

THE SYSTEMATICS OF SOME JAPANESE MARINE ISOPODS
(FAM. SPHAEROMATIDAE) OF THE GENERA *DYNOIDES* BARNARD,
1914 AND *CYMODOCELLA* PFEFFER, 1887, WITH DESCRIPTIONS OF
TWO NEW SPECIES

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Contained within a collection of cirrolanid isopods brought back from Japan by Dr. D. A. Jones, were a small number of sphaeromatid isopods. Amongst the species, those of taxonomic interest included two species of the genus *Dynoides*, of which one was new to science, and also an undescribed species of *Cymodocella*.

All specimens, other than those collected by means of a night light, were from a single sample of a substrate made up of the tubes of the polychaete *Pomatoleios kraussi* (Baird) (cf. Bruce & Jones, in press) collected in Sendai Bay, Kyushu. The night sample was taken from Iso Beach, Kinko Bay at high tide.

The collection of male and females of *Dynoides* has allowed an expansion of the generic description given by Barnard (1914) based only on the male. It is the only genus other than *Dies* Barnard, 1951, that possesses fused penes, and appears unique in that the male loses the segmentation of the exopod of the 3rd pleopod on reaching maturity. The type specimens have been deposited at the Osaka Museum of Natural History (OMNH).

***Dynoides* Barnard, 1914**

Dynoides Barnard, 1914: 407; Loyola e Silva, 1960: 91.

Paradynoides Loyola e Silva, 1960: 101.

Dynoidella Pillai, 1965: 78.

Dynoidella Nishimura, 1976: 275.

Maxillipeds with 2nd, 3rd, and 4th segments of palp inwardly produced. Anterior pereopods without natatory setae. Margin of coxae with setae appearing almost membranous. Male with outer ramus of pleopod 3 unsegmented, penes entirely fused along proximal half of their length. Uropods broad, lamellar, subequal in length; outer ramus of uropod with lateral margin folded up. Pleon with or without median dorsal process. Telson with a slit with denticulate sides and a small inwardly directed lobe at the anterior end projecting into the slit. Female with outer ramus of pleopod 3 segmented. Uropods lamellate, rounded, subequal in length, not extending beyond telson, which has a posterior notch.

Dynoides dentisinus Shen, 1929

Dynoides dentisinus Shen, 1929: 65, figs. 1-23; Nunomura & Nishimura, 1976: 21, fig. 1.
Dynoidella conchicola Nishimura, 1976: 275, figs. 1-19; Nunomura & Nishimura, 1976: 22, fig. 2.

Material examined. — Ca. 50 specimens from Sendai Bay, Kyushu Island, Japan and 20 specimens from night plankton. The material comprises males and females in various developmental stages from manca to mature individuals. Coll. Dr. D. A. Jones.

There were a small number of immature males with only a partially developed dorsal process on the pleon. In these the outer ramus of pleopod 3 was still segmented and the appendix masculina had not reached its typical form. Comparison of these and small females with the figures given by Nishimura (1976) leave no doubt that *Dynoidella conchicola* Nishimura is a junior synonym of *Dynoides dentisinus*, this possibility having already been considered by Nunomura & Nishimura (1976). A feature not previously mentioned is the presence of numerous small tubercles on the pleotelson of males and females.

Dynoides brevispina sp. nov. (figs. 1—4)

Material examined. — 1 ♂ holotype: OMNH-Ar. 1749, 12 ♀♀ paratypes: OMNH-Ar. 1750-1761.

Type locality. — Sendai, Kyushu Island, Japan. Ca 20 ♀♀ from night plankton, Iso Beach, Kinko Bay, Kyushu. Coll. Dr. D. A. Jones.

Description of the male. — Body with subparallel sides, slightly more than twice as long as broad (fig. 1a). Cephalon with interorbital ridge and small rostral point. Epistome (fig. 2e) with anterior margin truncate, posterior margin rounded with truncate extremities.

Peraeon segment 1 longest, about half as long again as segment 2. Hind margins with small denticles and becoming progressively more setose towards the posterior segments. Coxae of segments 2-6 rounded; coxae of peraeon segment 6 large, produced posteriorly, concealing coxae of segment 7 (fig. 1d). Margins of coxae with closely compacted setae.

Pleon with a median dorsal process (fig. 1a), which is about half the width of the pleon, and each distal angle is also produced.

Antennule (fig. 1c) with short flagellum reaching halfway along peraeon segment 1 (fig. 1d); the peduncle just reaches the eye. Peduncular segment 1 longest, just in excess of the combined lengths of peduncular segments 2, 3, and 4 (fig. 1c). Antenna slender with flagellum extending to hind margin of peraeon segment 1 (fig. 1b). Peduncular segment 1 very short; segments 2 and 3 subequal in length; peduncular segment 5 half as long again as segment 4, which is twice as long as segment 3.

Mouthparts: Mandible with robust incisor (fig. 2c), lacinia mobilis with six pectinate spines. Mandibular palp with segment 2 bearing two plumose setae on the outer distal margin; segment 3 with 10 plumose setae, the terminal seta being distinctly larger than the rest. Maxillule (fig. 2f) with one simple and four plu-

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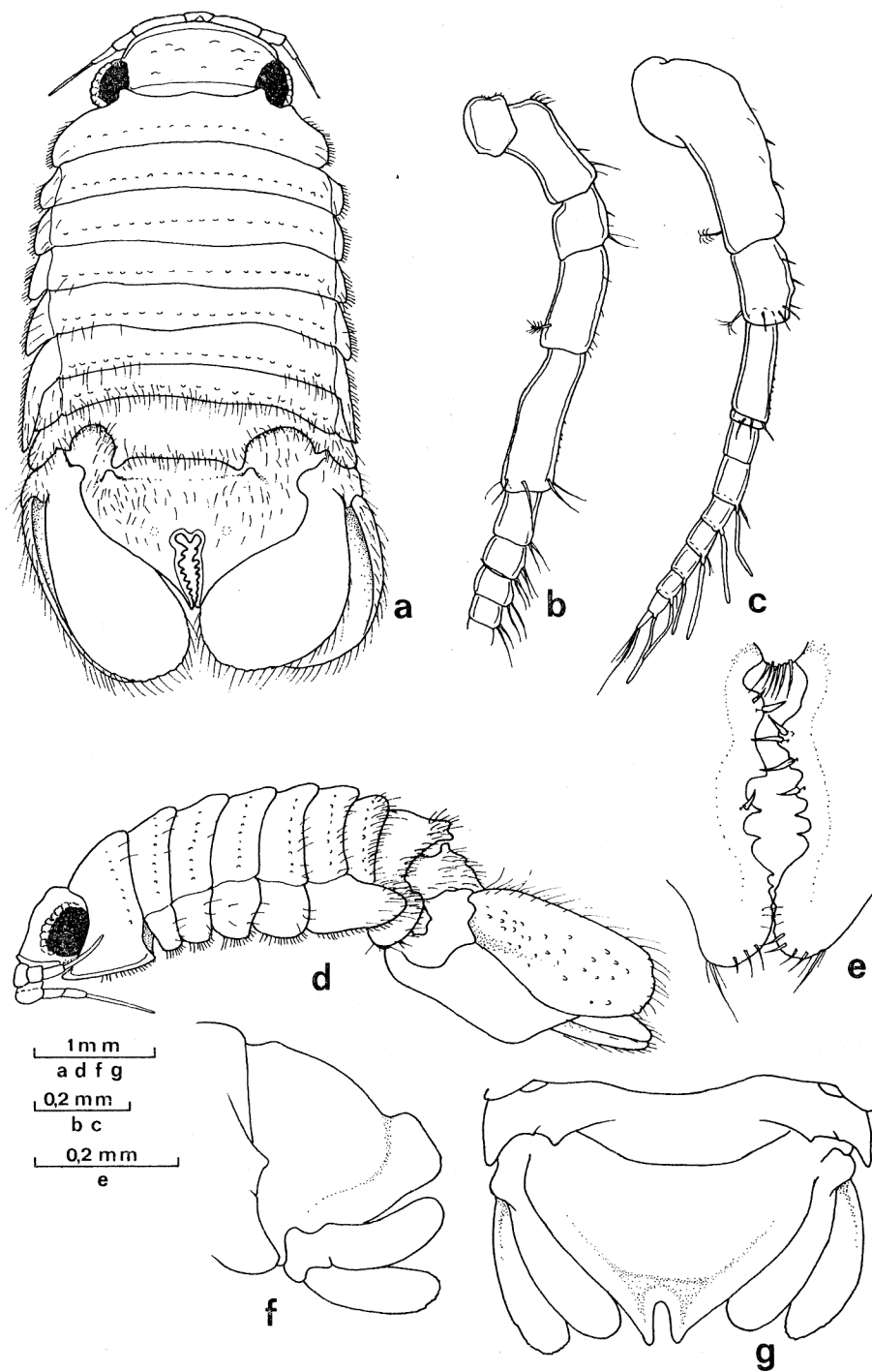


Fig. 1. *Dynoides brevispina* sp. nov. a, ♂ holotype, dorsal view; b, antenna; c, antennule; d, ♂ holotype, lateral view; e, ♂ telsonic sinus; f, ♀ telson and uropods, lateral view; g, ♀ pleotelson, dorsal view.

mose setae on the terminal margin of the endopod; exopod with five teeth, two simple and three dentate spines. Maxilla (fig. 2b) with four pectinate and seven plumose setae on the endopod; palp and exopod with five serrulate spines each.

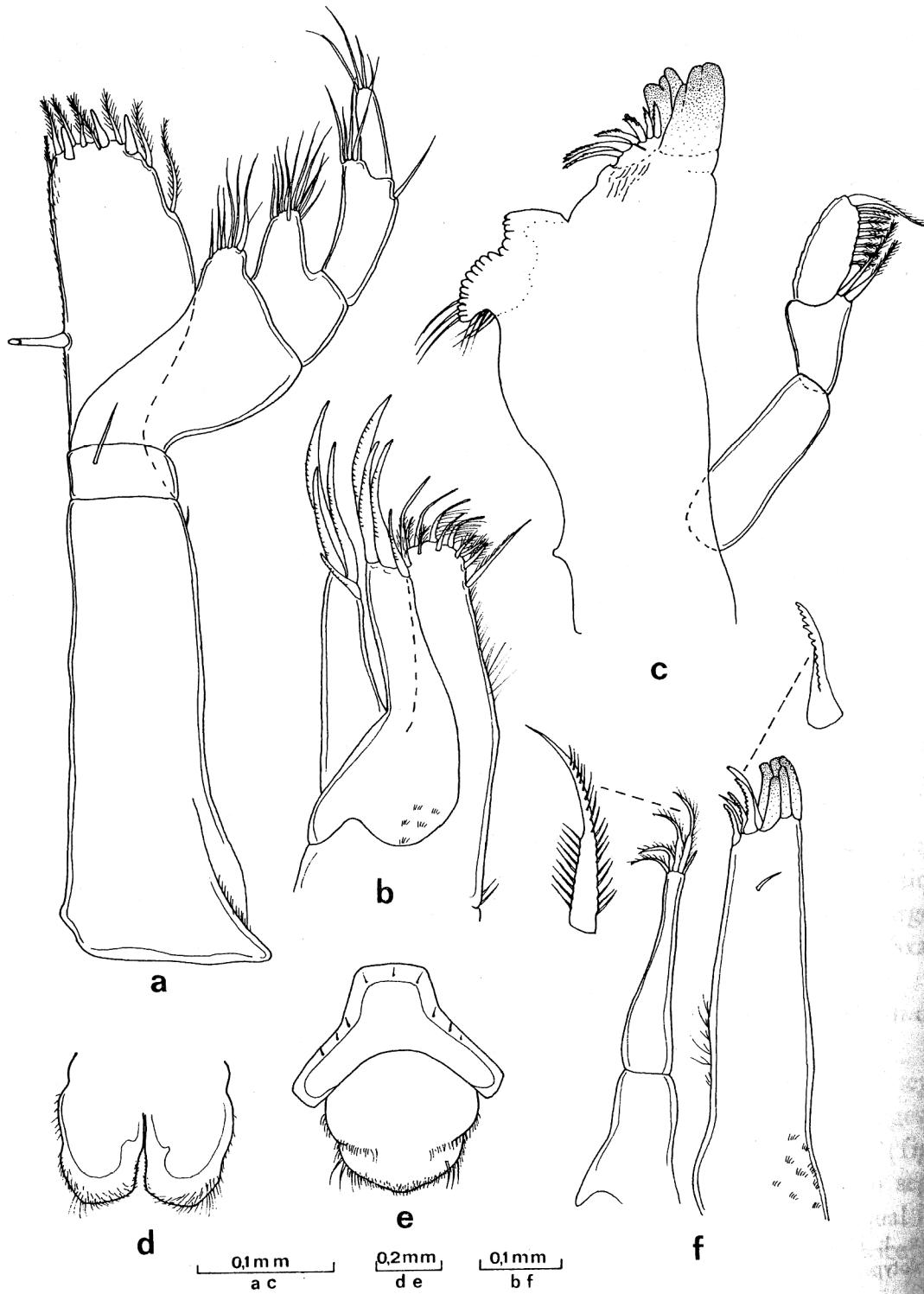


Fig. 2. *Dynoides brevispina* sp. nov., ♂. a, maxilliped; b, maxilla; c, left mandible, dorsal view; d, lower lip; e, epistome and upper lip; f, maxillule.

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Maxilliped (fig. 2a) with palp segments 2 and 3 inwardly produced, segment 4 only slightly so. Endite with a single coupling spine and armed with three stout spines and nine plumose setae on its distal margin.

Peraeopod 1 short, robust (fig. 3b); basis and ischium subequal in length; margins of ischium with a fringe of short setae; carpus short, about 1/3 the length of the propodus. Peraeopod 7 (fig. 3a) slender, propodus exceeding the combined length of carpus and merus; distal corners of merus each with a single stout spine, carpus with a single spine on its outer distal angle and two spines on the inner distal angle. All peraeopods with a secondary unguis on the dactyl.

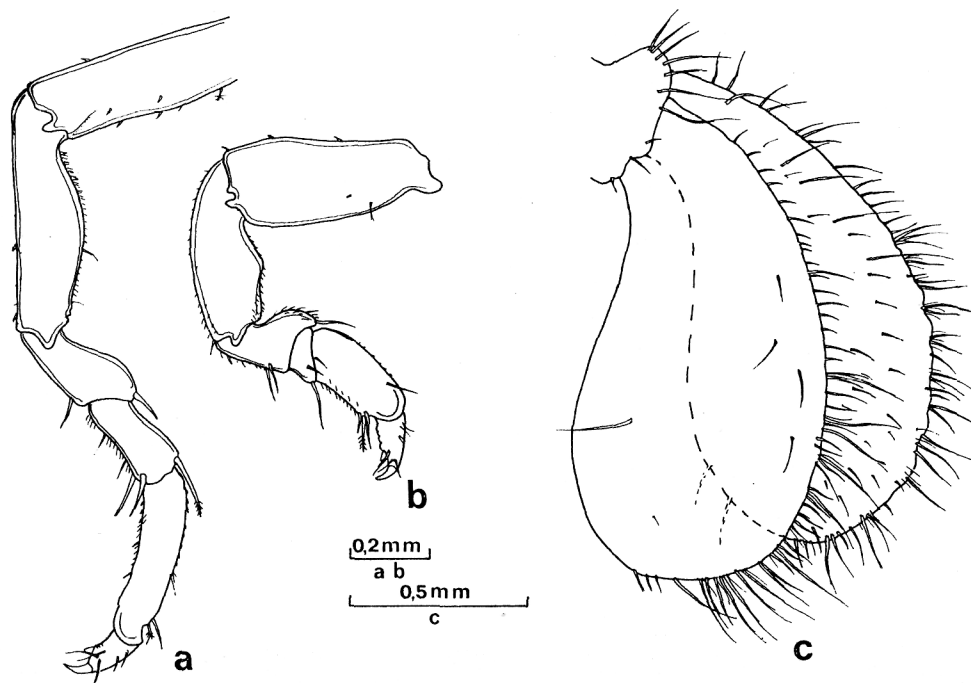


Fig. 3. *Dynoides brevispina* sp. nov., ♂. a, peraeopod 7; b, peraeopod 1; c, uropod.

Penes long (fig. 4f) entirely fused along the proximal half of their length. Distal exterior margin with minute spinules.

Pleopod 1 (fig. 4a) with two coupling spines on the inner margin of the peduncle; prominent spine present at proximal outer angle of exopod. Pleopod 2 (fig. 4b) with appendix masculina about twice the length of the endopod; distal half slender, tapering doubled back on the proximal half; peduncle with two coupling spines. Pleopod 3 (fig. 4c) with two coupling spines; endopod about twice the width of the exopod. Pleopod 4 (fig. 4d) with a 2-segmented exopod; endopod with eight fleshy folds. Pleopod 5 (fig. 4e) with the exopod 2-segmented; two subapical spinulose protuberances are present and also a third on the basal part of the inner margin; endopod with six fleshy folds.

Telson (fig. 1a) setose with two tubercles opposing those of the dorsal process. Posterior notch elongate with a constriction midway and a small lobe at the anterior end, projecting posteriorly into the sinus (fig. 1e).

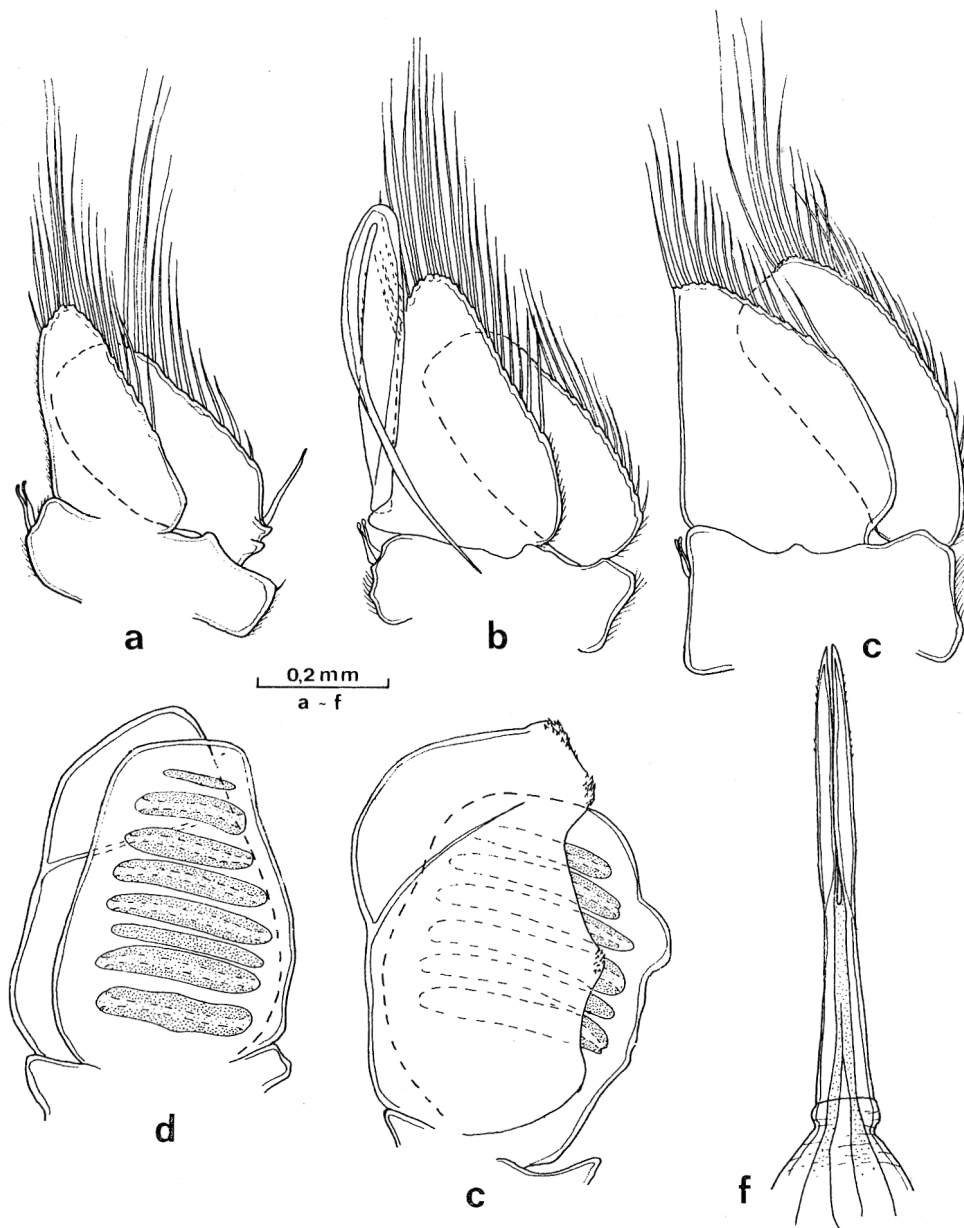


Fig. 4. *Dynoides brevispina* sp. nov., ♂. a-e, pleopods 1-5; f, penes.

Uropods (fig. 3c) broad lamellar, extending beyond the telson by about half the length of the latter. Exopod with numerous setae present on outer margin; its anterior outer margin folded at a right angle to the plane of the uropod; and the under-surface beset with scattered denticles.

Female. — Smaller than the male in most individuals. Coxae with characteristic, closely compacted setae. Telson (fig. 1f) in the form of a flattened dome. Posterior margin slightly produced (fig. 1a) with an open notch. Exopod of pleopod 3 is 2-segmented. Uropods rounded, lamellar, about 3 times as long as broad, not extending beyond the telson.

Colour. — Pale to dark brown in formalin, all specimens with a conspicuous brown to orange, oval blotch on the dorsal surface of the peraeon.

Length. — Males 5 mm, females up to 4 mm.

Remarks. — This species is easily distinguished from all other known species of *Dynoides* by the short dorsal process of the pleon and the conspicuously large coxae on peraeon segment 6. The only other species which has had the female described is *D. dentisinus*, and the females of these two Japanese species are very similar. The female of *D. brevispina* has the dome of the telson somewhat flattened, whilst in *D. dentisinus* it is bilobed. Also the telson of *D. brevispina* tends to be smooth with few setae, whilst *D. dentisinus* has tubercles and may also be setose. Probably the easiest way to distinguish the two species in the field is by the presence of a dorsal brown blotch in *D. brevispina*. This was not seen in any of the specimens of *D. dentisinus*.

Cymodocella Pfeffer, 1887

Cymodocella Pfeffer, 1887: 18, 30; Hansen, 1905: 80; Stebbing, 1910: 430; Hodgson, 1910: 31; Barnard, 1914: 421; Menzies, 1962: 138; Hurley & Jansen, 1977: 29.

Cymodocella marginata sp. nov. (figs. 5—7)

Material examined. — 1 ♂ holotype: OMNH — Ar. 1762, 1 ♀, 2 ♂♂ paratypes: OMNH-Ar. 1763-1765.

Type locality. — Sendai, Kyushu Island, Japan. Coll. Dr. D. A. Jones.

Description of the male. — Body ovate, about twice as long as its greatest width (fig. 5e), surface smooth. Epistome (fig. 5d) pentagonal, coming to a point anteriorly.

Peraeon segment 1 very slightly longer than segment 2, peraeon segments 5 and 6 longest. Coxae without distinct suture, vertical, becoming progressively larger posteriorly. Coxae 7 largest, rounded triangular in shape (fig. 5a). Hind margin of peraeon segment 7 produced into two lobes.

Pleon with two large tubercles on either side of the median line. Sutures not distinct.

Antennule (fig. 5b) with the flagellum extending to the posterior margin of peraeon segment 2 (fig. 5a). Peduncular segment 1 robust, half as long again as peduncular segment 3; peduncular segment 2 shortest, about half the length of the third peduncular segment. Antenna (fig. 5c) slender, flagellum composed of nine articles, just extending into peraeon segment 3, and about equal in length to the antennal peduncle.

Mouthparts: Mandible (fig. 6a) with stout incisor; lacinia mobilis with three pectinate spines. Palp long, extending to tip of mandible; segments 1 and 2 subequal in length, segment 3 about half the length of segment 2. Segment 2 with four plumose spines on the outer margin, becoming progressively longer distally. Terminal segment with seven stout, plumose spines, the terminal spine conspic-

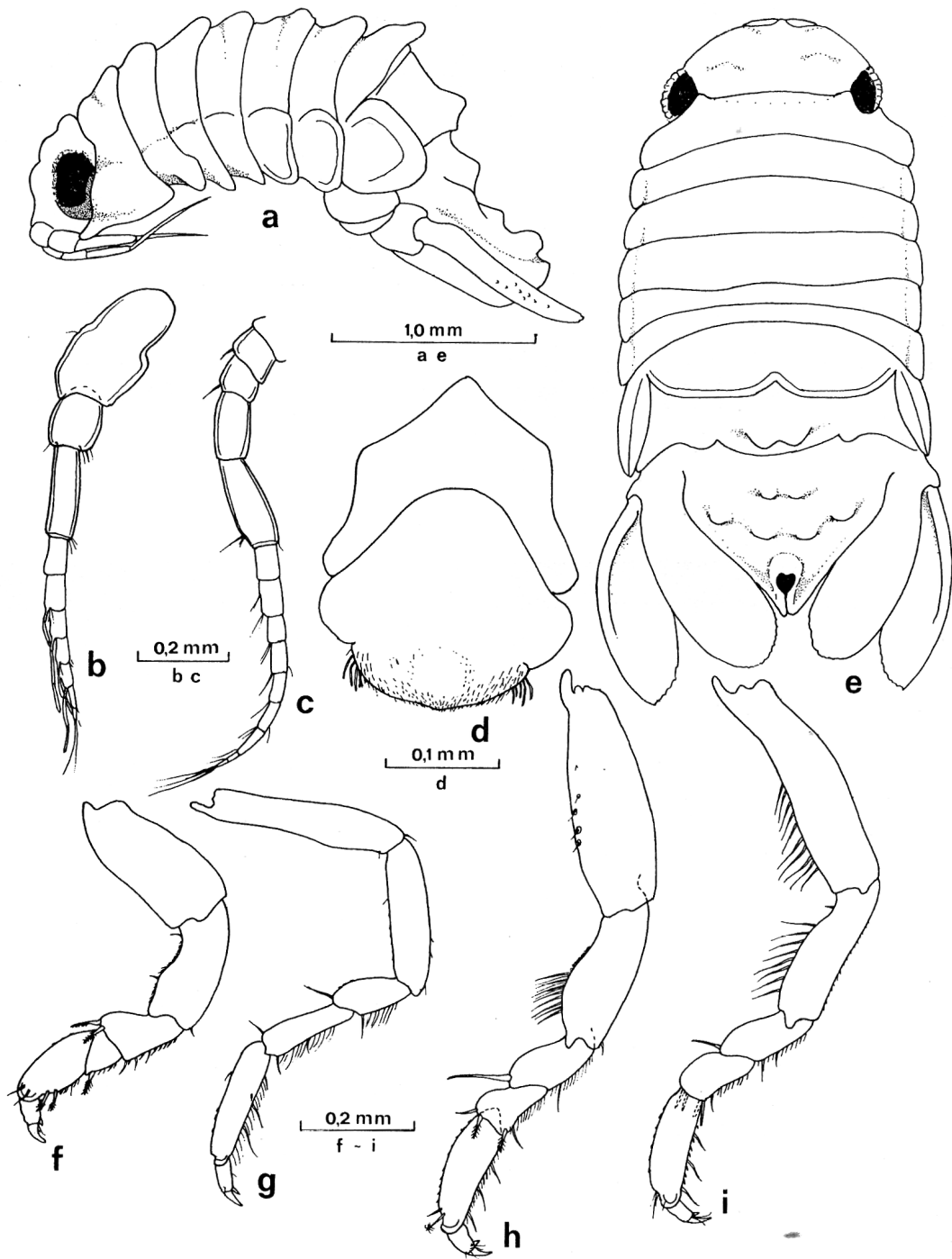


Fig. 5. *Cymodocella marginata* sp. nov. a, holotype ♂, lateral view; b, antennule; c, antenna; d, epistoma and upper lip; e, holotype ♂, dorsal view; f, peraeopod 1; g, peraeopod 2; h, peraeopod 6; i, peraeopod 7.

ously longer. Maxillule (fig. 6c) with seven simple and three plumose spines on the terminal part of the endopod; exopod with three teeth and one simple and three denticulate spines. Maxilla (fig. 6b) with three plumose and four pectinate

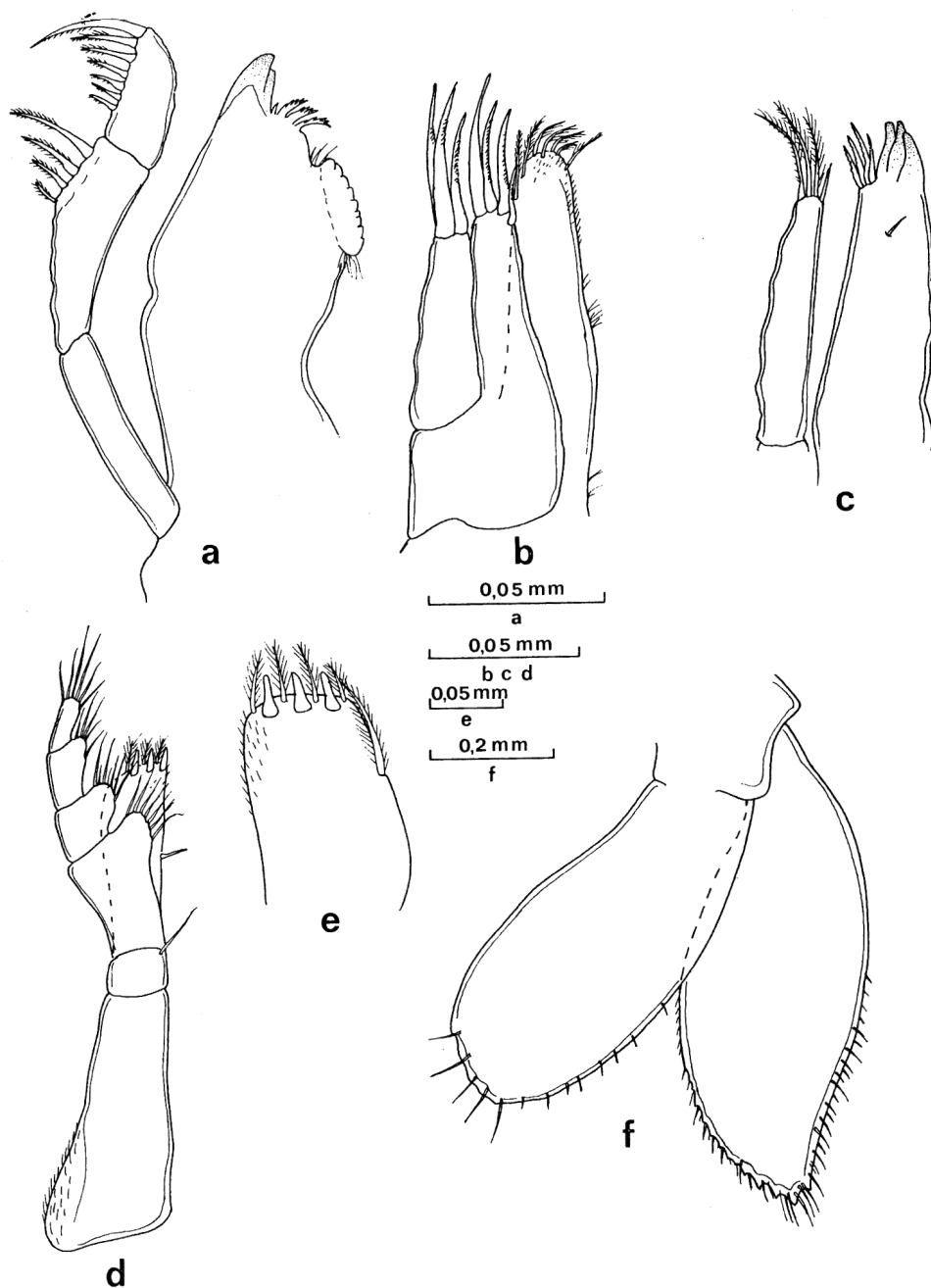


Fig. 6. *Cymodocella marginata* sp. nov. a, left mandible; b, maxilla; c, maxillule; d, maxilliped; e, apex of endite of maxilliped; f, uropod.

setae on the endopod; palp and exopod with three and four denticulate spines, respectively. Maxilliped (fig. 6d) with palp segments 2-4 moderately produced on the inner margin; segments 4 and 5 extend beyond the endite. Endite (fig. 6e) with three stout spines and five plumose setae.

Peraeopod 1 (fig. 5f) robust. Merus produced, outer distal corners with two pectinate spines; carpus short inner distal margin with single pectinate spines. Peraeopod 2 (fig. 5g) slender, inner margins of merus, carpus and propodus with numerous setae. Peraeopod 6 (fig. 5h) moderately robust, basis with a group

of small articulated spines; ischium with a group of long setae on the outer margin; merus with a stout simple spine on the outer distal corner; carpus with one simple and one pectinate spine at each distal corner. Peraeopod 7 (fig. 5i) with long setae on the outer margins of basis and ischium and short setae on the inner margins of merus, carpus, and propodus. All peraeopods with biungulate dactyls.

Penes (fig. 7b) long, united basally; proximal half twice as thick as distal half, which is attenuated. Minute pectinate setules are present about midway along the outer margin.

Pleopods 1-3 with coupling spines on the inner margin of the peduncle (fig. 7a, c, d). Pleopod 2 with appendix masculina exceeding tip of exopod by half its length. Pleopod 4 (fig. 7e) glabrous but for a single seta on the apex of the endopod; exopod only partially segmented. Exopod and endopod each with six fleshy folds. Pleopods 5 (fig. 7f) without setules; exopod with two apical spinulose patches, and a 3rd patch midway on its inner margin; endopod broadly rounded; exopod and endopod with five and 10 fleshy folds, respectively.

Telson (fig. 5e) with six dorsal tubercles of about equal size, situated as an anterior pair and a posterior row of four. Lateral margin bent inwardly to form a dorsally directed tube with an apical foramen.

Uropods large (fig. 6f), extending well beyond the telson; rami subequal in length. Exopod lamellar and lanceolate, distal portion of inner margin crenulate. Endopod lamellate and rounded, distal margin only faintly crenulate.

Female. — Slightly larger than the male; tubercles of pleotelson less pronounced; otherwise as for the male, but without male sexual characteristics.

Colour. — In formalin, orange brown. Margins of epimera and hind margin of pleon segment 7 white, from which feature the epithet is derived.

Length. — ♂♂ 2.5-3.0 mm, ♀ 3.5 mm.

Remarks. — This species is most closely allied to *Cymodocella nipponica* Nishimura, showing great similarity in the form of the penes, the appendix masculina, and the telson and uropods (Nishimura, 1969). It can readily be separated from that species by the presence of fewer tubercles on the telson, the bilobed hind margin of peraeon segment 7 and by the large coxae on peraeon segment 7. *Cymodocella (Dynamenopsis) dumerilii* (Audouin) is clearly also closely related, the telson, uropods, and appendix masculina being very similar to *C. marginata*. The penes were not figured in the description given by Monod (1933). *C. dumerilii* in fact cannot be included in the genus *Dynamenopsis* Baker as in this genus the exopod of pleopod 3 is 2-segmented (Baker, 1908; Menzies, 1962), and *C. dumerilii* has the exopod unsegmented. *C. sapmeri* Kensley shows some similarity to the present species, chiefly in the form of the telson, and uropods (Kensley, 1976), but it is otherwise distinct.

DISCUSSION

Prior to the present work the genus *Dynoides* contained four species, *D. serratisinus* Barnard, 1914 the type species; *D. barnardi* Baker, 1928; *D. dentisinus*

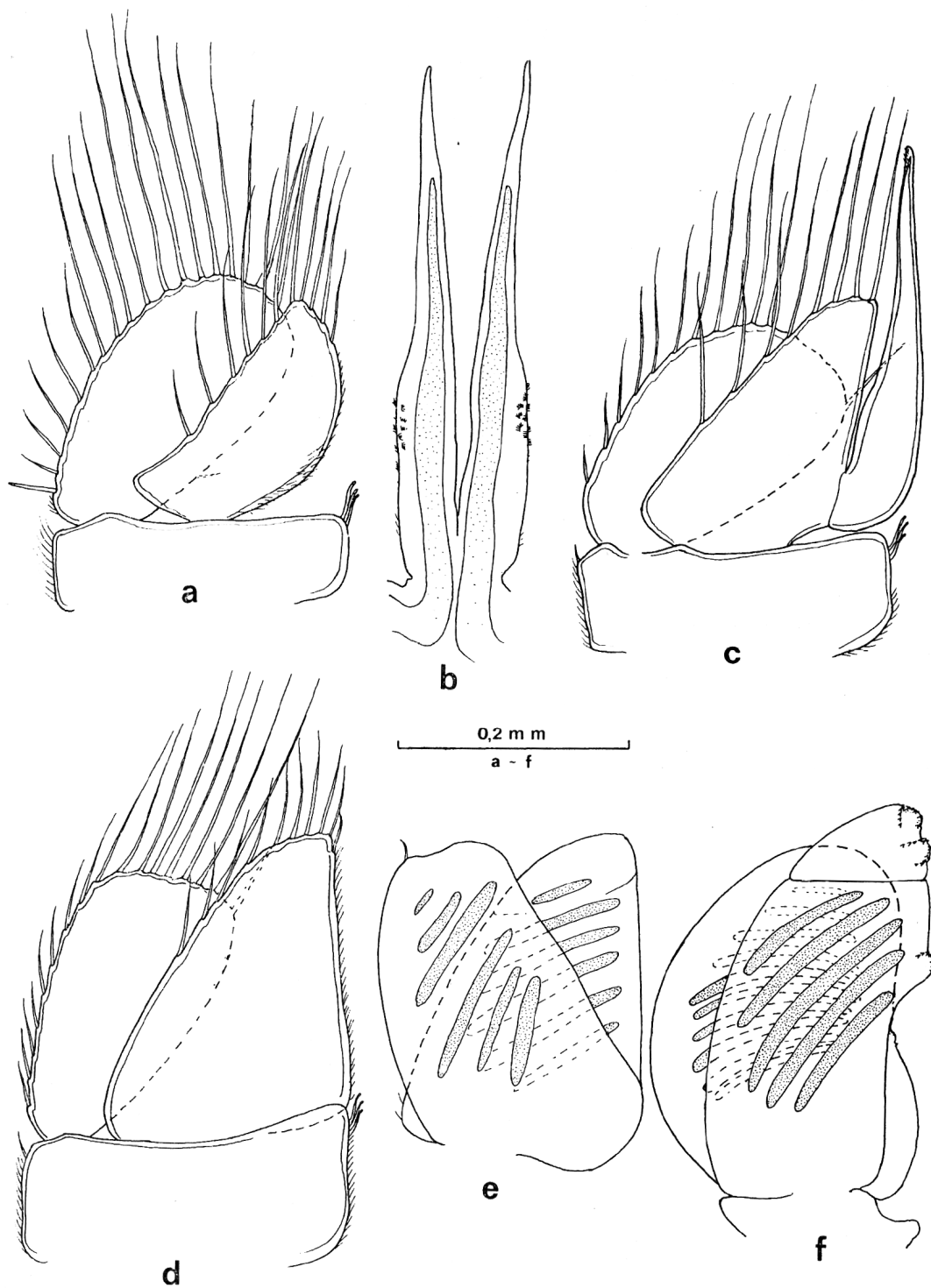


Fig. 7. *Cymodocella marginata* sp. nov. a, pleopod 1; b, penes; c-f, pleopods 2-5.

Shen, 1929; and *D. castroi* Loyola e Silva, 1960. A fifth species had been briefly described by Pillai (1954) as *Dynoides amblysinus*, the same author later transferring it to a new genus *Dynoidella* on the basis of a folded uropodal exopod and lack of a pleonal process (Pillai, 1965).

This author was apparently unaware of the existence *D. castroi*, another species without a pleonal process, or of the considerations of Loyola e Silva (1960) in placing his species in the genus *Dynoides*. The presence of a dorsal process was not considered of generic significance by Hansen (1905: 124) especially as the closely related genus *Dynamenella* Hansen includes in the diagnosis males "...with or without processes...". This leaves only the folded uropodal exopod to distinguish *Dynoidella* Pillai from *Dynoides*. This character is not unique as Pillai (1960) had supposed but present to a moderate degree in other species of the genus, and to a greater degree in the genera *Zuzara* Leach and *Isocladus* Miers. It is the author's opinion that *Dynoidella* Pillai is a junior synonym of *Dynoides* Barnard.

Loyola e Silva (1960) erected the genus *Paradynoides*. The similarity of that genus (Loyola e Silva, 1960, figs. 16, 17) to the females and juvenile males of *Dynoides dentisinus* (cf. Nishimura, 1976) and *Dynoides brevispina* sp. nov. is great, and it is strongly suggested that *Paradynoides* is a synonym of *Dynoides*.

The characteristics that most clearly separate *Dynoides* from other sphaeromatid isopod are the presence of fused penes and the configuration of the telson sinus in combination with the form of the appendix masculina. The close set setae on the coxae further separate this genus from others. In most species there is a dorsal process in the pleon.

Within the genus *Cymodocella*, there is a group of closely related species which differ in certain respects from the generic diagnosis of Hansen (1905) and Hodgson (1910). These differences are in the proportions of the uropodal rami of which in *Cymodocella* s. str. the exopod is considerably shorter than the endopod, and in the form of the telson tube, which in *Cymodocella* s. str. should be with the lateral walls bent downwards to form a long tube, open at both ends, with a slit on the lower surface. This combination occurs in *C. algoense* (Stebbing, 1875), *C. gauparensis* Loyola e Silva, 1965 and *C. foveolata* Menzies, 1962. In *C. nipponica*, *C. dumerilii*, *C. sapmeri*, and *C. marginata* the uropods extend beyond the telson which has the lateral wall bent inwards, and the tube is directed dorsally. *C. sublevis* Barnard and *C. pustulata* Barnard appear intermediate. In these two species the tube is directed dorsally (Barnard, 1914), and the uropods are subequal, but do not project beyond the tip of the telson.

It is clear that the generic description is in need of amendment, but this would be best left until more of the described species are better known.

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RÉSUMÉ

Deux nouvelles espèces d'Isopodes Sphaeromatidés, *Dynoides brevispina* et *Cymodocella marginata*, sont décrites, avec une discussion de leurs affinités dans leurs genres respectifs. Les genres *Dynoidella* Pillai, *Dynoidella* Nishimura et *Paradynoides* Loyola e Silva sont synonymes du genre *Dynoides*.

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