fifth abdominal somites are clearly upturned, but none of the specimens available shows such an upturned condition. As HALE (1941) has already suggested, BATE's illustration is not consistent with the text with regards to the length of the scaphocerite. The scaphocerite is illustrated as far exceeding the rostrum and being longer than the carapace, but BATE noted in the text that the scaphocerite is nearly as long as the carapace. The scaphocerite is eventually shorter than the carapace, with ratio ranging from 0.69–0.79 (seven examples including two syntypes are available).

ZARENKOV (1968) recorded two species of *Nematocarcinus* from the Antarctic Ocean: *N. longirostris* BATE, 1888, and *N.* sp. on the basis of material collected during the Soviet Antarctic Expedition. He did not give detailed accounts for his specimens, and therefore it is not clear how he identified his specimens either with *N. longirostris* or *N.* sp. Recent authors (MACPHERSON, 1984; TIEFENBACHER, 1990b) have proved that *N. longirostris* is best distinguished from *N. lanceopes* in having more dorsal teeth on the carapace posterior to the level of the orbital margin (8–9 versus 4–6). The rostral spine formula given by ZARENKOV only for *N.* sp. is "6−4+14−21/3−4 + ?", and it is well consistent with that of *N. lanceopes*. It is likely that ZARENKOV was actually reporting *N. lanceopes* under the name of *N.* sp. The taxonomic status of ZARENKOV's *N. longirostris* still remains unclear, though HANAMURA (1989) suggested that it is possibly *N. sigmoideus* MACPHERSON.

MACPHERSON (1984) described a new species, *Nematocarcinus sigmoideus*, on the basis of materials from Valdivia Bank (Southeast Atlantic) and South African waters. The South African material has been identified either as *N. lanceopes* (see STEBBING, 1914; CALMAN, 1925) or *N. longirostris* (BARNARD, 1950; KENSLEY, 1968). MACPHERSON cited four characteristics to separate *N. sigmoideus* from *N. lanceopes*: 1) the ventral series of teeth of the rostrum begins at the level of the base of the ultimate segment of the antennular peduncle and extends to the level of the midlength of the scaphocerite in *N. lanceopes*, while the series begins anterior to the level of the distal end of the antennular peduncle and reaches the level of the distal one-thirds of the scaphocerite in *N. sigmoideus*; 2) the dorsal teeth on the carapace are more closely appressed and more closely set in *N. lanceopes* than in *N. sigmoideus*; 3) the rostral ventral teeth are more numerous in *N. lanceopes* than in *N. sigmoideus* (8 *vs.* 3–5); 4) the scaphocerite is relatively longer in *N. lanceopes* than in *N. sigmoideus* (MACPHERSON gives the propor-

tional ratio as 0.7 for the latter). These characteristics now prove to be unreliable. As described above, the position of the posteriormost ventral tooth and arrangement of the dorsal series of teeth are quite variable intraspecifically in *N. lanceopes*. The variation range of the number of ventral rostral teeth may overlap between *N. lanceopes* and *N. sigmoideus*. MACPHERSON (1984) uncritically referred to BATE's illustration with regard to the relative length of the scaphocerite. We compared carefully the original description of *N. sigmoideus* with available material of *N. lanceopes*, and found that the former may be distinguished from the latter by having fewer dorsolateral spines on the telson (6–9 *vs.* 11–13 on either side; the counts include the spine at the posterolateral corner of the telson). To verify the validity of MACPHERSON's taxon, a careful comparison based on a large series of material is strongly recommended.

IWASAKI and NEMOTO (1987) recorded nine pelagic larvae possibly assignable to either *N. lanceopes* or *N. longirostris* from Antarctic waters. It is very likely that these larvae eventually belong to *N. lanceopes*.

Recently, TIEFENBACHER (1990b) recorded *N. lanceopes* from the Weddell Sea for the first time. He reexamined the syntypes of *N. lanceopes*, but did not realize the discrepancies between the original description and the syntypes discussed elsewhere. In addition, he seemed to be unaware of MACPHERSON's (1984) work. Therefore, his account of *N. lanceopes* is partially referred to *N. sigmoideus* (see synonymy).

Family Hippolytidae

Chorismus antarcticus (PFEFFER, 1887)

(Figs. 6, 7)

Restricted synonymy

Hippolyte antarctica PFEFFER, 1887: 51, pl. 1 figs. 22-27.

Hippolyte Romanchei A. Milne EDWARDS, 1891: 45, pl. 5 fig. 1.

Chorismus antarcticus: LENZ and STRUNCK, 1914: 318, fig. 4; HOLTHUIS, 1952: 59 (full synonymy); ZARENKOV, 1968: 161, fig. 6; KIRKWOOD, 1984: 31, fig. 40.

Material examined

Breid Bay, JARE-26 Stn. B7, 1 male (CL 12.6 mm), 2 ovigerous females (CL 16.0, 16.7 mm), NSMT-Cr 11454; Breid Bay, JARE-26 Stn. B8, 2 males (CL 12.6, 13.0 mm), 4 ovigerous females (CL 15.6-16.7 mm), NSMT-Cr 11455; Breid Bay, JARE-26 Stn. B 9, 4 males (CL 7.6-11.4 mm), NSMT-Cr 11456; Günnerus Bank, JARE-26 Stn. G9, 2 ovigerous females (CL 16.2, 16.7 mm), NSMT-Cr 11457; off Kromprins Olav Kyst, Enderby Land, JARE-35 Stn. E1, 1 female (CL 14.2 mm), CBM-ZC 1108; Prytz Bay, JARE-35 Stn. E1, 2 males (CL 11.0, 12.0 mm), CBM-ZC 1112.

Description

Rostrum (Fig. 6A, B) curving slightly dorsad, reaching scaphocerite or slightly overreaching that; dorsal margin armed with 7–9 teeth over entire length, including 2 (rarely 1) on carapace posterior to level of orbital margin and 1 or 2 small teeth near apex; ventral blade deep, armed with 6–9 teeth, deepest at level of posteriormost ventral tooth; lateral carina prominent. Carapace (Fig. 6A) with well developed antennal spine and rather small pterygostomian spine; supraorbital spine absent; median postrostral ridge not sharp even in anterior region.

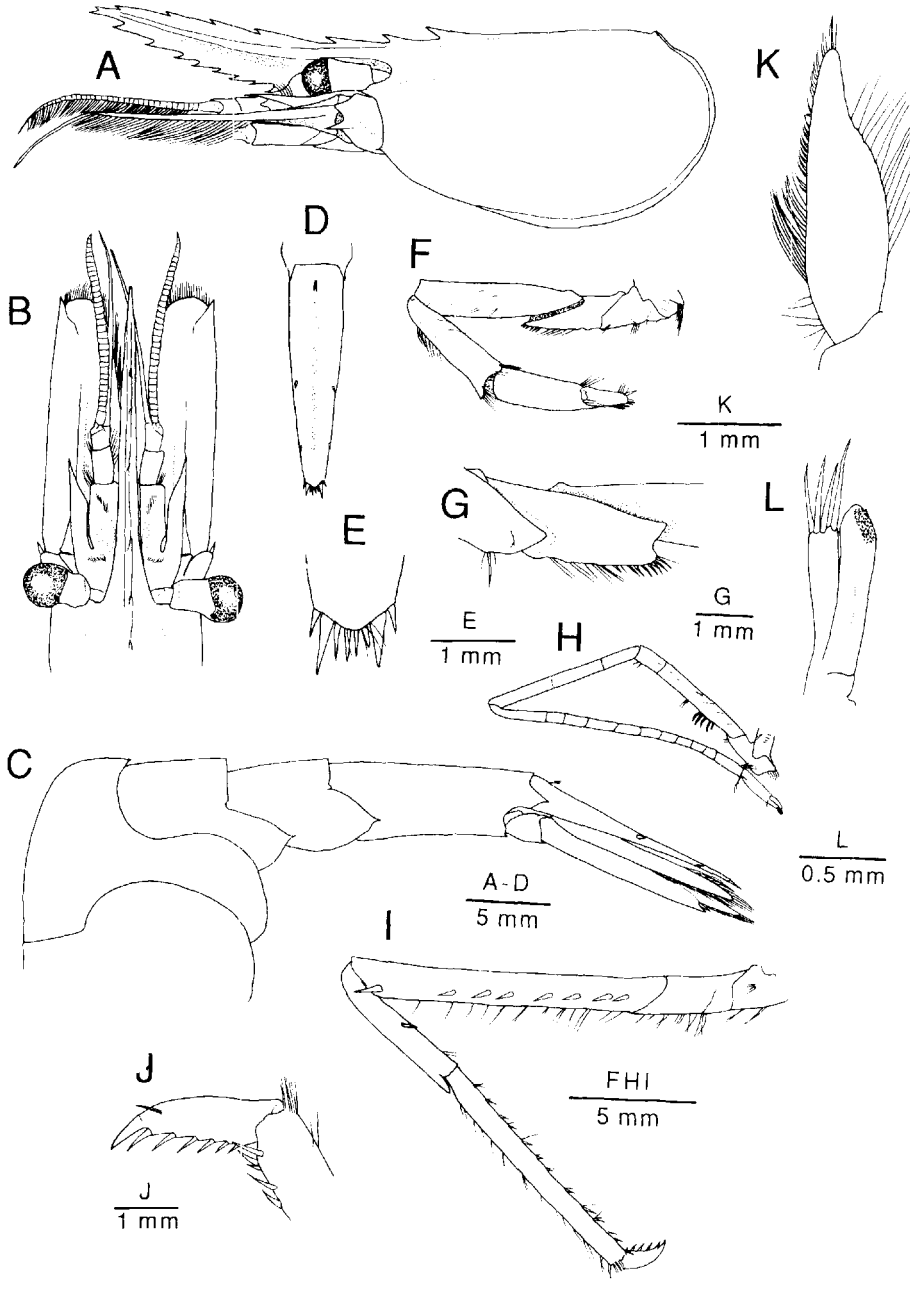

Fig. 6. Chorismus antarcticus *(PFEFFER, 1887). A–J, ovigerous female from Breid Bay Stn. 8 (CL 16.7 mm; NSMT-Cr 11455); K, L, male from same lot (CL 13.0 mm; NSMT-Cr 11455). Appendages dissected from left side. A, carapace and cephalic appendages, lateral; B, anterior part of carapace and cephalic appendages, dorsal; C, third to sixth abdominal somites, telson, and uropod, including posterior part of second abdominal somite, lateral, pleopods omitted; D, telson, dorsal; E, same, posterior margin, dorsal; F, first pereopod, lateral; G, same, ischium and basis, mesial; H, second pereopod, lateral; I, third pereopod, lateral; J, same, dactyl and distal part of propodus, lateral; K, endopod of first pleopod, dorsal; L, appendix interna and appendix masculina, mesial.*

Abdomen (Fig. 6C) with third somite rounded posteriorly, posterior part slightly compressed into median subcarinate ridge. Pleura of anterior three somites broadly rounded, those of fourth and fifth somites terminating posteroventrally in small, acute spine. Sixth somite about twice as long as fifth and about 2.7 times as long as proximal depth. Telson (Fig. 6D) slightly falling short of uropods, 1.1 times as long as sixth somite, typically armed with 3 pairs of dorsolateral spines, posteriormost pair situated dorsolateral to base of long lateral spine of 3 posterior pairs; posterior margin (Fig. 6E) narrowly convex.

Eye (Fig. 6A, B) subpyliform with corneal region somewhat inflated; ocellus appearing as small black spot.

Antennular peduncle (Fig. 6A, B) reaching midlength of scaphocerite; each segment without distal spine. Stylocerite acute, falling slightly short of distal margin of intermediate segment. Outer flagellum distinctly overreaching scaphocerite, slender, bearing thick aesthetascs except for filiform distal part composed of 5–7 small articles.

Antenna (Fig. 6B) with scaphocerite 0.9–1.1 times as long as carapace, distolateral tooth reaching about as far as or beyond level of distal margin of blade; lateral margin nearly straight.

Mandible (Fig. 7A) with three-articulated palp, proximal article relatively broad; incisor process shorter than molar process, tapering distally, with 3 distomesial teeth. Maxillule (Fig. 7B) with palp bearing external lobule exceeding internal lobule, with some long setae. Maxilla (Fig. 7C) with anterior lobe of scaphognathite somewhat elongate, posterior lobe rounded posteriorly. First maxilliped (Fig. 7D) with caridean

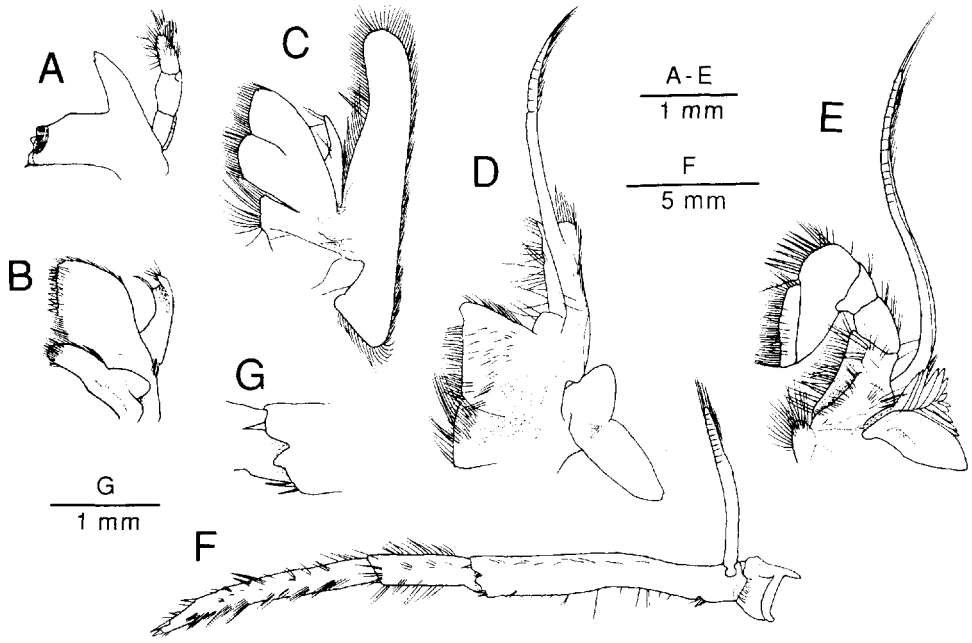

Fig. 7. Chorismus antarcticus *(Pfeffer, 1887). Ovigerous female from Breid Bay Stn. 8 (CL 16.7 mm, NSMT-Cr 11455), mouthparts from left side. A, mandible, external; B, maxillule, external; C, maxilla, external; D, first maxilliped, external; E, second maxilliped, external; F, third maxilliped, lateral; G, same, detail of distolateral margin of antepenultimate segment, lateral.*

lobe moderately broad; epipod bilobed. Second maxilliped (Fig. 7E) with coxa produced mesially into rounded protuberance; carpus with anterolateral and distomesial angle strongly produced; epipod with well developed podobranch. Third maxilliped (Fig. 7F) falling somewhat short of scaphocerite, bearing well-developed exopod and epipod; ultimate segment with several corneous spines distally; antepenultimate segment armed with 1 distolateral and 2 ventrodistal basally articulated spines (Fig. 7F).

First pereopod (Fig. 6F) reaching level of distal end of antennular peduncle; chela somewhat longer than carpus, dactyl distinctly shorter than palm; ischium (Fig. 6G) produced on flexor margin into distally subacute, blade-like crest, distally with slender, curved spinules, proximally with tufts of setae. Second pereopods (Fig. 6H) equal, overreaching scaphocerite by length of chela and distal 2 or 3 carpal articles; carpus consisting of 11 articles; merus three-articulated; ischium subdistally with articulation. Third to fifth pereopods similar in general, third (Fig. 6I) overreaching scaphocerite by length of dactyl and distal one-fourth of propodus, fourth overreaching scaphocerite by length of dactyl, fifth slightly falling short of distal margin of scaphocerite; dactyls (Fig. 6J) about 0.2 times as long as propodus, each with 6 or 7 spines over entire length of flexor margin; propodus each with double row of spinules almost over entire length of flexor surface; carpi each with 1 lateral spine situated at level of midlength; meri armed with 6–8 lateral spines in third, with 4–7 lateral spines in fourth, and with 3–5 lateral spines in fifth.

Epipods on third maxilliped to second pereopod each with terminal hook.

Male first pleopod with endopod (Fig. 6K) tapering distally to rounded apex; lateral margin sinuous, with row of long setae between distal one-fourth and proximal one-fourth; mesial margin regularly convex, with row of curved spiniform setae in distal half and with row of setae in proximal half; distal margin with relatively short setae. Male second pleopod with appendix masculina (Fig. 6L) slightly shorter than appendix interna, apically with 4 or 5 spines.

Coloration

Unavailable.

Distribution

Circumpolar; Magellanic region, South Georgia, Enderby Land, Kaiser Wilhelm II Land, the Ross Sea, King George V Land (HOLTHUIS, 1952); Chile from Puerto Bueno, Smith Channel, Charrua, Magellan Strait (A. MILNE EDWARDS, 1891; DOFLEIN and BALSS, 1912); 15–900 m (HOLTHUIS, 1952).

Remarks

Our examination of the present material of *Chorismus antarcticus* discloses that this species shows some unique or rare features for hippolytids: 1) the antepenultimate segment of the third maxilliped is armed with one lateral spine as well as two spines at the ventrodistal angle; 2) the ventrodistal portion of the ischium of the first pereopod is produced distally, and the ventral surface of the ischium is spinose distally and setose proximally; 3) the merus of the second pereopod is divided into three articles; 4) the ischium of the second pereopod bears an extra articulation subdistally; 5) the carpi of the posterior three pairs of pereopods are armed with one lateral spine situated at the level of the midlength. None of these characteristics has been mentioned by previous authors.

According to the figure given by BOSCHI *et al.* (1992), the sixth characteristic is common to *C. tuberculatus* BATE, 1888, another member of the genus, and therefore it would seem to provide generic significance. It is uncertain at present whether other characters are shared by *C. tuberculatus.*

Chorismus antarcticus is readily distinguished from *C. tuberculatus* in the dorsally smooth third abdominal somite and the shorter rostrum which bears dorsal teeth distributed over the entire length. In *C. tuberculatus,* the third abdominal somite is provided with a prominent hump-like median carina; the rostrum is longer, distinctly overreaching the scaphocerite, and its dorsal margin is unarmed in the distal three-fourths (BATE, 1888; LEDOYER, 1979; BOSCHI *et al.,* 1992).

HOLTHUIS (1952) examined the holotype of *Hippolyte Romanchei* A. MILNE EDWARDS, 1891, and placed it in synonymy with *C. antarcticus.*

Lebbeus antarcticus (HALE, 1941)
(Fig. 8)

Spirontocaris antarcticus HALE, 1941: 267, figs. 5, 6.
Lebbeus antarctica: ZARENKOV, 1968: 161; HAYASHI, 1992: 109 (table).
Lebbeus antarcticus: KIRKWOOD, 1984: 27, fig. 39; WARD, 1985: 58, figs. 1-3.

Material examined

One male (CL about 17.6 mm), Prytz Bay, JARE-35 Stn. P1, CBM-ZC 1113.

Description

Specimen somewhat damaged; all pereopods but left first, left second, right fourth and left fifth missing, left second and left fifth degenerative.

Integument soft and membranous.

Rostrum (Fig. 8A, B) directed forward, straight, falling short of distal end of proximal segment of antennular peduncle; dorsal margin armed with 5 teeth including 2 on carapace posterior to level of orbital margin, distal one-third left unarmed; ventral blade poorly developed, armed with 3 teeth. Carapace (Fig. 8A, B) with well developed antennal and rather small pterygostomian spines; supraorbital spine moderately strong, with deep ventral notch; median postrostral ridge hardly recognizable, last tooth situated at anterior one-fourth of carapace length; anterolateral margin between antennal and pterygostomian spines strongly sinuous.

Abdomen dorsally smooth (Fig. 8C). Third somite with posterodorsal margin strongly produced posteriorly. Pleura of anterior four somites broadly rounded, particularly that of second very broad, that of fifth somite terminating posteroventrally in acute tooth. Sixth somite 1.8 times as long as fifth. Telson (Fig. 8D) slightly falling short of end of uropods, 1.5 times as long as sixth somite, armed with 5 pairs of dorsolateral spines, posteriormost pair situated dorsolateral to base of longest lateral spine of 4 posterior pairs; posterior margin (Fig. 8E) relatively broad, obtusely triangular.

Eye (Fig. 8A, B) with corneal region somewhat inflated; ocellus apparently absent.

Antennular peduncle (Fig. 8A, B) reaching level of distal one-fourth of scaphocerite; proximal segment distinctly longer than distal two segments combined, with 2 acute teeth on anterodorsal margin; intermediate segment with strong tooth at anterolateral

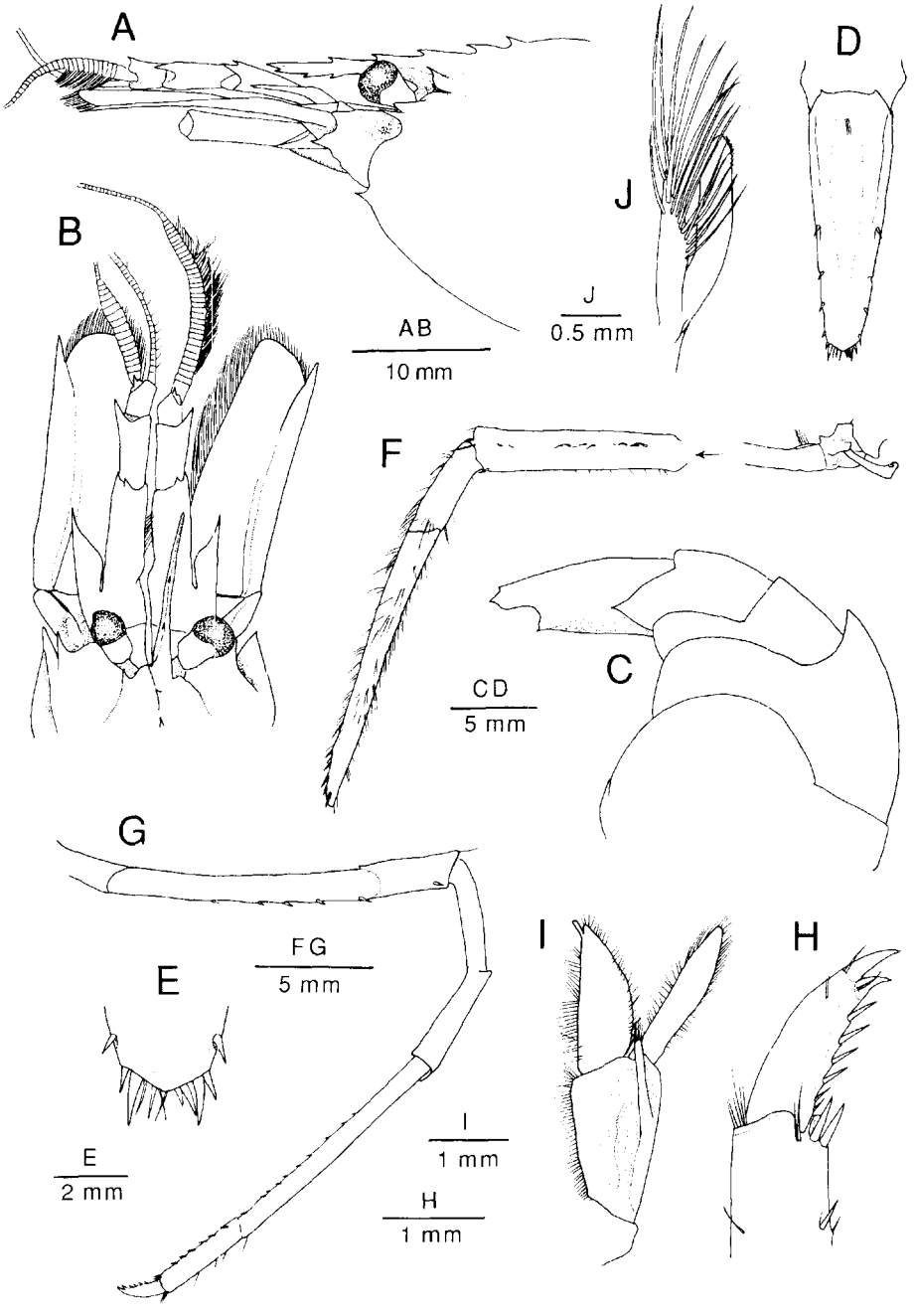

Fig. 8. Lebbeus antarcticus *(HALE, 1941). Male from JARE-35 Stn. E2 (CL about 17.6 mm, CBM-ZC 1113). A, anterior part of carapace and cephalic appendages, lateral; B, same, dorsal; C, abdomen, posterior part of second somite to sixth somite, lateral, pleopods omitted; D, telson, dorsal; E, same, posterior margin, dorsal; F, left third maxilliped, lateral, antepenultimate segment damaged; G, right fourth pereopod, lateral; H, same, dactyl and distal part of propodus, lateral; I, left first pleopod, ventral; J, appendix masculina and appendix interna of left second pleopod, mesial.*

corner; distal segment with small anterodorsal tooth. Stylocerite abruptly tapering distally to acute point, falling somewhat short of anterior margin of proximal segment. Outer flagella with aesthetasc-bearing portion thickened, right distinctly longer than left.

Antenna (Fig. 8A, B) with scaphocerite 0.7 times as long as carapace, distolateral tooth falling slightly short of distal margin of blade; lateral margin nearly straight.

Mouthparts not shown. Third maxilliped (Fig. 8F) overreaching scaphocerite by half length of ultimate segment, bearing epipod but lacking exopod; ultimate segment with several darkly pigmented corneous spines distally; antepenultimate segment armed with 1 distolateral tooth, lateral face with row of curved spinules.

First pereopod moderately stout, overreaching scaphocerite by length of dactyl. Fourth pereopod (Fig. 8G) relatively long, overreaching scaphocerite by length of dactyl and propodus; dactyl (Fig. 8H) 0.15 times as long as propodus, armed with 6 accessory spinules and 1 subterminal claw; merus armed with 6 ventral or ventrolateral spines.

Epipods on first to third pereopods and corresponding setobranchs on first to fourth pereopods.

First pleopod (Fig. 8I) with endopod much broader than and subequal in length to exopod, tapering distally to rounded apex, with distinct appendix interna subterminally; lateral margin convex; mesial margin nearly straight, without spiniform setae. Second pleopod with appendix masculina (Fig. 8J) somewhat shorter than appendix interna, with about 15 long stout setae.

Coloration

Unavailable.

Distribution

Previously known from Terre Adélie (HALE, 1941; ZARENKOV, 1968), Lützow-Holm Bay (NUMANAMI *et al.*, 1984), and the Weddell Sea (WARD, 1985).

Remarks

The integument of the present specimen is soft and membranous, but this is probably due to recent molting. The mouthparts have not been illustrated, since they agree well with WARD's (1985) excellent figure.

Several minor differences are apparent when the present specimen is compared with the previous descriptions of HALE (1941) and WARD (1985). WARD (1985) showed that the number of ventral teeth on the rostrum is variable from one to three. In the present specimen, the rostrum bears three ventral teeth, but each tooth is more widely spaced than in the figure of WARD. The proximal segment of the antennular peduncle in WARD's specimen bears three acute teeth on the anterodorsal margin, whereas two teeth are present in the present specimen as well as the original description and figure of HALE (1941). HALE was not successful in depicting a deep notch below the supraorbital spine. WARD's figure and the present specimen clearly show the presence of the notch. The holotype and the present specimen, both male, apparently differ from WARD's specimens, comprised of 7 females and 1 male, in the absence of a posteroventral tooth on the fourth abdominal pleuron. WARD's description seems to be chiefly based upon females, and therefore the condition in the male could not be specified. This discrepancy may be a result of sexual dimorphism. Although ZARENKOV's (1968) branchial formula for *L. antarcticus* indicates the absence of the exopod from the first maxilliped, WARD (1985)

correctly pointed out its presence. The present specimen is peculiar in having dissimilar antennular outer flagella. In several species of *Lebbeus*, noticeable sexual difference in morphology of the outer antennular flagellum has been reported (HAYASHI, 1992); in males, the outer flagellum is thickened and greatly elongated. But such a dissimilar condition has not been known in other members of *Lebbeus* as well as the related genera. It remains unclear whether this dissimilarity is normal for this species.

Lebbeus antarcticus appears very close to *L. washingtonianus* (RATHBUN, 1902) from the northeastern Pacific and *L. bidentatus* ZARENKOV, 1976, from the southeastern Pacific. HALE (1941: 268) cited four characteristics to separate *L. antarcticus* from *L. washingtonianus* as follows: "*S(pirontocaris) antarcticus* is extremely close to *S. washingtoniana* RATHBUN but differs in having only one inferior rostral tooth (instead of three teeth), in the proportions of the segments of the peduncle of the first antennae, in the relatively longer second to fifth peraepods, and in having the sixth pleon somite much more than half as long as the telson." These differences, however, have been proved to be not reliable to separate them. Our attempt to make clear the distinction between these two species has not been successful, as the descriptive information on the latter species (RATHBUN, 1902, 1904; SCHMITT, 1921; BUTLER, 1980; WICKSTEN, 1990) still remains insufficient in detail. Also, an adequate evaluation of morphological differences between *L. antarcticus* and *L. bidentatus* is impossible at present.

Family Crangonidae

Notocrangon antarcticus (PFEFFER, 1887)

(Figs. 9–12)

Restricted synonymy

Crangon antarcticus PFEFFER, 1887: 45, pl. 1 figs. 1-21; CALMAN, 1907: 3.

Notocrangon antarcticus: COUTIÈRE, 1917: 2, figs. 1-17; ZARENKOV, 1968: 167, figs. 11-20; KIRKWOOD, 1984: 23, fig. 36; CHRISTOFFERSEN, 1988: 46; BOSCHI *et al.*, 1992: 39, fig. 31.

Notocrangon antarcticus var. *gracilis* BORRADAILE, 1916: 89; BAGE, 1938: 8.

Material examined

Breid Bay, JARE-26 Stn. B9, 1 female (CL 13.7 mm), NSMT-Cr 11458; Günnerus Bank, JARE-26 Stn. G9, 1 male (CL 15.8 mm), 5 females (CL 12.0–20.0 mm), NSMT-Cr 11459; off Kromprins Olav Kyst, Enderby Land, JARE-35 Stn. E1, 4 females (CL 19.2–23.4 mm), 1 ovigerous female (CL 20.6 mm), CBM-ZC 1109; Prytz Bay, JARE-35 Stn. P1, 3 males (CL 15.6–17.0 mm), 6 females (CL 21.2–23.0 mm), 3 ovigerous females (CL 19.4–20.6 mm), CBM-ZC 1114.

Description of female

Integument not particularly firm, surface naked.

Rostrum (Fig. 9) strongly compressed, ascending, reaching anterior margin of proximal segment of antennular peduncle, terminating in acute tip; dorsal surface nearly flat or slightly convex, dorsolateral margins sharply cornered, with slightly convex or nearly straight dorsal profile in lateral view; ventral margin slightly convex. Carapace (Fig. 9; also refer to Fig. 12A) with strong median spine in gastric position, followed by distinct median carina extending to posterior one-third of carapace length; gastric region not depressed below; postorbital (first lateral) carina well defined, confluent with

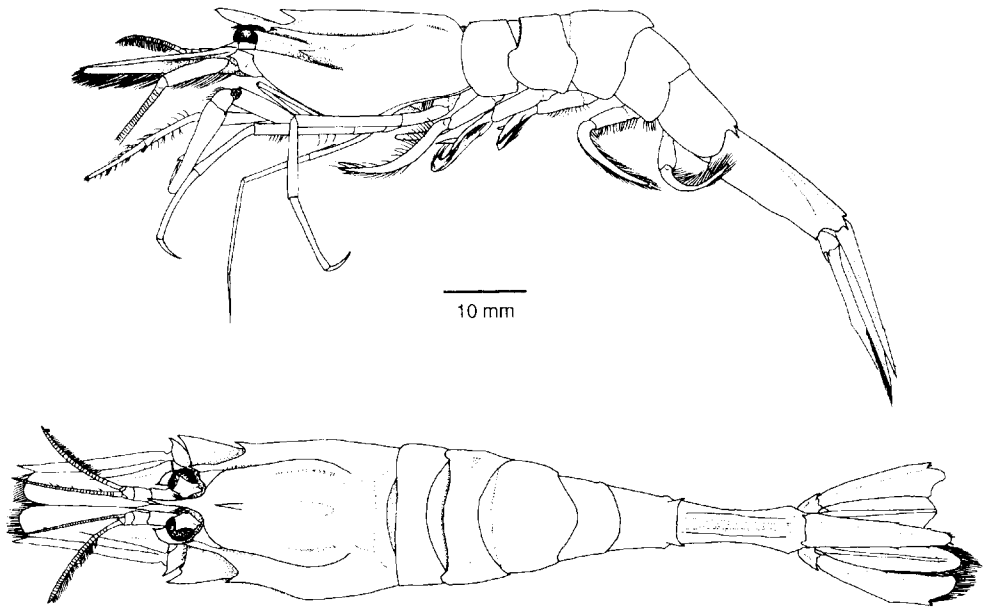

Fig. 9. Notocrangon antarcticus *(PFEFFER, 1887). Female from JARE-35 Stn. E1 (CL 22.0 mm; CBM-ZC 1109). Entire animal; top, lateral; bottom, dorsal.*

dorsolateral margin of rostrum, somewhat convex posteriorly, extending beyond posterior end of median carina; antennal spine moderately strong, supported by distinct carina (second lateral) confluent with hepatic spine, accompanied by deep superior groove; hepatic spine moderately strong, situated slightly to somewhat posterior to level of median gastric spine; branchiostegal spine relatively strong, slightly divergent, supported by distinct carina (third lateral) reaching level of hepatic spine; hepatic groove well marked; orbital margin with submarginal ridge, with shallow orbital cleft; anterolateral margin between antennal and branchiostegal spines slightly concave, sometimes with obtuse protuberance; pterygostomian angle sometimes obtusely produced, but not acutely pointed.

Anterior five abdominal somites (Fig. 9) smooth dorsally. Third somite with posterodorsal margin somewhat produced posteriorly. Fifth somite with posterodorsal margin bearing pair of acute teeth. Pleura of anterior five somites without conspicuous teeth. Sixth abdominal somite 0.71–0.94 times as long as carapace (tending to become shorter with growth) and about 3 times as long as basal width, lateral profile concave in dorsal view; dorsal surface with distinct paired carinae, not extending beyond posterodorsal margin; posterolateral process terminating in acute tooth, with deep notch mesial to its base. Telson 1.2 times as long as sixth somite, armed with 3 lateral spines including 1 pair at posterolateral angle, anteriormost pair situated at two-fifths length of telson; posterior margin (Fig. 11K) with 2 pairs of spines excluding one pair at posterolateral corner on either side of acutely produced median projection.

Eye (Fig. 9; also refer to Fig. 12A) with cornea well developed, slightly inflated; ocular peduncle protruding into corneal region in dorsal surface, but without tubercle.

Antennule (Figs. 9, 10A, B; also refer to Fig. 12A) with peduncle reaching level of

proximal one-third length of scaphocerite. Proximal segment subequal in length to distal two segments combined; anterolateral corner produced dorsally into prominent process; dorsal surface with abruptly delimited fossa concealed by row of setae; ventromesial ridge with acute spine. Stylocerite rather broad, lateral margin rounded, terminating in acute tip, somewhat falling short of anterior margin of proximal segment. Distal segment with anterodorsal tooth. Outer flagellum slender, reaching or slightly overreaching blade of scaphocerite, distal three-fourths bearing aesthetascs. Inner flagellum slightly longer and more slender than outer, with scattered short setae.

Antenna (Fig. 9; also refer to Fig. 12A) with scaphocerite 0.8–0.9 times as long as carapace, 2.8 times as long as broad, lateral margin nearly straight, distolateral tooth slightly overreaching broadly rounded blade. Basicerite with moderately strong lateral tooth directed anterolaterally. Carpocerite reaching near to level of midlength of scaphocerite. Flagellum very long, exceeding body length; each article smooth.

Mouthparts (Fig. 10C–G) of usual crangonid type. Posterior lobe of scaphognathite (Fig. 10E) not elongate. Third maxilliped (Fig. 10H) reaching beyond scaphocerite; ultimate segment subequal in length to penultimate segment; antepenultimate segment ventrally with 2 or 3 subterminal spines; exopod well developed; arthrobranch absent.

First pereopod (Fig. 11A) reaching beyond level of distal one-fourth of scaphocerite; palm (Fig. 11B) 3.3–4.0 times as long as broad, not tapering, cutting edge moderately oblique; fixed finger moderately stout; dactyl not overreaching base of fixed finger when closed; carpus only with ventrolateral spine; merus with strong dorsodistal spine, distolateral margin and ventral surface unarmed. Second pereopod (Fig. 11C) moderately long, chelate; dactyl (Fig. 11D, E) 0.4 times as long as palm, both fingers setose, opposing margins bearing minute spinules; coxal process well developed. Third pereopod (Fig. 11F) very slender, reaching distal margin of scaphocerite. Fourth pereopod (Fig. 11G) not particularly robust, reaching distal margin of scaphocerite; dactyl (Fig. 11H, I) subspatulate, moderately curved, about half length of propodus, lateral and mesial margins sharply ridged, ventral surface with submedian keel, terminating distolaterally in thin process, with minute spine mesial to base of terminal process; propodus 1.1 times as long as carpus, extensor surface setose; merus with scattered setae on both flexor and extensor margins. Fifth pereopod (Fig. 11J) similar to fourth, falling slightly short of scaphocerite; merus less setose.

Pleurobranchs on fourth to eighth thoracic somites inclined anteriorly.

Thoracic sternite slightly inflated in non-ovigerous specimens, deeply concave in ovigerous specimens, with median spine or tubercle between coxae of second pereopods in both phases; each transverse suture indicating each somite very obscure. Abdominal sternites each with large median tubercle.

First pleopod (Fig. 10I) with endopod (Fig. 10J, K) changing in relative length and armature with growth; proportional ratio increasing with growth, from about one-fourth (CL 12.0 mm) to half (CL 23.0 mm) of exopod length; armature developed with growth; in matured specimens, endopod well curved dorsad, terminal margin rounded, with curved spines subterminally, ventral margin with irregular single or double row of bristles between proximal one-fifth and distal one-third; in immature specimens, no subterminal spines or ventral bristles. Second pleopod (Fig. 10L) with endopod strongly curved laterally. Protopods each with mesial margin strongly concave, with closely set

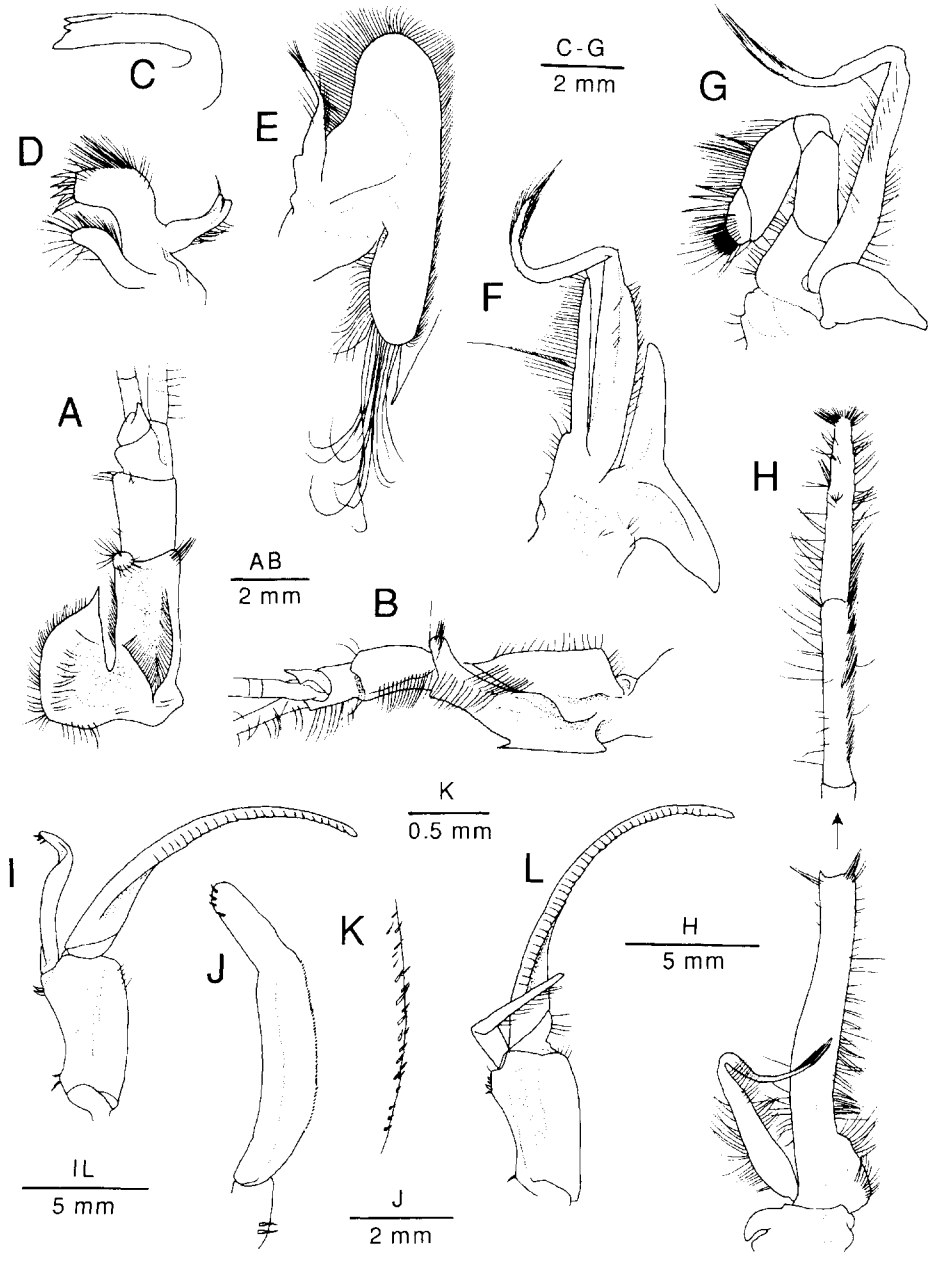

Fig. 10. Notocrangon antarcticus *(Pfeffer, 1887). Female from JARE-35 Stn. E1 (CL 19.8 mm; CBM-ZC 1109). Appendages dissected from left side. A, antennule, dorsal; B, same, lateral; C, mandible, external; D, maxillule, external; E, maxilla, external; F, first maxilliped, external; G, second maxilliped, external; H, third maxilliped, dorsal; I, first pleopod, ventral; J, same, endopod, mesial; K, same, detail of ventral margin of endopod; L, second pleopod, ventral.*

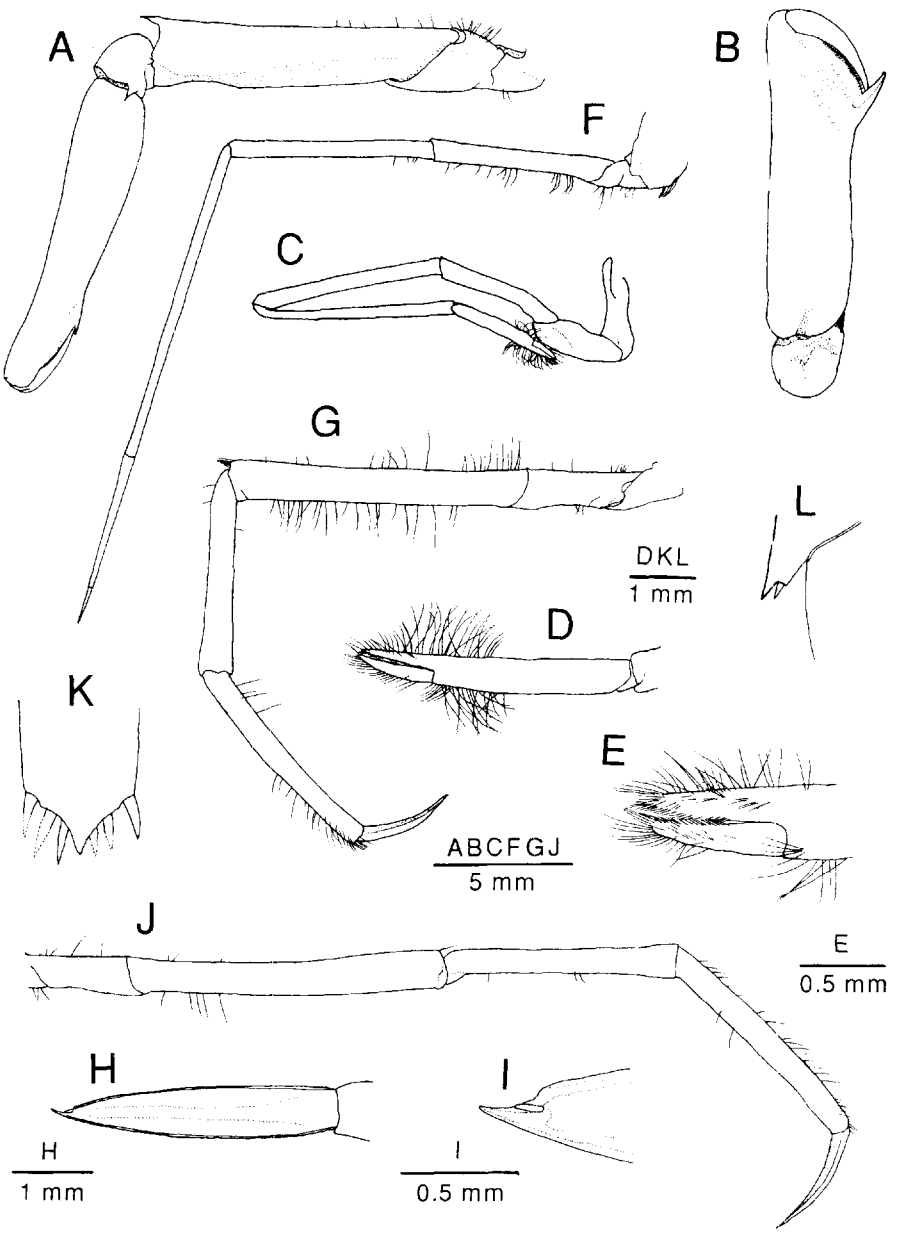

Fig. 11. Notocrangon antarcticus *(PFEFFER, 1887). Female from JARE-35 Stn. E1 (CL 19.8 mm; CBM-ZC 1109). All but the fifth pereopod were dissected from the left side. A, first pereopod, lateral; B, same, chela, ventral; C, second pereopod, lateral; D, same, chela, lateral; E, same, detail of fingers, lateral; F, third pereopod, lateral; G, fourth pereopod, lateral; H, same, dactyl, extensor; I, same, detail of distal part of dactyl, extensor; J, right fifth pereopod, lateral.*

2 or 3 curved spines at distomesial and proximomesial corners. Appendices internae absent from all pleopods.

Uropod (Fig. 9) with both rami reaching beyond tip of telson; outer ramus with lateral margin very slightly convex, with small spine just mesial to acute posterolateral tooth (Fig. 11L); diaeresis distinct (Fig. 11L).

Description of males

The males differ from the females in the following particulars.

Outer antennular flagellum (Fig. 12A) apparently longer than in females, overreaching distal end of scaphocerite by distal two-thirds length, and comparatively stout.

Thoracic sternite not inflated, with distinct transverse sutures separating each somite. Abdominal sternite with obtuse median tubercle in first and second somites and acute median spine in third to fifth somites.

First pleopod (Fig. 12B) with endopod (Fig. 12C) slightly less than half length of exopod, abruptly tapering at about midlength with markedly sinuous mesial margin; mesial margin with row of dense stiff setae in proximal half, and with row of small curved spines distributed between midlength to about distal one-fourth, subdistal to distal portion with long spines. Second pleopod (Fig. 12D) with appendix masculina long and slender, about two-thirds length of exopod, rigid, slightly inflated sub-

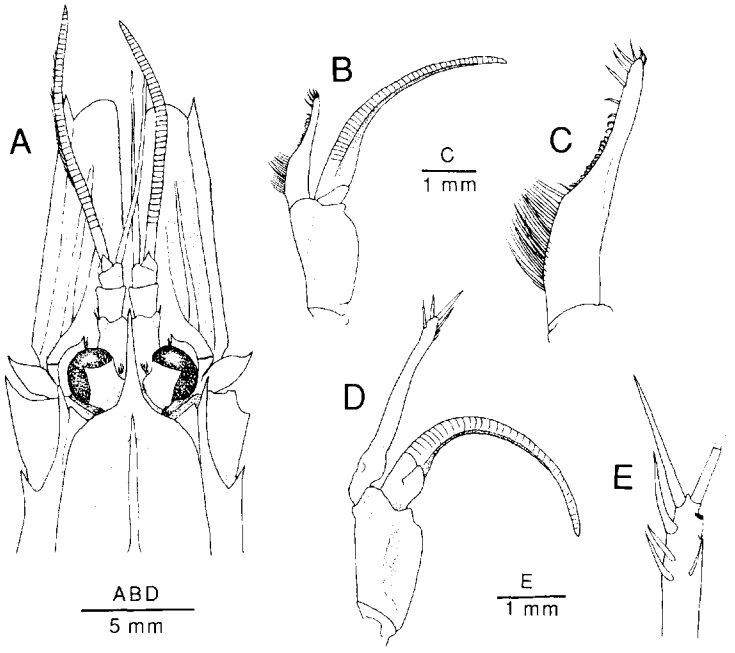

Fig. 12. Notocrangon antarcticus *(PFEFFER, 1887). Male from JARE-35 Stn. P1 (CL 17.2 mm; CBM-ZC 1114). A, anterior part of carapace and cephalic appendages, dorsal; B, left first pleopod, ventral; C, same, endopod, ventral; D, left second pleopod, ventral; E, same, detail of distal part of appendix masculina.*

proximally; distal portion (Fig. 12E) with several spines, distal two spines particularly elongate. Protopods (Fig. 12B, D) with mesial margin nearly straight, unarmed.

Coloration in life

Entire animal with scattered dark brown spots on brown background; lateral surface near ventral margin mixed with white spots. Eye with cornea gray.

Distribution

Circumpolar distribution in Antarctic waters; 15–1320 m (KIRKWOOD, 1983).

Remarks

BORRADAILE (1916) proposed a subspecific division of *Notocrangon antarcticus*, and described *Notocrangon antarcticus* var. *gracilis*. The validity of this division was questioned by COUTIÈRE (1917). On the other hand, BAGE (1938) accepted this division. ZARENKOV (1968) critically examined features which BORRADAILE (1916) considered to provide taxonomic significance, such as stoutness of the sixth abdominal somite and of the palm of the first pereopod and relative length of the rostrum and the antennular stylocerite, and clearly showed that the slight differences found in these characteristics fall within the variation range of a single species. Our observation of the present specimens well supports ZARENKOV's conclusion.

According to ZARENKOV (1968), the spination of the appendix masculina shows a tendency to reduction accompanied with growth. In the present male specimens, however, we cannot find such a reduction, though our male specimens are larger than the largest specimen of which the distal portion of the appendix masculina was illustrated by ZARENKOV.

Our observation discloses that several minor but important characteristics have been overlooked by previous authors: The proximal segment of the antennular peduncle is produced into a prominent protuberance at its distodorsal angle; its dorsal surface bears a deep fossa; the distal segment of the antennular peduncle bears a distodorsal process; fingers of the chela of the second pereopod are armed with minute spinules; the subspatulate dactyls of the fourth and fifth pereopods terminate distolaterally in a thin process mesially, with subterminal spine. These features may provide useful information for future phylogenetic study of the Crangonidae.

A recent published figure of *Notocrangon antarcticus* by BOSCHI *et al.* (1992) is considerably different from the present specimens and previous descriptions of the species. For example, the rostrum is much shallower and is rather horizontal; the gastric tooth is much weaker; the carapace carinae are less distinct, and the postorbital carina is curved anteriorly in the cardiac region, forming a *Metacrangon*-like depression; and the hepatic tooth is situated more anteriorly, at the level of the gastric tooth. It is not clear at present whether these discrepancies are due to error or inaccuracy, but if these characteristics are true for their specimens, the Patagonian population may represent a distinct species.

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