

A new genus of hemibranchiate sphaeromatid isopod crustacean from tropical Western Australia

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A new genus and species of marine sphaeromatid isopod is described from the North West Shelf (Indian Ocean) tropical Western Australia. *Kranosphaera haptomela* gen. nov. sp. nov. (Sphaeromatinae) is distinguished from other hemibranchiate genera by the strongly rugose and deeply pitted body surfaces, projecting epistome, uniramous uropodal rami, and in the male by modified pereopod 5 which is greatly expanded and 6 which has a coupling flange on the ischium. It is known only from the vicinity of the type locality.

KEYWORDS Crustacea, Isopoda, Sphaeromatidae, new genus, Indian Ocean, Western Australia.

Introduction

During 1982 and 1983 CSIRO conducted a biological survey of the North West Shelf of Australia, a region off Port Hedland, Western Australia. Large collections of invertebrates were made by beam trawl and epibenthic sled. Isopoda were well represented in the collections, the Sphaeromatidae being numerically the most abundant (Ward and Rainer, 1988) as well as diverse, with about 15 species (personal observation).

Among the sphaeromatids was an abundant species that could not be assigned to any Australian taxon, and equally could not be assigned to a genus using the key of Harrison and Ellis (1991). Superficially, the species appeared to be similar to *Moruloidea* Baker, 1908, *Waiteolana* Baker, 1926 and even some species of *Cymodopsis* Baker, 1926, but the unique mouthpart and pereopod morphology at once separated it from those genera. A new genus is established for this species.

All drawings of groups of appendages (antennule and antenna, pereopods, pleopods) are drawn at the same magnification. Type material is held at the Queensland Museum (QM). Paratypes are deposited at the Australian Museum, Sydney (AM), The Museum of Victoria (NMV) and the Western Australian Museum (WAM). PMS = plumose marginal setae. The posterior margins of many sphaeromatids are often covered by a dense pile of setule-like filaments. These are derived from cuticular scales (Fig. 4G) and that fringe is here referred to as setulose.

Taxonomy

Family SPHAEROMATIDAE Latreille, 1825
Subfamily SPHAEROMATINAE Latreille, 1825

Kranosphaera gen. nov.

Diagnosis. Body rugose, heavily calcified, without dorsal process on pereon or pleon. Eyes with ocelli obscured by calcified cuticle. Coxae of pereonite 5 overlapping those of

pereonites 4 and 6. Pereonite 7 manifestly narrower than 6, with coxae not reaching lateral or ventral body line. Pleon composed of 4 segments: segment 1 entire; segments 2–4 fused, with sutures reaching to posterolateral margin. Pleotelson with apex produced, without ventral channel.

Antennule peduncle article 1 massive, robust; not produced to form plate; article 2 less than half as long as articles 1 or 3; article 3 slender. Antenna peduncle articles approximately colinear; flagellum shorter than peduncle. Episome with anterior margin projecting. Mandible with incisor conical, unicuspidate; spine row represented by 3 (left) or 2 (right) spines; lacinia mobilis absent; molar process large, flattened and smooth. Maxillule lateral lobe with gnathal spines simple; medial lobe with 4 spines with reduced setulation or serration. Maxilliped palp articles 2–4 with strongly produced setigerous medial lobes; article 5 elongate, distally with about 20 simple setae; endite with about 6 spines in distal margin 3 of which are serrate, and 2 spines on distomedial margin. Pereopod 1 not modified. Pleopods 1–3 with prominent PMS; exopod of pleopods 3–5 with conspicuous transverse suture; endopods of pleopod 4 and 5 with prominent transverse thickened ridges; exopod 5 with three scaled lobes. Uropods without exopod.

Male. Pereopod 1 robust; posterior margin without fringe of setules. Pereopods 2–4 similar, ischium to propodus of pereopods 2 and 3 with setulose fringe; pereopod 4 propodus without setulose fringe. Pereopod 5 greatly enlarged, inflated smooth in appearance. Pereopod 6 slender, with posteroproximal flange on ischium. Pereopod 7 slender. Penes elongate, separate, basally adjacent. Pleopod 1 endopod medial margin with recessed groove (which receives appendix masculina). Pleopod 2 appendix masculina basally attached, elongate.

Female. Mouthparts metamorphosed. Pereopod 1 similar to that of male. Pereopods 2–6 similar to each other, setulose fringe weak on pereopods 2–5, absent on 6 and 7. Oostegites present on sternites 2–4, overlapping at midline; oostegite 4 reaching to posterior of pereon; embryos retained within body.

Type species. *Kranosphaera haptomela* n.sp., by designation.

Etymology. From the Greek, *kranos* (rugged, rocky) and *-sphaera* indicating the family affinity. Gender is feminine.

Remarks. The prominent thickened folding of the endopods of pleopods 4 and 5 unambiguously places this genus in the subfamily Sphaeromatinae. Within that subfamily all genera have either both uropod rami present (e.g. *Cymodoce*, *Sphaeroma*, *Zuzara*, *Clanella*, see Harrison and Holdich, 1984) or the endopod reduced with the exopod prominent and articulating (e.g. *Cilicaea*, *Paracilicaea*, see Harrison and Holdich, 1984). Several genera have the exopod small, but obvious (e.g. *Waiteolana*, *Cymodopsis*, *Ceratocephalus* Woodward (Haswell, 1884), *Cassinidella* Whitelegge, 1901). *Kranosphaera* is therefore immediately separable from all other sphaeromatine genera in having uniramous uropods consisting of only the endopod.

Waiteolana Baker, 1926 and the hemibranch genus *Moruloidea* Baker, 1908 show a similarity to *Kranosphaera* in body form (Harrison, 1984), all having a strongly vaulted body shape with rugose and nodulose body surfaces. *Waiteolana* has in common a projecting epistome (a feature also of *Ceratocephalus* and some cassinidine genera), but

differs in details of the mouthparts, pereopods and pleopod morphology. In *Kranosphaera* the mandibles are unicuspidate (multicuspid in *Waiteolana*), the lacinia mobilis is absent (present), the spine row is reduced (developed) and the molar a smooth flat plate (conical cusp). The pereopods of *Kranosphaera* males are unique within the Sphaeromatidae, while those of *Waiteolana* are of usual form of pereopods 2–7 basically similar to each other. The first pair of pleopods of *Waiteolana* are more elongate than those of *Kranosphaera* and furthermore lack the recessed groove on the medial margin of pleopod 1. *Kranosphaera* also has pereonite 7 reduced in size, while in *Waiteolana* it is as wide as the preceding segment.

Moruloidea also presents a similar form, especially in the shape and articulation of coxa 5, but again one finds that numerous details of the mouthparts and pereopods separate the two genera.

At present it is not possible to hypothesize relationships, or a sister group to *Kranosphaera*. The mandibles show several apomorphic characters such as the loss of the lacinia mobilis, reduction of spine row and unicuspidate incisor; additionally the spines of the maxillule and maxilla are simple or very nearly so. The remarkable pereopod morphology is unique and the phylogenetic aspects of the inflated enlarged fifth pereopod cannot be assessed.

Kranosphaera haptomela n. sp.

(Figs 1–5)

Material examined. All material from the North West Shelf, Western Australia, coll. T. Ward—CSIRO.

Holotype. ♂ (7.4 mm), 19°29.4'S, 118°52.5'E, 24 October 1983, 39 m depth (QM W17988).

Paratypes. 5♂ (6.9, 7.0, 7.2, 7.4, 7.5 mm), 2♀ (6.2, 6.5 mm, non-ovig), imm (4.7 mm), + microslides, same data as holotype (QM W17989). 2♂ (7.7, 8.4), 14♀ (ovig 7.4, 13 non-ovig 5.7–7.4 mm), 3 manca (4.0, 4.0, 4.4 mm), 20°00.3'S, 117°00.2'E, 4 September 1983, 52 m depth (QM W17990). 6♂, 44♀, 19°42.6'S 118°53.4'E, 12 February 1983, 40 m depth (QM W17991). 8♂, 3♀ (ovig), 5♀ (non-ovig), 19°56.6'S, 117°53.8'E, 22 April 1983, 42.5 mm depth (QM W17992).

Additional paratypes. ♂♂, ♀♀, 20°00.4'S, 117°00.2'E, 22 February 1983, 54 m depth (WAM). ♂♂, ♀♀ 19°59.5'S, 117°03.3'E, 22 February 1983, 52 m depth (AM P41016, NMV J27476).

Description of male. Body about 1.5 times as long as wide, anterior crudely rectilinear in shape. Dorsal surface granulose; with deep pits and nodular processes on posterior margins of pereonites 2–6; body capable of complete folding with anterior and posterior ventral margins fitting exactly to each other. Cephalon about 4 times as wide as long; anterior margin with two submedial domes; moderately immersed in pereonite 1. Pleon mediodorsal surface raised. Pleotelson dorsal surface bidomed.

Antennule peduncle article 1, 1.5 times as long as wide; article 2 shortest, about 0.4 as long as article 3; article 3 slender, 5.8 times as long as wide; flagellum with 15 articles, about as long as combined lengths of peduncle articles 1 and 2. Antenna peduncle articles 1–3 short, articles 4 and 5 subequal in length and longest; flagellum shorter than

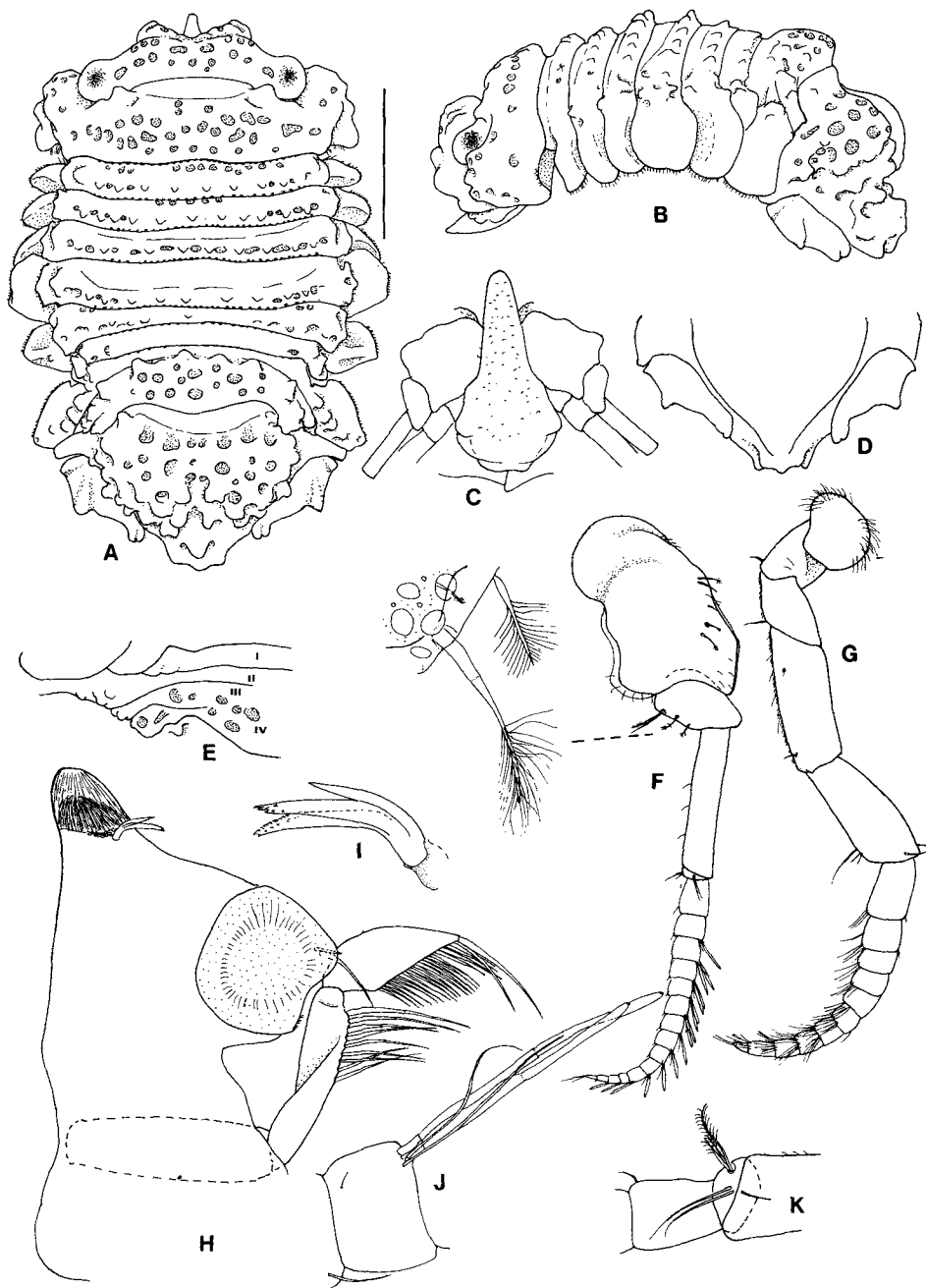


FIG. 1. *Kranosphaera haptomela* n.sp. A-E, holotype, remainder male paratype 7.4 mm (QM W17989). A, Dorsal view; B, lateral view; C, epistome; D, pleon, ventral view; E, pleonites, lateral view showing segment i-iv; F, antennule and detail; G, antenna; H, mandible; I, spine row, left mandible; J, antennule flagellum, article 4; K, antenna peduncle articles 3 and 4. Scale line represents 2.0 mm.

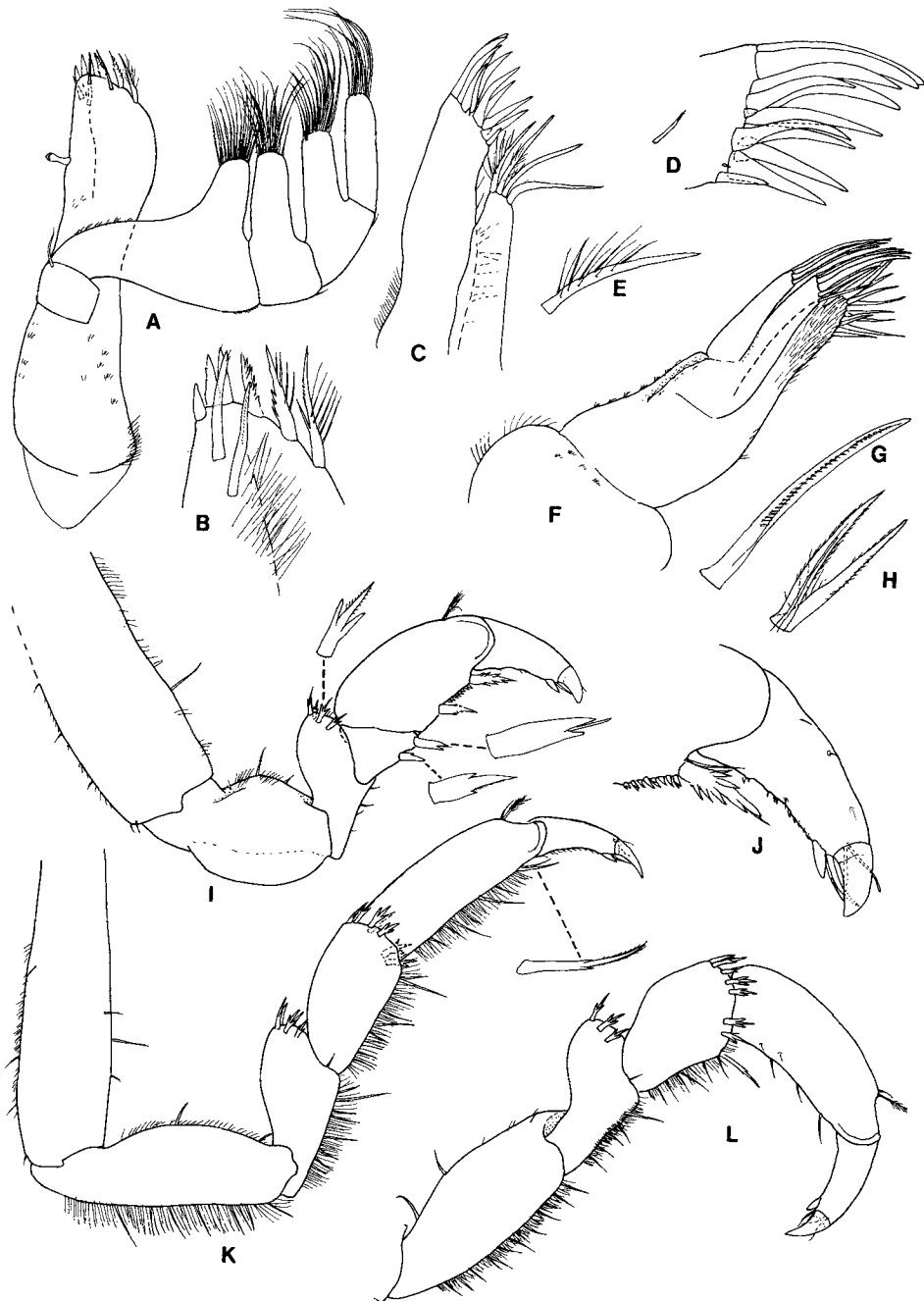


FIG. 2. *Kranosphaera haptomela* n.sp. All figs of male paratype 7.4 mm (QM W17989). A, maxilliped; B, maxilliped endite, dorsal view; C, maxillule; D, maxillule lateral lobe apex; E, lateralmost spine, maxillule medial lobe; F, maxilla; G, maxilla spine no. 4, middle lobe; H, maxilla medial lobe, spines nos. 5 and 6; I, pereopod 1; J, pereopod 1 dactylus; K, pereopod 2; L, pereopod 4.

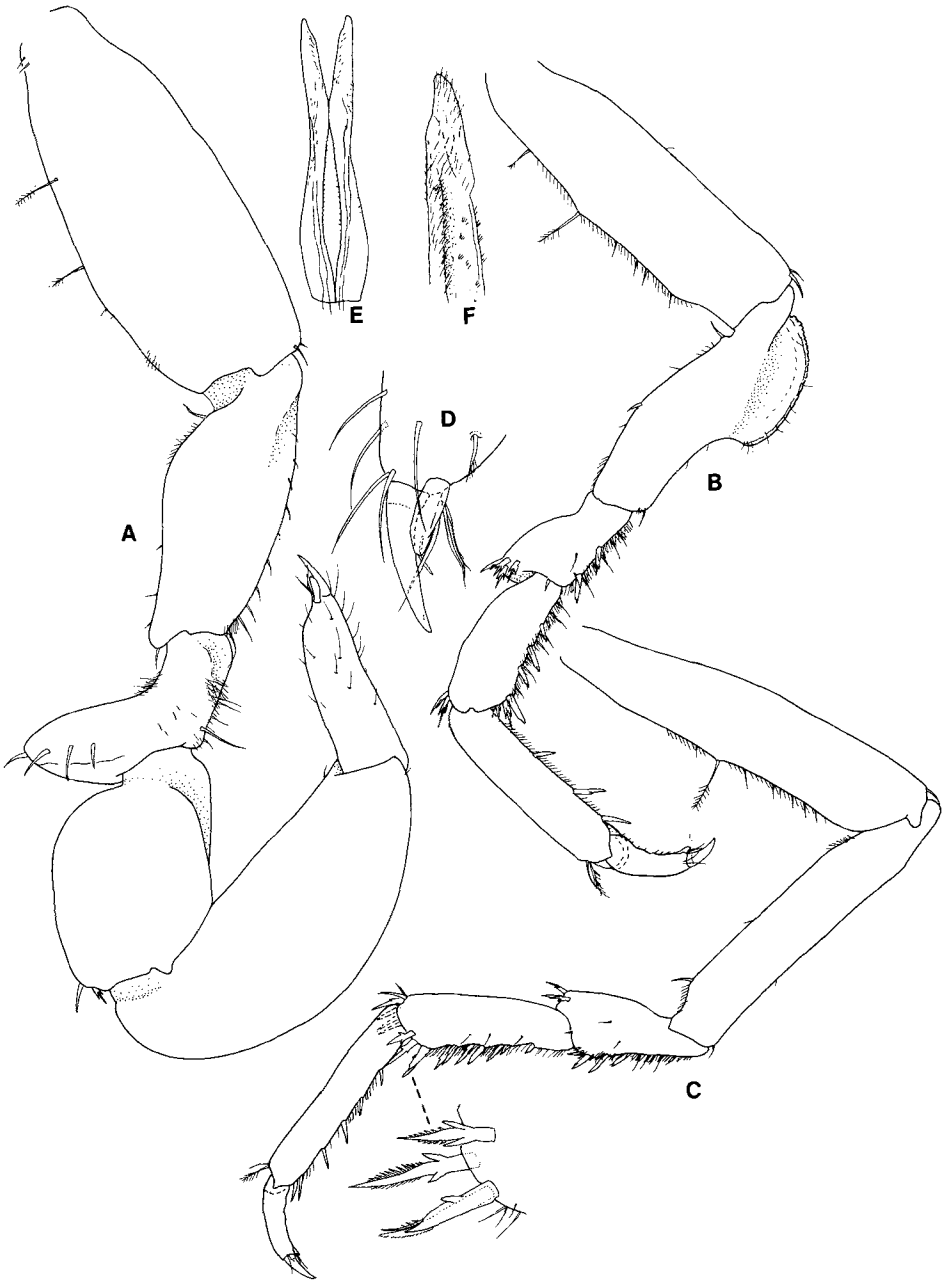


FIG. 3. *Kranosphaera haptomela* n.sp. All figs of male paratype 7.4 mm (QM W17989). A-C, pereopods 5-7 respectively; D, pereopod 5, unguis detail; E, penes; F, apex of penial process.

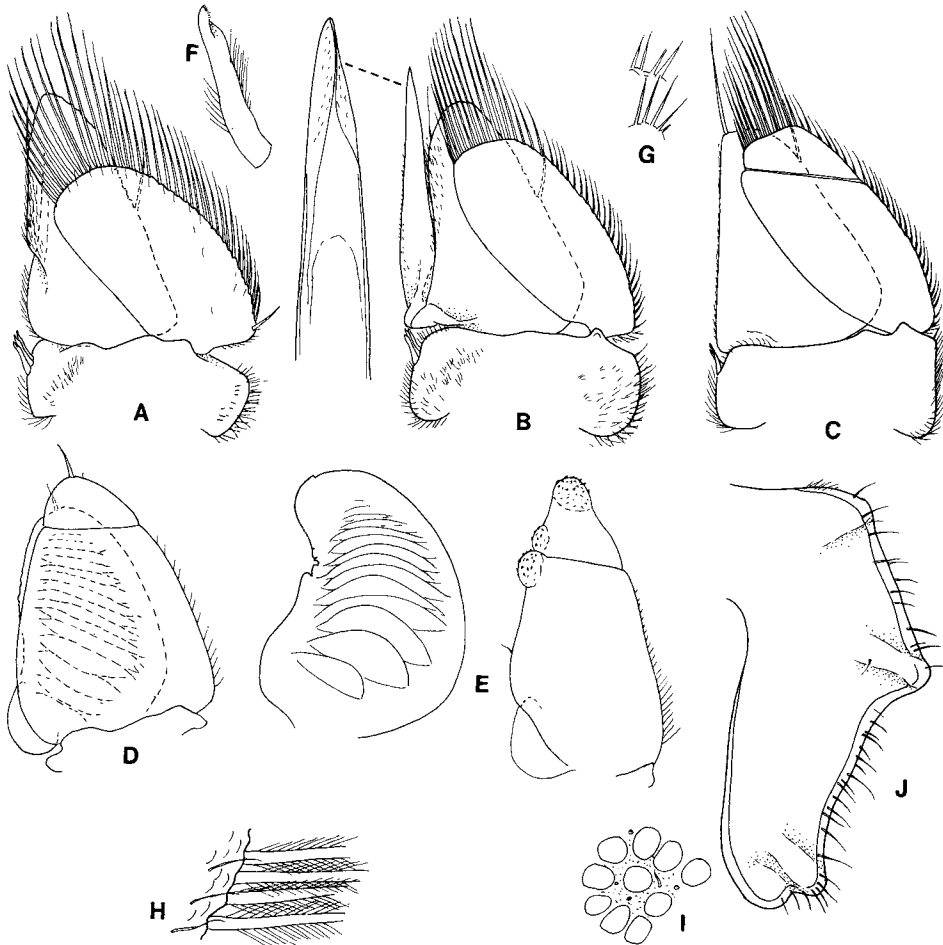


FIG. 4. *Kranosphaera haptomela* n. sp. All figures of male paratype 7.4 mm (QM W17989). A-E, pleopods 1-5 respectively; F, coupling hook, pleopod 3; G, scales, pleopod 2, peduncle; H, base of PMS, pleopod 1, exopod; I, surface detail, uropod; J, uropod.

peduncle, consisting of 12 articles, each provided with abundant simple setae. Epistome with anterior portion elongate, produced; visible in dorsal view.

Mandible palp article 1 longest; article 2 with about 9 serrate setae on distolateral margin; article 3 with 22 serrate setae on medial margin. Maxilla with 5 and 6 finely serrate spines on lateral and middle lobes respectively; medial lobe with about 10 plumose or serrate spines in two ranks (dorsal and ventral). Maxilliped palp articles 2-5 each with about 14-20 simple setae at distal extremity.

Pereopod 1 ischium with indistinct flange on posterior margin; single spine and setulose fringe on anterior margin; merus with 4 trifid spines on anterodistal angle; carpus with 2 bifid spines on posterior margin; propodus with two large serrate spines on posterior margin, between these spines a series of denticular scales. Pereopod 2 longer and more slender than 1; posterior margins without prominent spines, with simple setae and dense setulose fringe; anterodistal angle of merus with 4 trifid spines; distal margin of merus with 6 trifid spines. Pereopod 3 similar to pereopod 2. Pereopod 4 merus anterodistal angle more strongly lobed; carpus with 7 trifid spines on distal

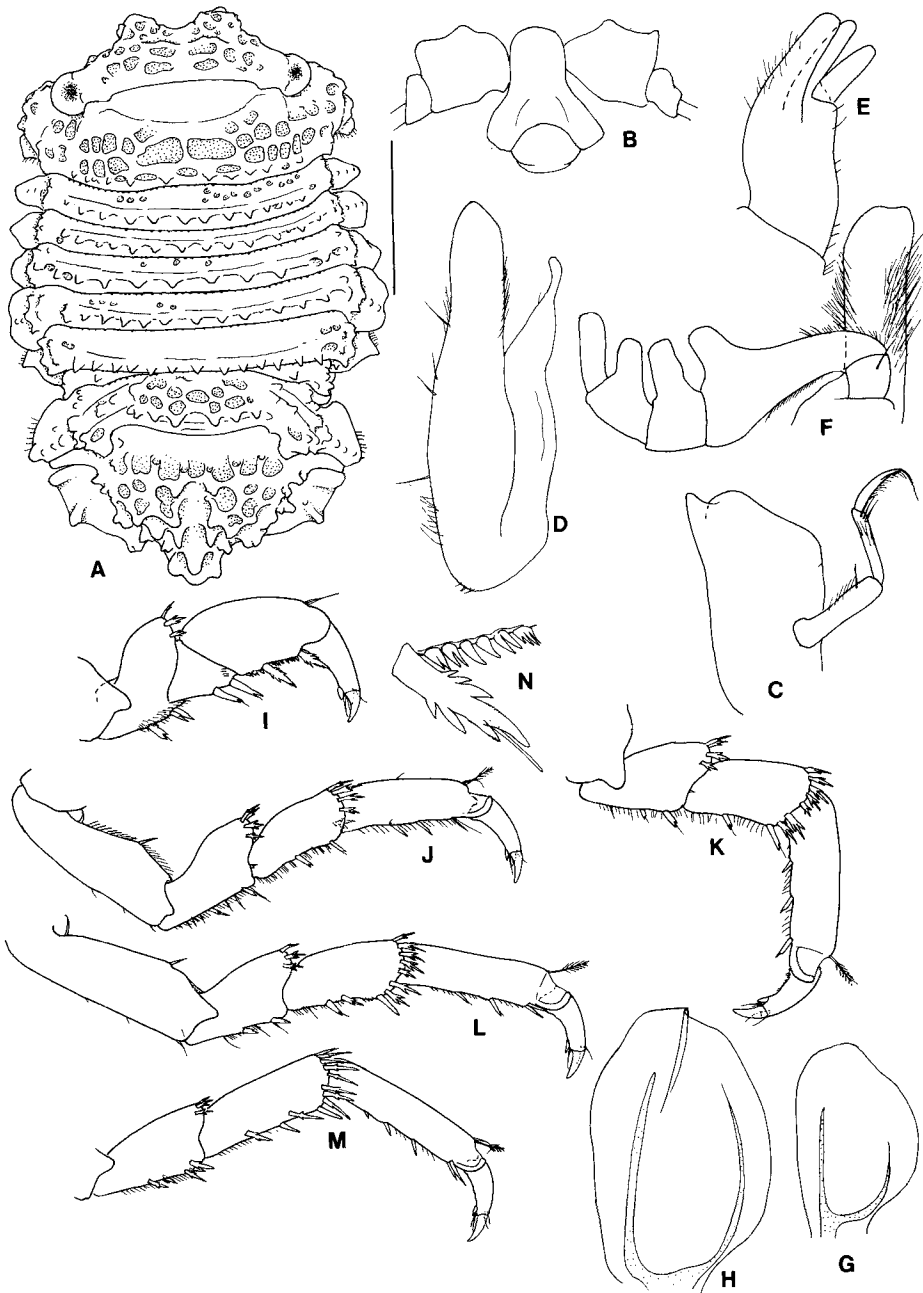


FIG. 5. *Kranosphaera haptomela* n.sp. A, B; female paratype, 7.4 mm (QM W17990); A, dorsal view; B, epistome; C-F, M, L, ovigerous female (QM W17990); C, mandible; D, maxillule; E, maxilla; F, maxilliped; G, oostegite no. 2; H, oostegite no. 4; I-N, non-ovigerous female 7.2 mm (QM W17990). I-M, pereopods 1, 2, 5-7 respectively; N, proximal spine, pereopod 1 propodus. Scale line represents 2.0 mm.

margin; propodus without setulose fringe. Pereopod 5 smooth, without setulose fringe, propodus and dactylus reflexed against carpus, appearing cylindrical in section; dactylus with scattered simple setae; ischium posterior margin with sparse short setae; carpus with anterior margin produced, with 4 acute spines. Pereopod 6 slender; ischium without setulose fringe; merus with 2 spines on posterior margin, 4 trifold spines at anterodistal angle; carpus with 4 simple spines on posterior margin, 2 trifold spines at posterodistal angle, 2 trifold spines at anterodistal angle; propodus with 3 spines on posterior margin. Pereopod 7 slender, ischium with single slender spine at anterodistal angle; carpus with 8 spines on posterior margin, further single spine on mediolateral margin and 6 spines on distolateral margin; propodus with 6 spines along palm.

Penes with sub-acute apex; about 8 times as long as basal width.

Pleopod 1 peduncle with 3 coupling hooks; endopod with about 20 PMS, exopod with about 35. Pleopod 2 appendix masculina widest at about one-third of its length, apex acute, with appearance of folded margins; endopod and exopod with about 22 and 36 PMS respectively. Pleopod 3 endopod and exopod with about 12 and 39 PMS respectively. Pleopod 4 exopod proximolateral margin with continuous row of short simple setae; apex with single prominent feebly plumose seta; proximomedial lobe present. Pleopod 5 exopod lateral margin with setules; proximomedial lobe present. Uropod articulating in dorsoventral plane only; lateral margin with anteromedial boss; posterior margin with boss and shallow indentation.

Female. Dorsal surfaces similar to male, often more rugose, sometimes with pits forming reticulate pattern. Epistome shorter than male, apex bluntly rounded, projecting, but not visible in dorsal view. Pereopod 1 similar to that of male; pereopods 2–7 subsimilar, with setulose fringe absent or weak on posterior margins; pereopods 6 and 7 shorter than those of male, with more trifold spines on distal margin of carpus than in the male (8 and 9 respectively).

Colour. Tan to white in alcohol; chromatophores not apparent. Incisor brown; molar process clear yellow.

Size. Males 6.9–8.4 mm, females 5.7–7.4 mm. Largest manca 4.4 mm.

Habitat. The stations from which these specimens were collected consist primarily of sand (70–98%) and gravel (4–25%) substrata (Ward and Rainer, 1988).

Remarks. This species, with its uniquely pitted and rugged surfaces, uniramous uropod and, in the male, massive fifth pereopods, poses no problems in recognition.

The function of the remarkable fifth legs can only be speculated on, but would be assumed to relate to reproductive or mating behaviour. The flange on the ischium of pereopod 6 couples closely to the ischium of pereopod 5, and it appears that pereopod 6 may act in tandem with, and probably control the movement of, pereopod 5.

Distribution. Common in the area of collection, having been taken at about half of all stations sampled, at depths between 39 and 54 m. Of 43 samples, two only were from depths of 83 m.

Etymology. The epithet is derived from the Greek words *hapto* (to grasp, lay hold of) and *melos* (limb), and alludes to the unusual fifth and sixth pereopods.

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