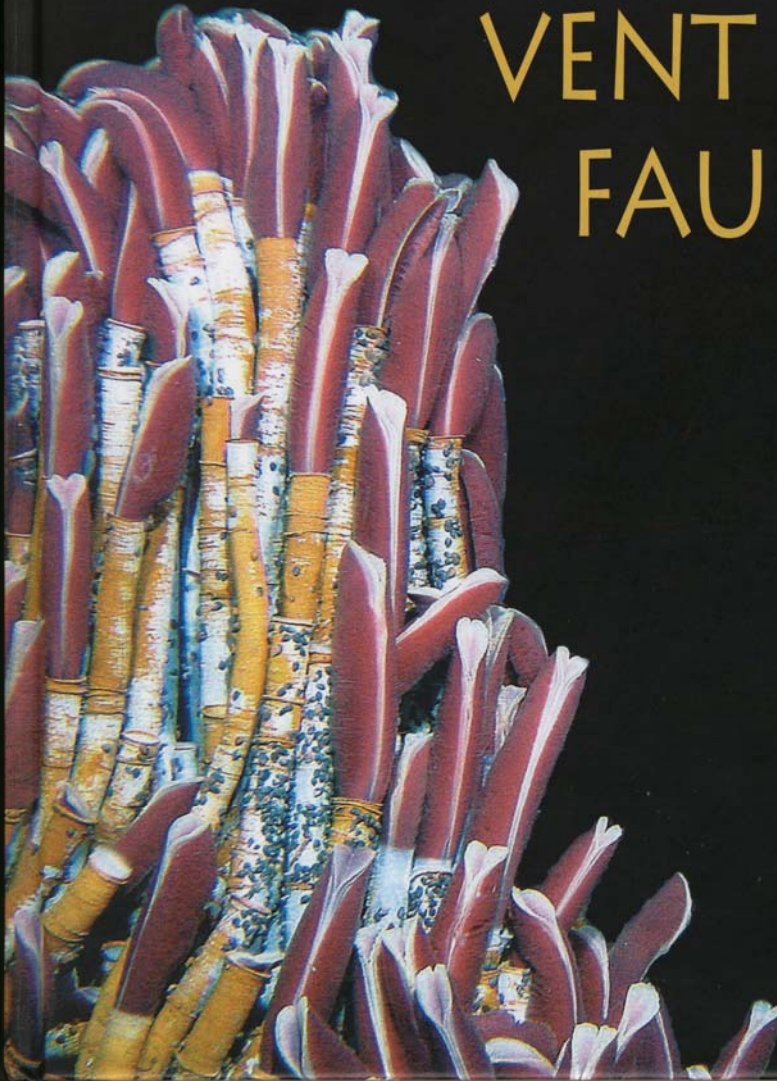


ISSN: 1608-8700

# HANDBOOK OF DEEP-SEA HYDROTHERMAL VENT FAUNA



EDITORS: D. DESBRUYERES, M. SEGONZAC & M. BRIGHT

# Handbook of Deep-Sea Hydrothermal Vent Fauna

D. DESBRYÈRES, M. SEGONZAC & M. BRIGHT (Eds.)

Denisia 18, 544 pages (27 x 21 cm)

ISSN: 1608-8700; ISBN: 10 3-85474-154-5 or ISBN: 13 978-3-85474-154-1

Ordering via e-mail: bio.buch@landesmuseum.at

Price: 49 €(excl. shipping)

The second extensively expanded edition of the "Handbook of Deep-Sea Hydrothermal Vent Fauna" gives an overview of our current knowledge on the animals living at hydrothermal vents. The discovery of hydrothermal vents and progresses made during almost 30 years are outlined. A brief introduction is given on hydrothermal vent meiofauna and parasites. Geographic maps and a table of mid-ocean ridges and back-arc basins with the major known hydrothermal vent fields, their location and depth range and the most prominent vent sites are provided. Higher taxa are presented individually with information on the current taxonomic and biogeographic status, the number of species described, recommendations for fixation, and schematic drawings, which aim to help non-specialists to identify the animals. 86 authors contributed with their expertise to create a comprehensive database on animals living at hydrothermal vents, which contains information on the morphology, biology, and geographic distribution of more than 500 currently described species belonging to one protist and 12 animal phyla. It comprises also the largest collection of more than 1000 pictures of hydrothermal vent animals taken in situ with submersibles, in vivo after collection, and with various dissection, light, and scanning electron microscopes after fixation and preparations.

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*Bonnierella cf. linearis* BARNARD, 1964

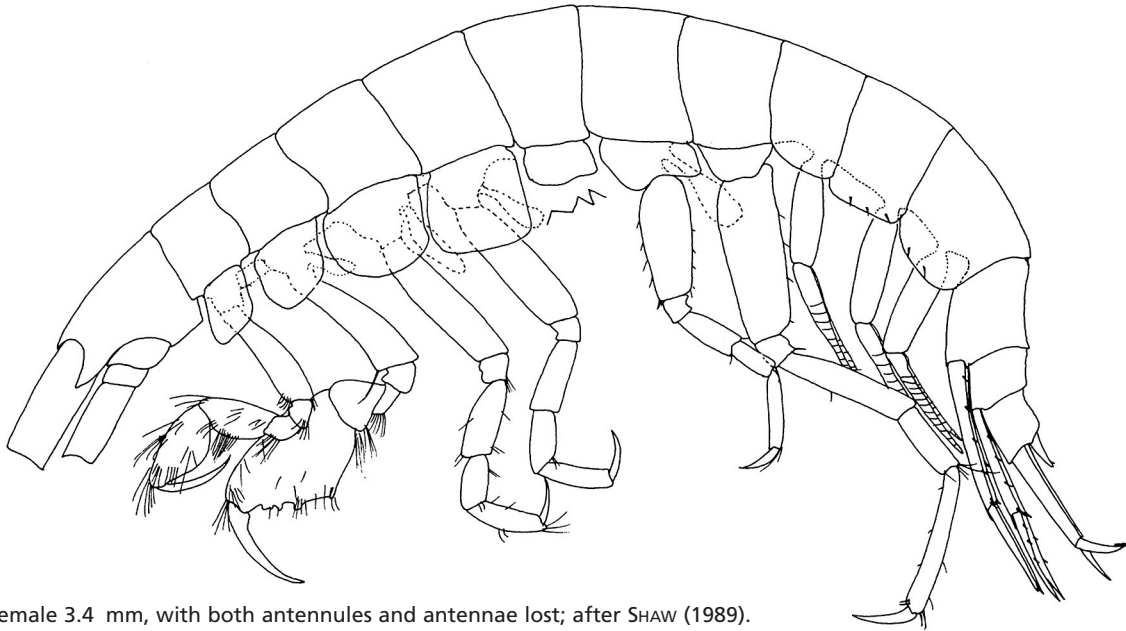
**Size:** Up to 4 mm.

**Morphology:** (Family) Head anteroventral margin moderately to strongly recessed and moderately excavate. Gnathopod 2 enlarged in males and females. Pereopods 3-4 basis glandular. Uropod 3 peduncle broad proximally, narrow distally, rami with tiny apical setae. Telson dorsoventrally thickened. (Species) Eyes absent. Lateral lobes of head produced and acute. Antennae nearly as long as body. Gnathopod 1, palm not ornated. Gnathopod 2, armed with three sharp cusps in male; with two blunt process in female defining cusps obsolete. Uropod 1, inner ramus lacking a marginal spine. Uropod 3 with outer ramus bearing 5 to 6 minute fringe-like spinules and a distal setule. Telson triangular, the narrow apex blunt. The single specimen known from hydrothermal vents, a female, differs slightly from the original description (BARNARD 1964) in the tuberosities of the palmar margin of gnathopod 2, minor differences in telson

setation, and number of spines in the mandibular spine row. But virtually all characters used to distinguish the present *Bonnierella* species are only present on the males, which makes the specific assignment of this specimen dubious.

**Biology:** Unknown. At hydrothermal vents, collected from washings of associated vent fauna (vestimentiferans and archaeogastropods).

**Distribution:** Off Peru, 10°13'S 80°05'W, 6324 m. Reported also from hydrothermal vents at Explorer Ridge, Juan de Fuca Ridge: site Gulati Gusher.



1: Female 3.4 mm, with both antennules and antennae lost; after SHAW (1989).

**References:**

- BARNARD J.L. (1964) Bull. Am. Mus. Nat. Hist. **127**(1): 1-46.  
SHAW P. (1989) Can. J. Zool. **67**(8): 1882-1890.

*Apotectonia heterostegos* BARNARD & INGRAM, 1990

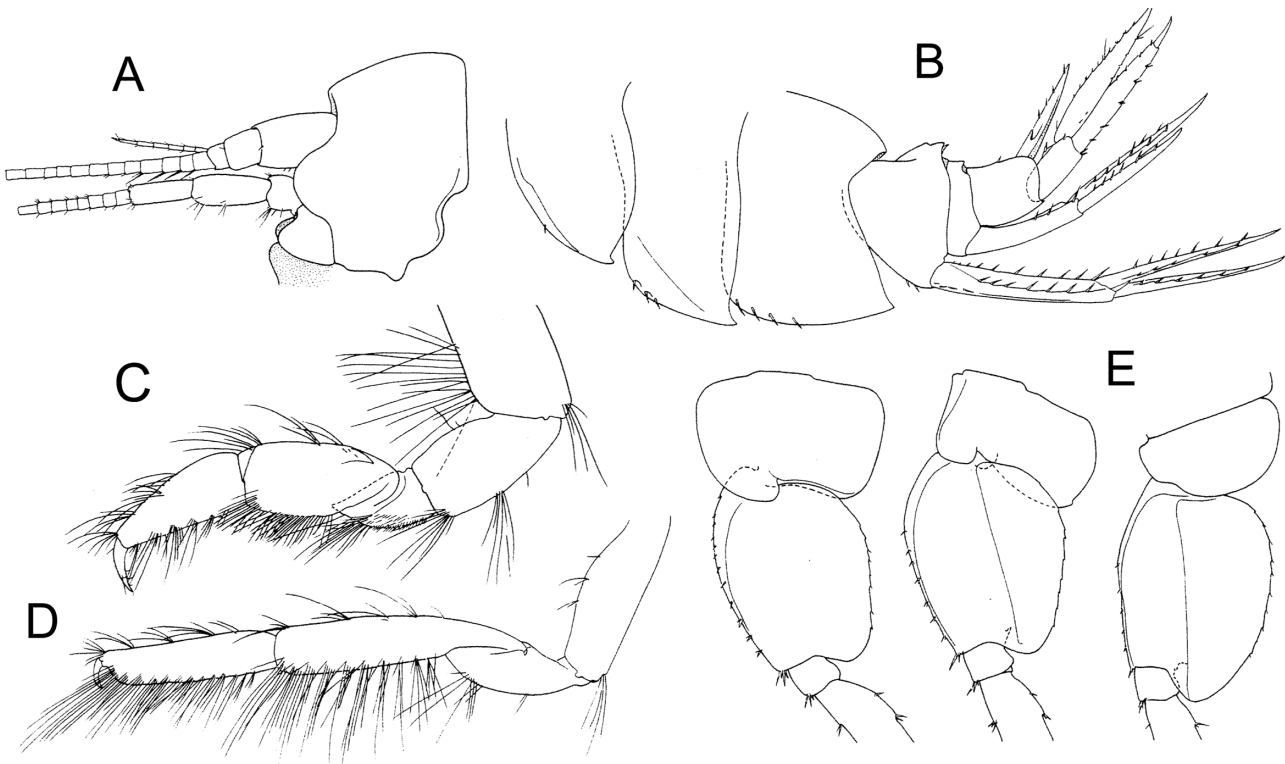
**Size:** Up to 18.3 mm.

**Morphology:** (Family) Body compact, robust. Coxae generally large. Antenna 1, peduncle article 1 large, inflated, articles 2-3 much shorter, often telescoped. Mouthparts very variable. Gnathopod 1 simple, subchelate or chelate. Gnathopod 2 characteristic for the family, slender and microchelate. Pereopods 5-7 basis usually broadly expanded. Telson variable. (Genus) Dorsal process of urosomite 1 complexly toothed. Gnathopod 1 simple. (Species) Antenna 1, primary flagellum with basal spines. Urosomite 1 with 2 sharp dorsal teeth. Mandibular right lacinia mobilis tiny, bifid; left lacinia mobilis scarcely larger and

multitoothed; molar of both mandibles simple, pubescent. Inner plate of either maxilla 1-2 fully setose medially. Inner plate of maxilliped with strongly oblique apex. Gnathopod 1 simple and with reduced coxa. Basis of pereopods 5-7 rounded-attenuate. Oostegite present on coxa 1 of brooding females.

**Biology:** Largely unknown. Readily attracted to baited traps; some specimens sorted also from siboglinid washings.

**Distribution:** Galapagos Spreading Center, apparently endemic to the sites Garden of Eden and Rose Garden.



1: Female 18.3 mm. A: Head; B: Pleosome and urosome with attached uropods and telson; C: First gnathopod; D: Second gnathopod; E: Proximal portion of pereopods 5-7; from BARNARD & INGRAM (1990).

**Reference:**

BARNARD J.L. & C. INGRAM (1990) *Smithson. Contrib. Zool.* 499: 1-80.

*Cyclocaris tahitensis* STEBBING, 1888

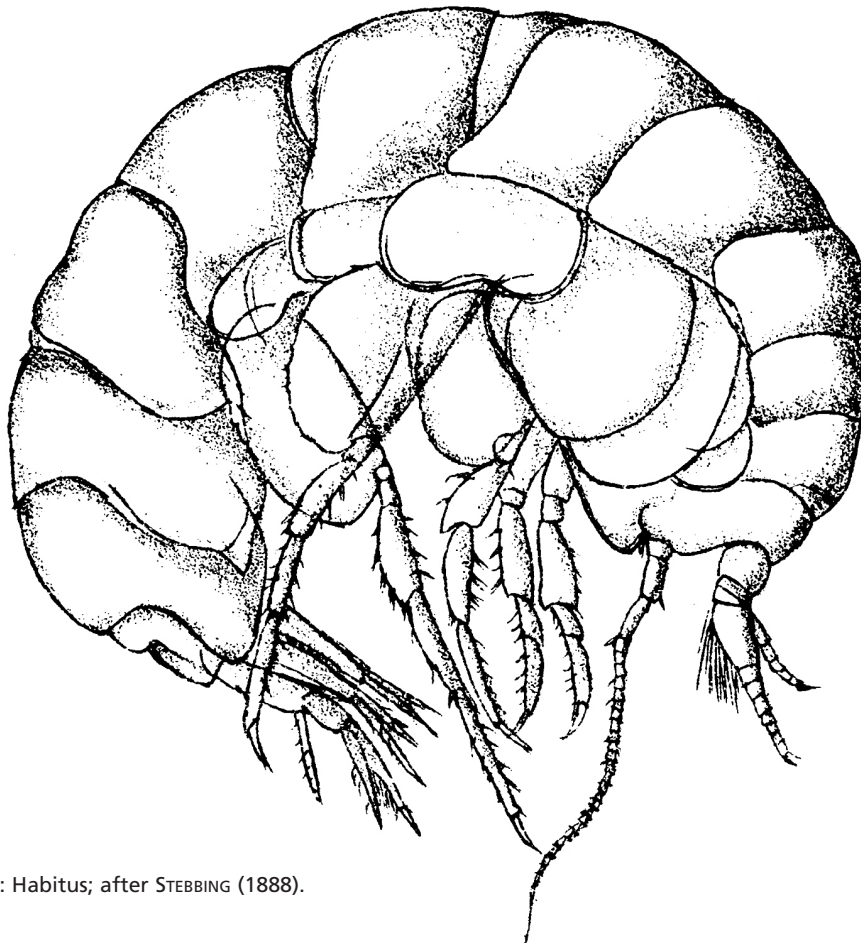
**Size:** Up to 15 mm.

**Morphology:** (Family) Body compact, robust. Coxae generally large. Antenna 1 peduncle article 1 large, inflated, articles 2-3 much shorter, often telescoped. Mouthparts very variable. Gnathopod 1 simple, subchelate or chelate. Gnathopod 2 characteristic for the family, slender and microchelate. Pereopods 5-7 basis usually broadly expanded. Telson variable. (Genus) Head tall, horizontally short, weakly grotesque. Coxae 1-2 small, strongly shortened and partly covered by coxa 3. Coxa 4 large excavate. Gnathopod 1 long, simple. Uropod 3 elongate. Telson elongate, deeply cleft. (Species) Base of primary flagellum of antenna 1 with callinophore. Body capable of coiling into a circle, bending its head round to the protection of the coxae of the third and fourth pereopods. Head extremely short,

lacking rostrum. Mandibular palp present. Coxa 1 much wider at distal margin than at insertion. Epimeron 3 with posterior angle rounded. Rami of uropod 1 about equal in length. Peduncle of uropod 2 shorter than rami.

**Biology:** Unknown. Originally described from volcanic mud bottoms around Tahiti and trapped also around Cape Verde on sandy bottoms, the only report of the species from hydrothermal vents could be accidental since the accompanying fauna was also not typically hydrothermal.

**Distribution:** Off Tahiti, 17°30'26"S, 149°33'45"W (STEBBING 1888). Off Cape Verde Islands, 1477 m. East Pacific Rise, Guaymas Basin.



1: Habitus; after STEBBING (1888).

**References:**

- CHEVREUX E. (1935) Résult. Camp. Sci. Prince Albert Ier de Monaco **90**: 1-214.  
STEBBING T.R.R. (1888) Rep. Sci. Results Voyage H. M. S. Challenger Years 1873-1876, Zoology **29**: 1-1737.  
VINOGRADOV G.M. (1993) Zool. Zh. **72**(2): 40-53 [in Russian].



*Euonyx mytilus* BARNARD & INGRAM, 1990

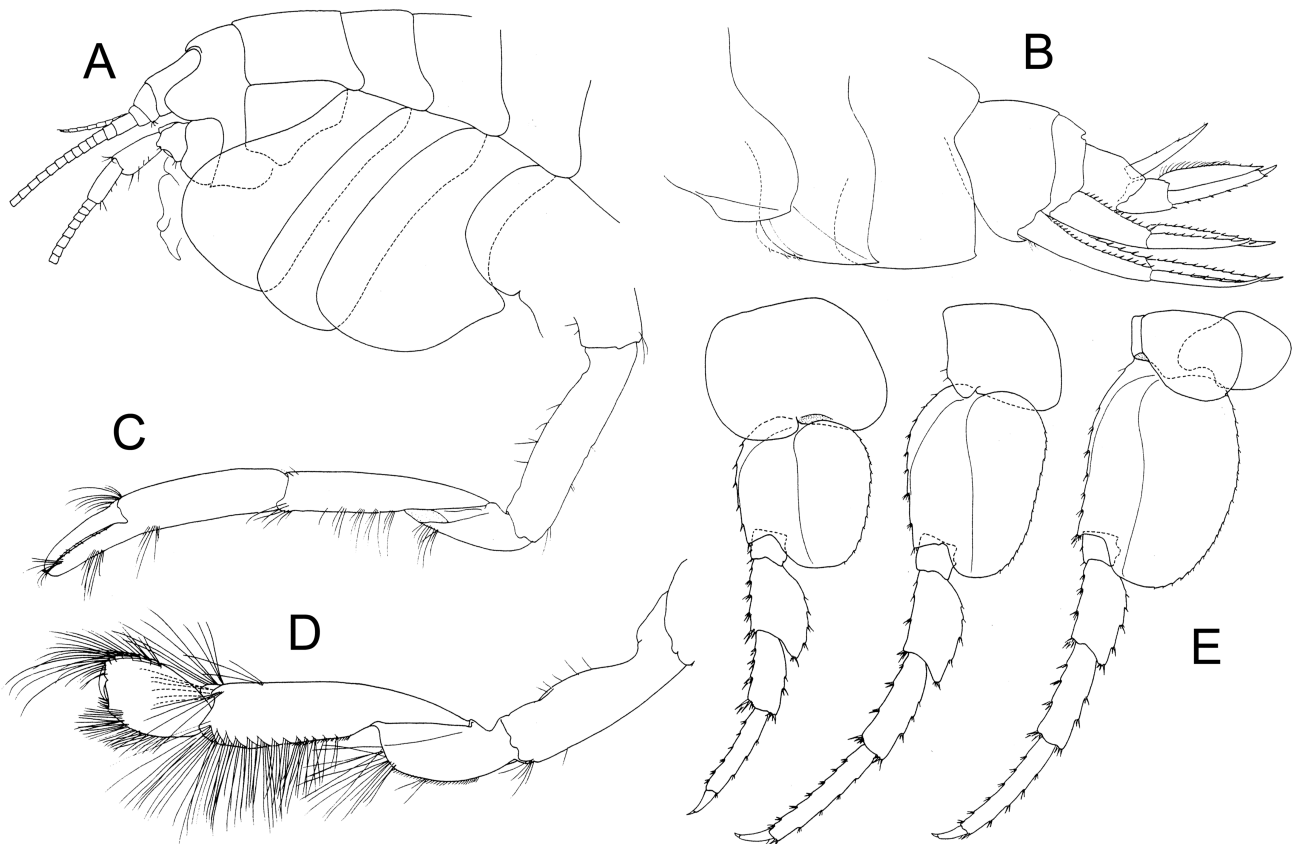
**Size:** Up to 20 mm.

**Morphology:** (Family) Body compact, robust. Coxae generally large. Antenna 1 peduncle article 1 large, inflated, articles 2-3 much shorter, often telescoped. Mouthparts very variable. Gnathopod 1 simple, subchelate or chelate. Gnathopod 2 characteristic for the family, slender and microchelate. Pereopods 5-7 basis usually broadly expanded. Telson variable. (Genus) Mandible with palp attached strongly distal. Inner plate of maxilla 1 weakly setose. Coxa 1 strongly shortened. Gnathopod 1 elongate. Inner ramus of uropod 2 without notch. Uropod 3 ordinary. Telson elongate, deeply cleft. (Species) Body lacking any prominent dorsal tooth. Lateral cephalic lobes rounded.

Gnathopod 1 with propodus about 1.2 times as long as carpus. Palm of gnathopod 2 long. Epimeron 2 with a strong tooth. Epimeron 3 with tiny posteroventral tooth.

**Biology:** Members of this genus come readily to baited traps and some appear occasionally associated with echinoderms and deep-sea corals. *Euonyx mytilus* was sorted from washings of vent clams, trapped also with baited traps, and also caught directly with a slurp gun around vent fauna.

**Distribution:** East Pacific Rise, 13°N; Galapagos Spreading Center: Garden of Eden and Rose Garden.



1: Female 20.04 mm; A: anterior portion of body, lateral; B: pleosome and urosome with uropods and telson attached, lateral; C: First gnathopod; D: second gnathopod; E: fifth to seventh pereopods; from BARNARD & INGRAM (1990).

**Reference:**

BARNARD J.L. & C. INGRAM (1990) *Smithson. Contr. Zool.* **499**: 1-80.

*Hirondellea glutonis* BARNARD & INGRAM, 1990

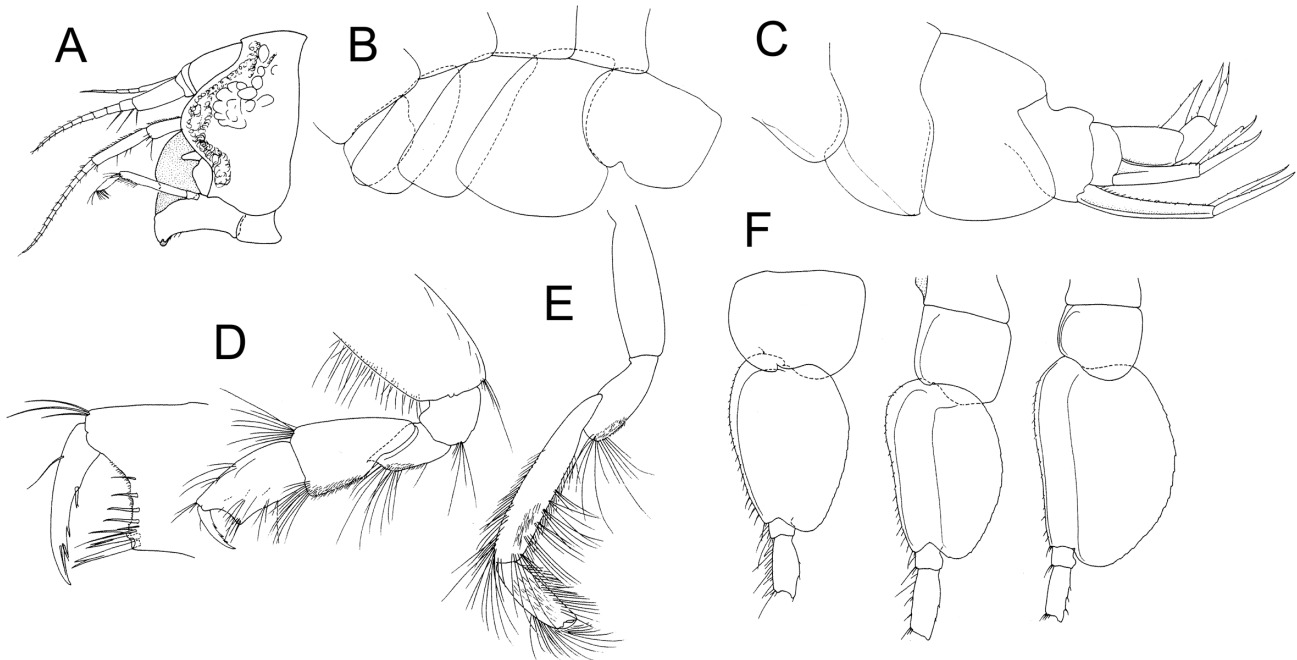
**Size:** Up to 12.6 mm.

**Morphology:** (Family) Body compact, robust. Coxae generally large. Antenna 1 peduncle article 1 large, inflated, articles 2-3 much shorter, often telescoped. Mouthparts very variable. Gnathopod 1 simple, subchelate or chelate. Gnathopod 2 characteristic for the family, slender and microchelate. Pereopods 5-7 basis usually broadly expanded. Telson variable. (Genus) Mandible with incisor ordinary, molar simple, palp attached opposite molar. Coxa 1 strongly shortened. Gnathopod 1 short, subchelate, palm transverse. Gnathopod 2, propodus greatly

shorter than carpus, propodus minutely chelate. Telson elongate, cleft. (Species) Dactylus of gnathopod 1 scarcely overlapping palm. Epimera 3 rounded behind. Inner ramus of uropod 2 constricted. Telson weakly cleft.

**Biology:** Attracted by baited traps, but caught also directly with slurp gun on and around, or sorted from vent mussel and clam washings. Most specimens had the midgut densely packed with bait food, and with the sternites ventrally extended.

**Distribution:** Galapagos Spreading Center, East Pacific Rise.



1: Female 12.45 mm; A: head; B: Detail of coxal plates of anterior pereopods; C: Pleosome and urosome with attached uropods and telson; D: First gnathopod; E: Second gnathopod; F: Proximal portion of pereopods 5-7; from BARNARD & INGRAM (1990).

**Reference:**

BARNARD J.L. & C. INGRAM (1990) *Smithson. Contrib. Zool.* **499**: 1-80.



*Tectoalopsis diabolus* BARNARD & INGRAM, 1990

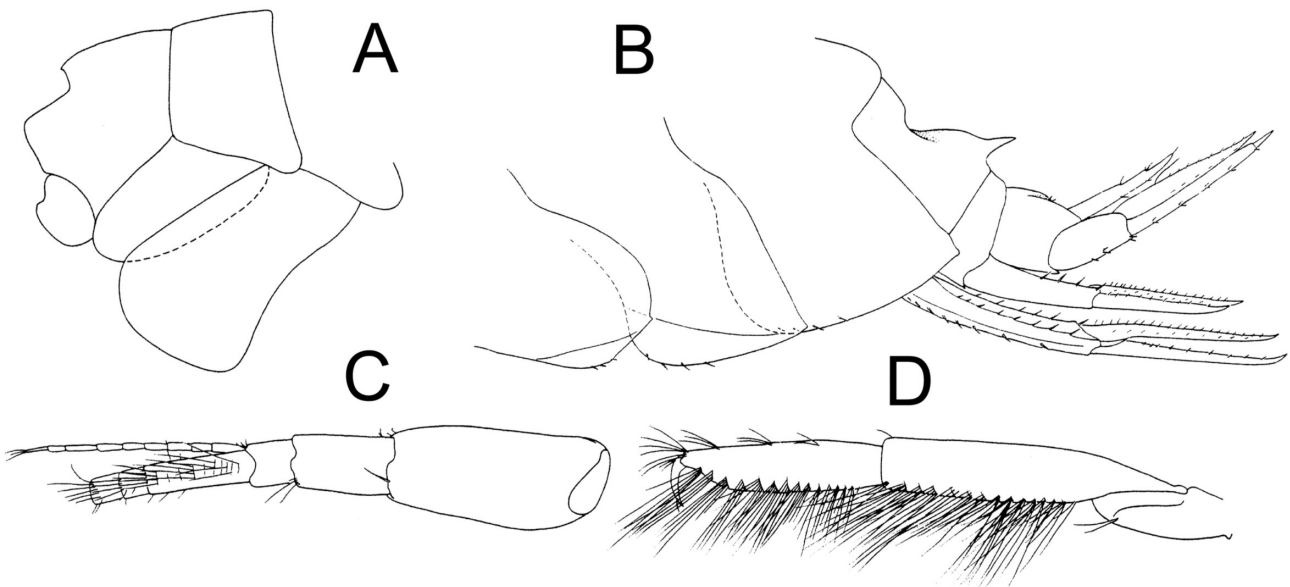
**Size:** Up to 23.4 mm.

**Morphology:** (Family) Body compact, robust. Coxae generally large. Antenna 1 peduncle article 1 large, inflated, articles 2-3 much shorter, often telescoped. Mouthparts very variable. Gnathopod 1 simple, subchelate or chelate. Gnathopod 2 characteristic for the family, slender and microchelate. Pereopods 5-7 basis usually broadly expanded. Telson variable. (Genus) Mandible with molar large, conical, setulose; palp attached strongly distal of molar. Coxa 1 strongly shortened. Gnathopod strongly subchelate. Urosomite 1 carinate. Telson elongate deeply cleft. (Species) Mandibular incisor with two teeth; right lacinia mobilis very small, flake-like, much broader than long; left lacinia also broader than long, evenly serrate; molar conical,

densely setulose, tapering to tiny apical plaque with weak triturative surface. Inner plate of maxillae with medial setae. Gnathopod 1 not elongate and subchelate, with reduced coxa. Palm of gnathopod 2 long, strongly oblique. Teeth on epimera 2-3 weak. Epimeron 2 lacking facial spine. Keel of urosomite 1 simple. Urosomite 3 with erect dorsal keel.

**Biology:** Unknown. Collected with slurp gun or baited traps.

**Distribution:** East Pacific Rise: 13°N. Apparently endemic to this vent site.



1: Female 19.1 mm; A: Head; B: Pleosome and urosome with uropods and telson attached; C: Antennule; D: Second gnathopod; from BARNARD & INGRAM (1990).

**Reference:**

BARNARD J.L. & C. INGRAM (1990) *Smithson. Contrib. Zool.* **499**: 1-80.

*Tectoalopsis wegeneri* BARNARD & INGRAM, 1990

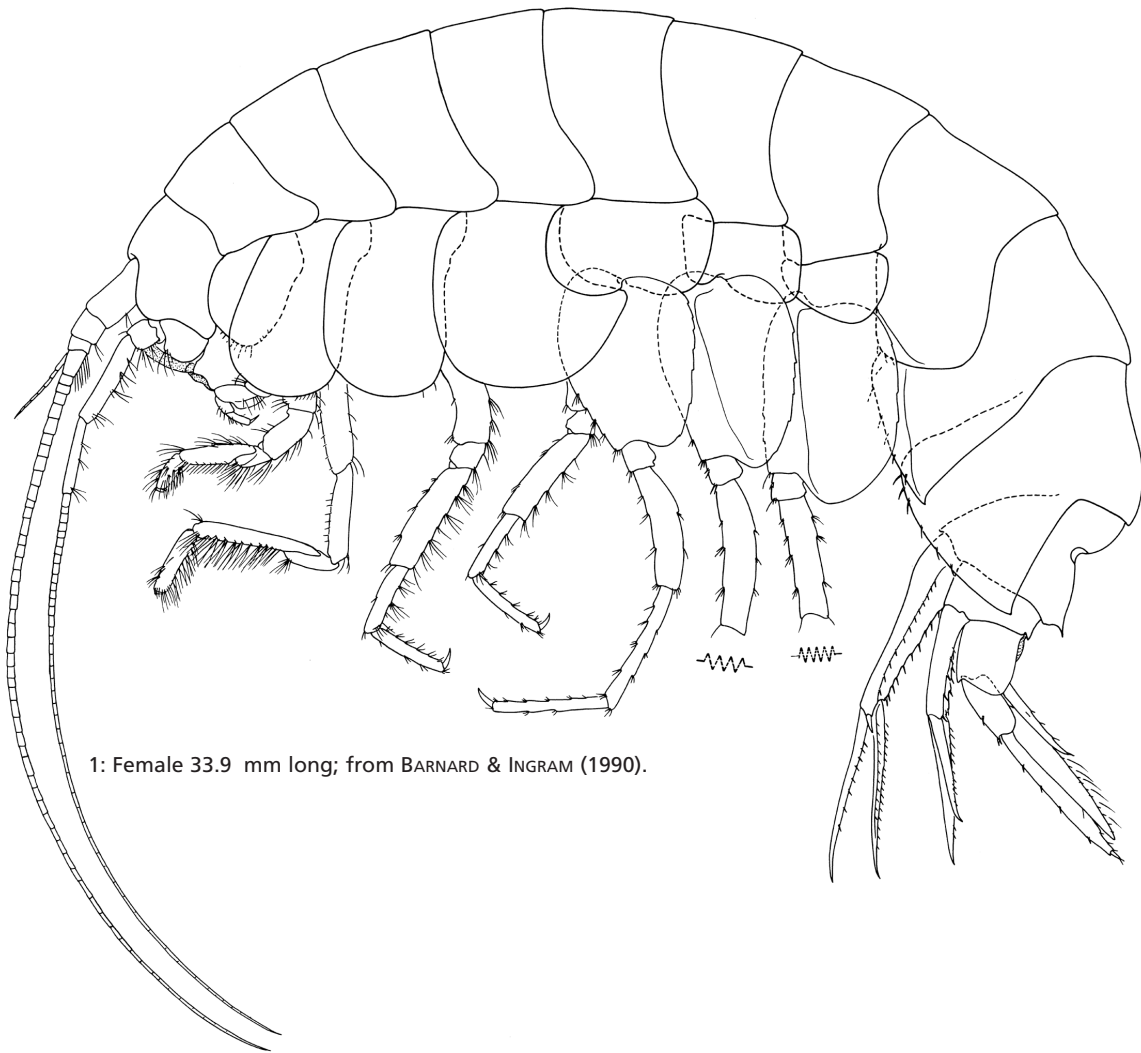
**Size:** Up to 33.9 mm.

**Morphology:** (Family) Body compact, robust. Coxae generally large. Antenna 1 peduncle article 1 large, inflated, articles 2-3 much shorter, often telescoped. Mouthparts very variable. Gnathopod 1 simple, subchelate or chelate. Gnathopod 2 characteristic for the family, slender and microchelate. Pereopods 5-7 basis usually broadly expanded. Telson variable. (Genus) Mandible with molar large, conical, setulose; palp attached strongly distal of molar. Coxa 1 strongly shortened. Gnathopod 1 strongly subchelate. Urosomite 1 carinate. Telson elongate deeply cleft. (Species) Similar to the foregoing *T. diabolus* BARNARD & INGRAM, 1990 except for: (1) the wider peduncle of antenna 1; (2) the slightly less tapering coxa 1; (3) the less

adz-shaped coxa 2; (4) the slightly stouter lobe of coxa 4; (5) the slightly weaker gnathopods with shorter carpus and propodus on gnathopod 2; (6) the less oblique palm of gnathopod 2; (7) the more numerous and more widely spread spines on epimera 2-3; (8) the less stronger dorsal projection of urosomite 2 and dorsal keel of urosomite 3; and (9) the outer ramus of uropod 2 a bit longer.

**Biology:** Largely unknown. Collected with slurp gun around *Alvinella* polychaetes.

**Distribution:** East Pacific Rise: 13°N. Apparently endemic to this vent site.



1: Female 33.9 mm long; from BARNARD & INGRAM (1990).

**Reference:**

BARNARD J.L. & C. INGRAM (1990) *Smithon. Contrib. Zool.* **499**: 1-80.

*Transtectonia torrentis* BARNARD & INGRAM, 1990

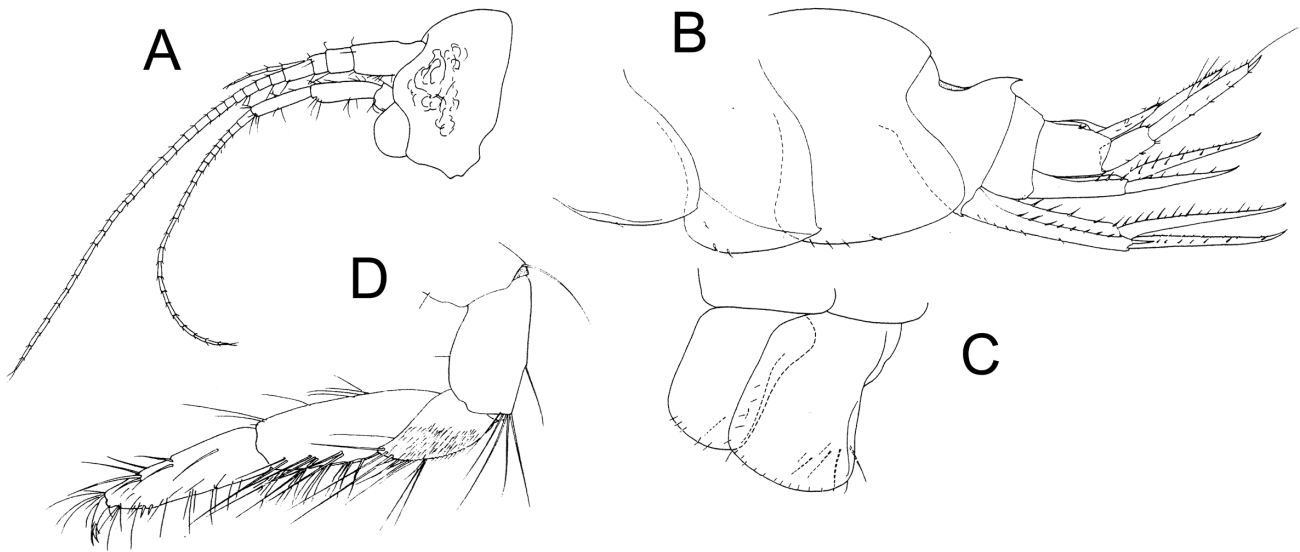
**Size:** Up to 21.2 mm.

**Morphology:** (Family) Body compact, robust. Coxae generally large. Antenna 1 peduncle article 1 large, inflated, articles 2-3 much shorter, often telescoped. Mouthparts very variable. Gnathopod 1 simple, subchelate or chelate. Gnathopod 2 characteristic for the family, slender and microchelate. Pereopods 5-7 basis usually broadly expanded. Telson variable. (Genus) Mandible with incisor strongly toothed, laciniae mobilis longer than broad, molar large, conical. Coxa 1 not shortened and no strongly covered by coxa 2. Pereopods 5-7 elongate, basis

strongly tapering. Urosomite 1 with a sharp dorsal tooth. Telson elongate, deeply cleft. (Species) Antennae especially short. Inner plate of maxillae setose medially only along distal half. Gnathopod 1, palm strongly oblique. Epimeron 3 rounded behind with six spines narrowly spread.

**Biology:** Caught associated with worms and attracted to baited traps.

**Distribution:** East Pacific Rise: 13°N. This monotypic genus is apparently endemic to this vent site.



1: Female 10.6 mm; A: Head; B: Pleosome and urosome with uropods and telson attached; C: Coxal plates of first and second gnathopods; D: First gnathopod; from BARNARD & INGRAM (1990).

**Reference:**

BARNARD J.L. & C. INGRAM (1990) *Smithson. Contrib. Zool.* **499**: 1-80.

*Pardalisca endeavouri* SHAW, 1989

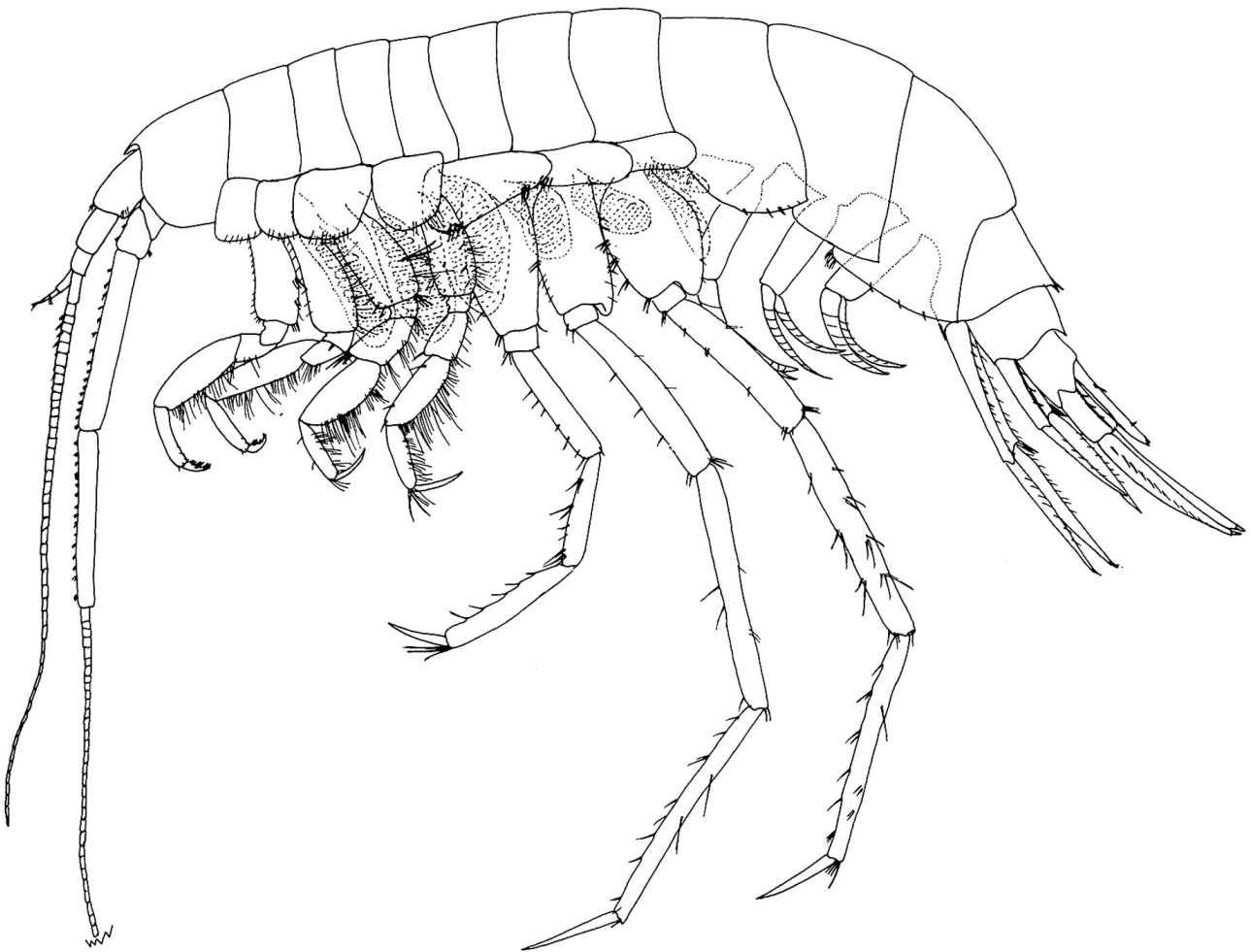
**Size:** 11.5 mm.

**Morphology:** (Family) Body laterally compressed, coxae short. Accessory flagellum well developed. Molar absent. Inner plate of maxilliped short to evanescent. (Genus) Rostrum small. Eyes absent. Mandible asymmetrical, incisor on left smooth, weakly toothed, on right strongly toothed. Palp of maxilla 1 apically expanded. Coxae 1-4 subquadrate. Gnathopods simple. Telson scarcely elongate, partly cleft. (Species) Body slender smooth. Antenna 2 with peduncle segments 3 and 4 elongate. Epimeron

3, posteroventral corner acute. Telson cleft to 80%, lobes widely separated, each apex tridentate, bearing paired marginal spines, in addition to paired penicillate setae on the upper face.

**Biology:** Unknown. Collected with slurp gun from the vicinity of siboglinids and archaeogastropods.

**Distribution:** Explorer Ridge: site Gulati Gusher.



1: Male 11.5 mm; after SHAW (1989).

**Reference:**

SHAW P. (1989) Can. J. Zool. **67**(8): 1882-1890.

*Seba profundus* SHAW, 1989

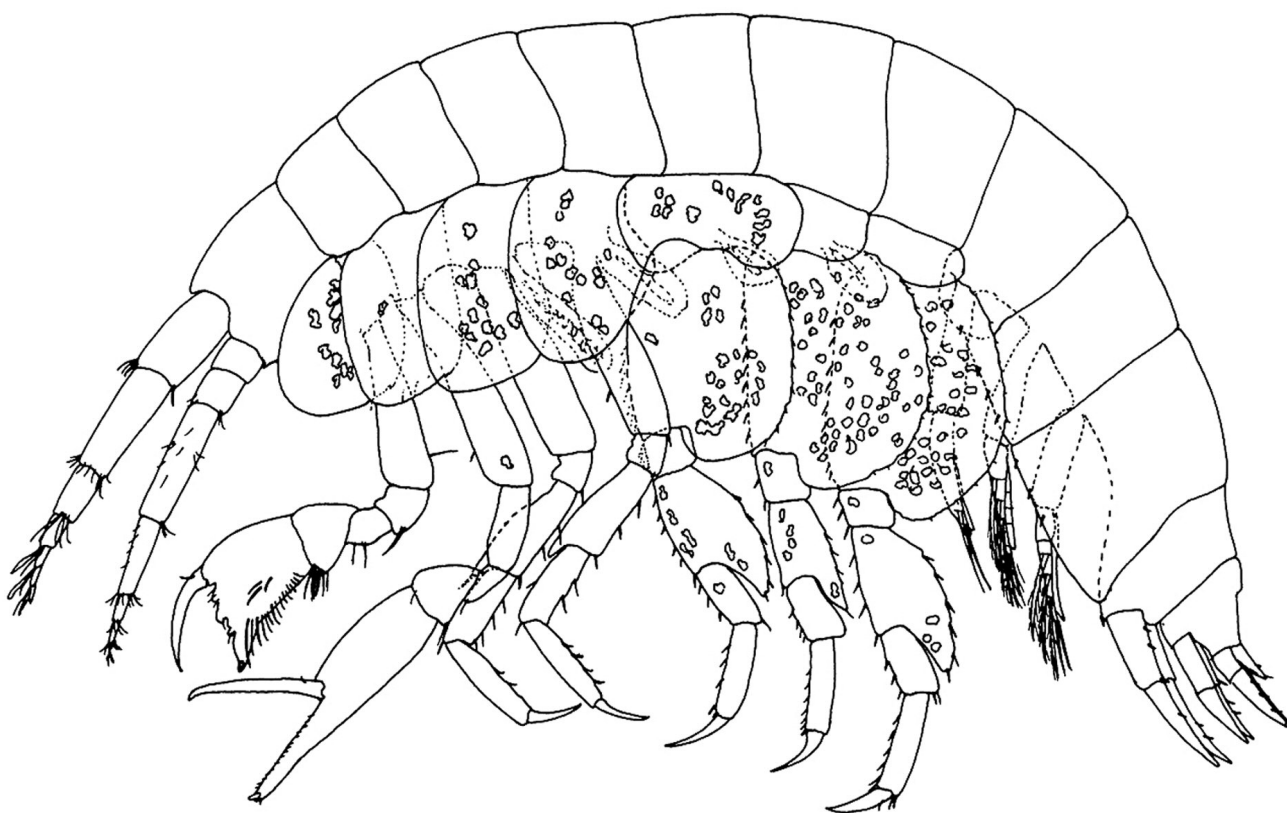
**Size:** Up to 3.5 mm.

**Morphology:** (Family) Urosomites 2-3 free or coalescent. Antenna 1, peduncle elongate, accessory flagellum two-articulate. Gnathopods 1-2 chelate or gnathopod 1 strongly subchelate. Gnathopod 1 larger than gnathopod 2. Uropod 3 uniramous. Telson entire. (Genus) Body slender. Urosomites 2-3 coalescent. Gnathopods diverse. Gnathopod 1 much the larger, subchelate or chelate. Gnathopod 2 strongly chelate. Telson linguiform. (Species) Body stout. Antennae subequal. Epimeron 3 lacking large posterodistal tooth. Gnathopod 1, subchelate, with posterodistal corner of propodus extending out from lon-

gitudinal axis of limb. Gnathopod 2 elongate, propodus slender. Basis of pereopods 5-7 evenly expanded, with convex anterior and posterior margins. Telson triangular, armed with two pairs of marginal setae.

**Biology:** Sorted from samples of associated vent fauna (the siboglinid *Ridgeia piscesiae* and archaeogastropods). Other members of the genus are typically associated either as a commensal or as inquiline with invertebrate hosts.

**Distribution:** Explorer Ridge: Crab Vent.



1: Male 3.4 mm; after SHAW (1989).

**Reference:**

SHAW P. (1989) Can. J. Zool. **67**(8): 1882-1890.

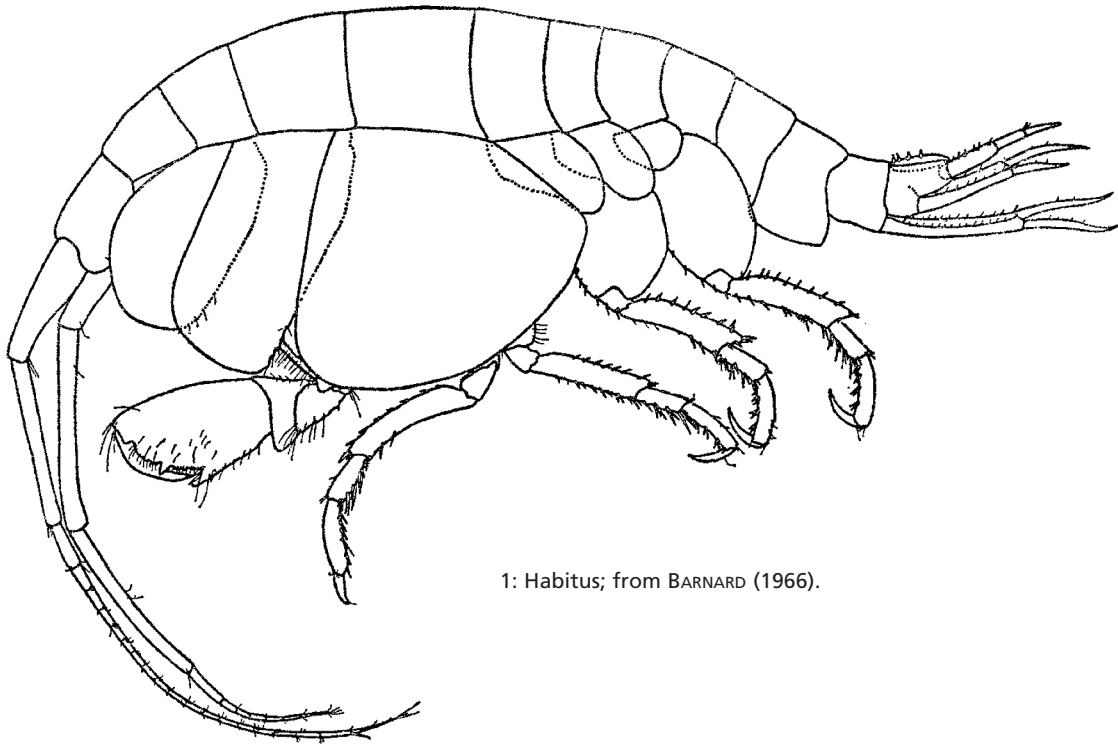
*Metopa (Prometopa) samsiluna* BARNARD, 1966

**Size:** 4.5 mm.

**Morphology:** (Family) Coxa 1 very small and partially covered by following coxae. Coxa 4 enlarged, shield-like, not posteriorly excavate. Uropod 3 uniramous. Telson entire. (Genus) Antenna 1 lacking nasiform process. Accessory flagellum absent or vestigial. Palp of mandible two- to three-articulate. Gnathopods 1-2 subchelate, different from each other in size and shape. Pereopod 5 with basis rectilinear. Pereopod 6-7 with expanded lobate basis. (Species) Eyes absent. Antennae very long. Accessory flagellum vestigial. Coxa 2 very broad. Gnathopod 1 short. Gnathopod 2 with a large medial tooth, defining corner with large tooth. Telson spinose.

**Biology:** Unknown.

**Distribution:** Originally described from the submarine canyons off southern California (San Clemente Rift Valley, 32°44'N, 118°12'W, 1096-1620 m). Found also in the Gulf of California, in the Guaymas Basin.



1: Habitus; from BARNARD (1966).

**References:**

BARNARD J.L. (1966) Allan Hancock Pac. Exped. **27**(5): 1-166.  
VINOGRADOV G.M. (1993) Zool. Zh. **72**(2): 40-53 [in Russian].