

***Paradella tiffany* sp. nov., a distinctive sphaeromatid isopod (Crustacea: Isopoda: Sphaeromatidea) from Baja California, Mexico**

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Abstract

Paradella tiffany sp. nov., from the high intertidal of Baja California, Mexico, is described and figured. It is the first record of a species of *Paradella* with a posteriorly-directed median process on pereonite 7, this character distinguishing males of the species from all other species in the genus and all other sphaeromatids known from the East Pacific. A further unique character, in the male only, is the presence of short, stout and rigid plumose marginal setae on the distal margin of the pleopod 1 endopod.

Key words: East Pacific; Crustacea; Isopoda; Sphaeromatidae; *Paradella*; taxonomy; Baja California; Mexico

Introduction

Harrison & Holdich (1982) reviewed and revised the group of sphaeromatid genera that contained species long placed in *Dynamenella* Hansen, 1905. Species were reassigned among the existing genera *Dynamenella*, *Ischyromene* Racovitza, 1908, and their new genus *Paradella* Harrison & Holdich, 1982. A large number of species, including most of the Pacific North American species, remained as *incertae sedis*. Of the genera discussed by Harrison & Holdich (1982) *Ischyromene*, *Cymodocella* Pfeffer, 1887 and *Dynamenopsis* Baker, 1908, have since been recognized by Bruce (1995) as belonging to a distinct group of primarily Southern Hemisphere genera (the '*Ischyromene* group') characterized by the wholly or partly indurate (thickened) first pleopods (among other characters).

The genera that concern the species described here are the two very similar and species-rich genera *Dynamenella* and *Paradella*. Integral to the diagnosis of *Dynamenella* given by Holdich & Harrison (1982) was that the pereonite 7 lacked a posteriorly-directed process of any sort. In their discussion of *Paradella* the presence or absence of such processes was not discussed [though it was included as a diagnostic character by Kensley & Schotte (1989)]. Since that time it has been demonstrated that these processes are not necessarily of generic merit (e.g. Bruce 1997), and a full discussion on the subject has been given by Bruce & Holdich (2002) who again concluded that the presence or absence of such processes should not necessarily be considered to be of generic merit.

It is of interest therefore that we here record the first species of *Paradella* that has a prominent posteriorly-directed bifid process arising from the posterior margin of pereonite 7. Many species of both *Paradella* and *Dynamenella* have the posterior margin of pereonite 7 raised to form a distinct transverse knife-edged rim, usually with a median indentation [see figures of *Paradella diana* (Menzies, 1962a), in Holdich & Harrison 1982 and Kensley & Schotte 1989]. The process in *Paradella tiffany* sp. nov. is an extreme extension of that rim, so forming a process. In all other generic characters the species conforms to *Paradella* as defined by Harrison and Holdich (1982).

Higher classification follows Brandt & Poore (2003).

Abbreviations: RS—robust setae; CP—circumplumose setae; PMS—plumose marginal setae; LACM—Natural History Museum of Los Angeles County.

Superfamily Sphaeromatoidea Latreille, 1825

Family Sphaeromatidae Latreille, 1825

Genus *Paradella* Harrison and Holdich, 1982

Paradella Harrison & Holdich, 1982: 99.– Harrison, 1984: 386.– Harrison & Ellis, 1991: 943.– Kensley & Schotte, 1989: 223.– Storey, 2002: 139.

Remarks: There is no need to modify the generic diagnoses other than to accept that species may be with or without a posteriorly-directed process on pereonite 7. Harrison & Holdich (1982) provided a key to the genera related to *Paradella* as did Kensley & Schotte (1989) who used rather easier to observe characters than did Harrison & Holdich (1982). The genus is best identified by males having a distinct dorsally-directed and posteriorly closed pleotelson foramen, long, tapering and basally fused penial processes, a long (extending well beyond pleopod 2 endopod) and basally narrow appendix masculina, both sexes with two fused pleonal sutures, pleopod 1 rami lamellar (without thickened margins) and pereopod dactyli with a simple secondary unguis.

There are, including the new species described here, thirteen species in the genus. Of these only three have been recorded from the East Pacific. However, we are aware that

many undescribed species are held in collections around the world (including one more from Baja California) and that there are several species of 'Dynamenella-like' sphaeromatids described from the Pacific coast of North America that may, when redescribed, be found to belong to *Paradella*.

***Paradella tiffany* sp. nov.**

Material examined.— All material from Pacific Mexico. Holotype, ♂ (5.4 mm), Boca del Alamo, Bahía de los Muertos, Baja California Sur, Gulf of California, 23°53.253'N, 109°47.775'W, 10 January 2000, beneath large rounded stones in high intertidal, RW00.104, coll. T. A. Haney (LACM CR 2000-030.1). Paratypes: Immature ♂ (2.5 mm), 2 non-ovigerous ♀ (2.4, 2.8 mm), same data as holotype, RW00.104 (LACM 2000-030.2).

Additional material: adult ♂ (4.2 mm), ♀ (2.4 mm), immature ♂ (3.6 mm), Boca del Alamo (local signage reads "Boca de Amo"), Bahía de los Muertos, Baja California Sur, Gulf of California, 23.895°N 109.803°W, 7 October 2003, from beneath rocks in high intertidal, under those with thin coverage of *Ulva*, UC Mexus station 29, RW03.285, coll. T. A. Haney (LACM CR 2003-009.1).

Description.— *Male*. *Body* about 1.8 times as long as greatest width, strongly vaulted, lateral margins subparallel, widest at pereonite 6; dorsal surfaces smooth. *Head* anterior margin with single prominent transverse ridge, ventral rostral process weakly developed. Head and pereonite 1 subequal in length, pereonite 1 about 1.5 times as long as pereonite 2, unornamented; pereonites 2<3<4<5<6>7; posterior margins of pereonite 5 and 6 with weak transverse submarginal dorsal ridge; pereonite 7 posterior margin posteriorly produced into flat, posteriorly bifid process, with sinuate lateral margins. *Pereonite* 7 posteriorly bifid process concealing pleon in dorsal view (Figure 1B). Coxae without evident sutures, progressively increasing in size posteriorly, those of pereonite 7 enlarged forming two large posteriorly directed plate-like blades. *Pleon* with evident sutures and sublateral 'keys'; lateral margins each with extended flat, upturned, distally rounded lobes. *Pleotelson* with 6 prominent nodules set as transverse row of 4 and 2; pleotelson sinus conforming to generic diagnoses.

Antennule peduncle article 1 1.8 times as long as wide, about 1.9 times as long as article 2; posterior margin of both articles 1 and 2 with brush-tipped sensory setae; article 3 about 1.1 (1.14) times as long as article 2, 0.6 times as long as article 1, 3.7 times as long as wide; flagellum 9-articled, extending to posterior of pereonite 1, about 3.0 times as long as article 3. *Antenna* peduncle articles 1–3 short, subequal in length, article 1 anterior margin with mass of setae; article 4 about 1.5 times as long as article 3, about 0.7 as long as article 5, articles collinear; flagellum 1.4 times as long as peduncle, extending to pereonite 4, with 14 articles.

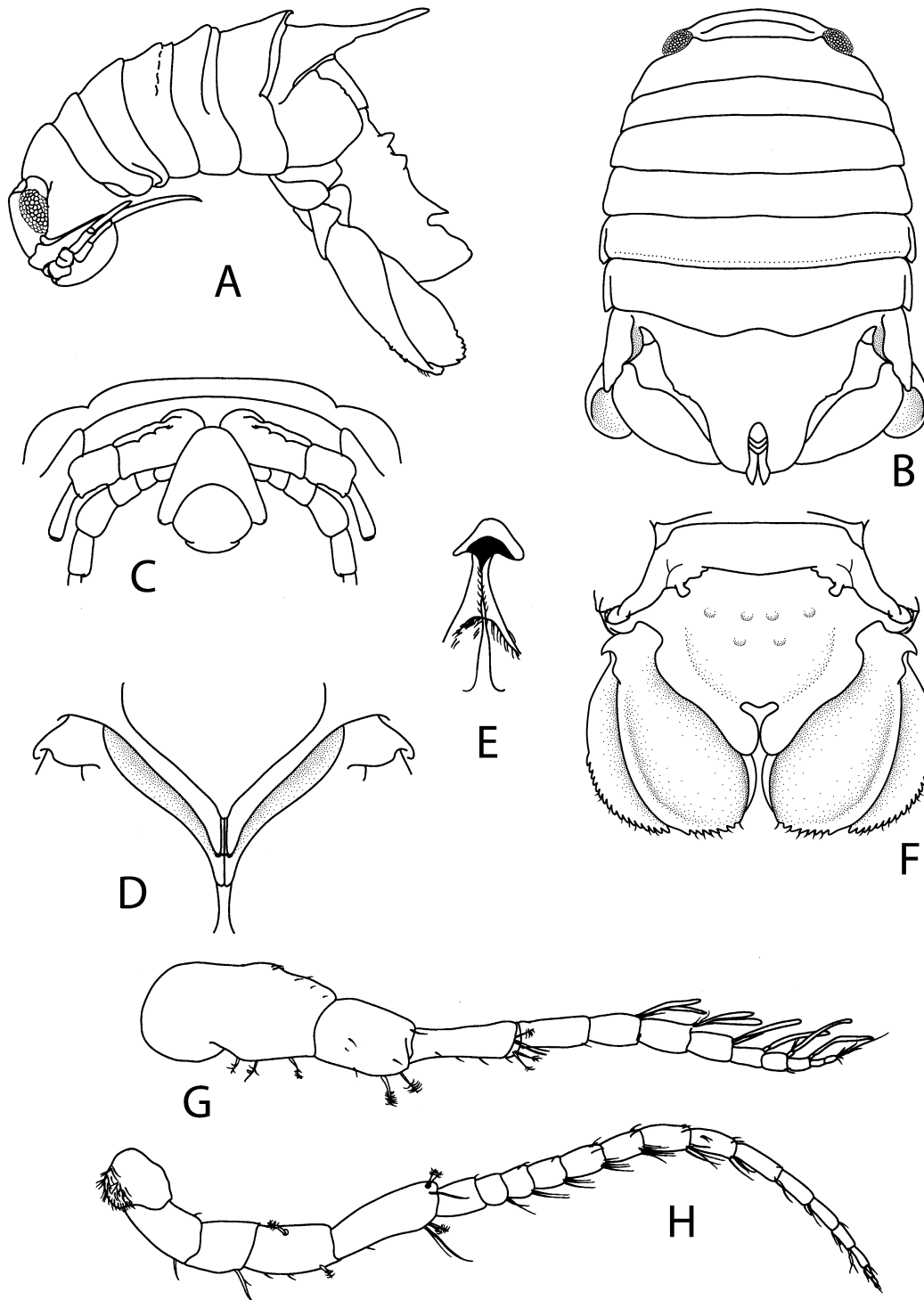


FIGURE 1. *Paradella tiffany* sp. nov. Holotype. A, lateral view; B, dorsal view; C, frons and anterior of head in ventral view; D, pleotelson, posterior margin, ventral view; E, pleotelson sinus, posterior view; F, pleon and pleotelson, perpendicular view; G, antennule; H, antenna.

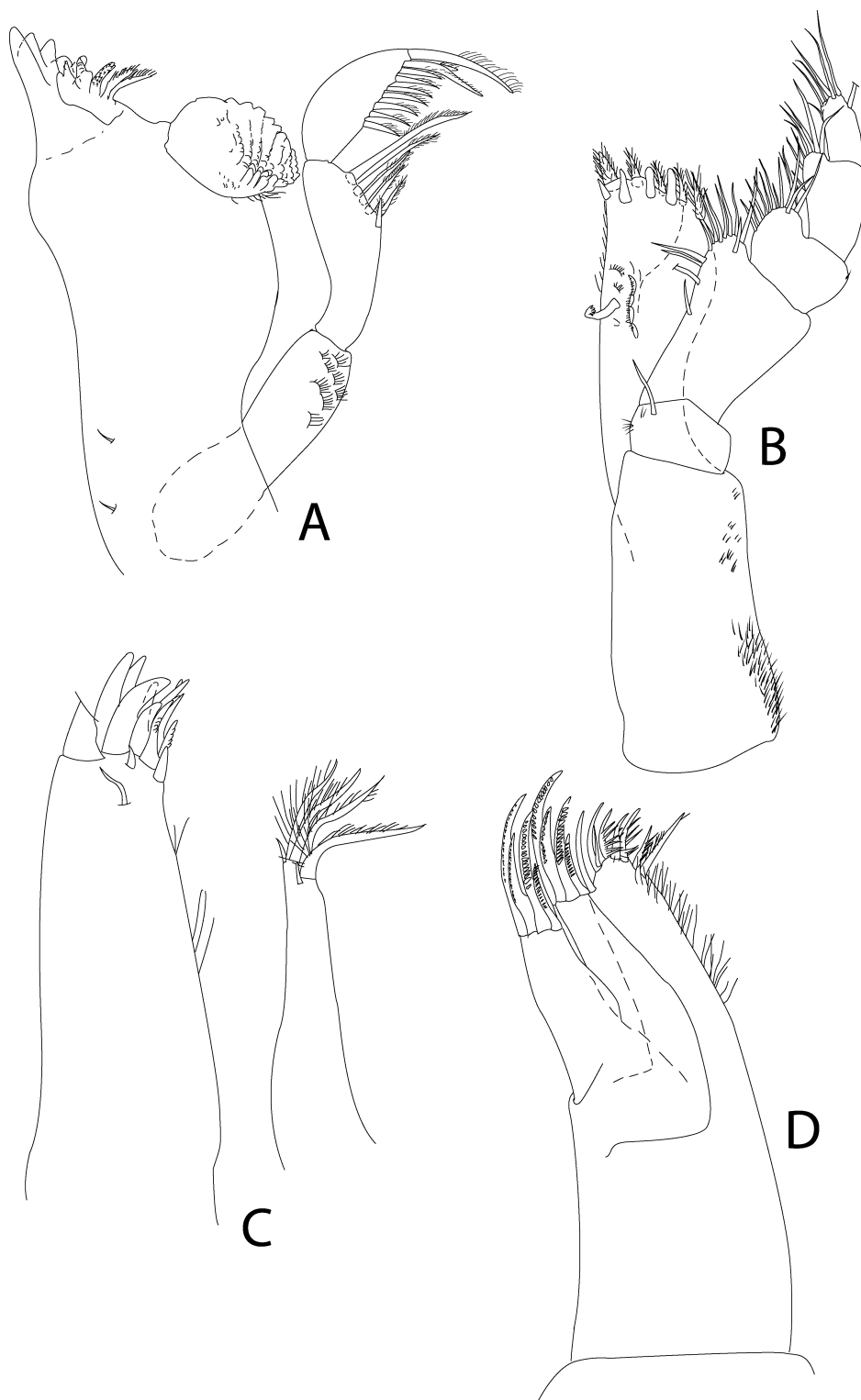


FIGURE 2. *Paradella tiffany* sp. nov. Holotype. A, right mandible; B, maxilliped; C, maxillule; D, maxilla.

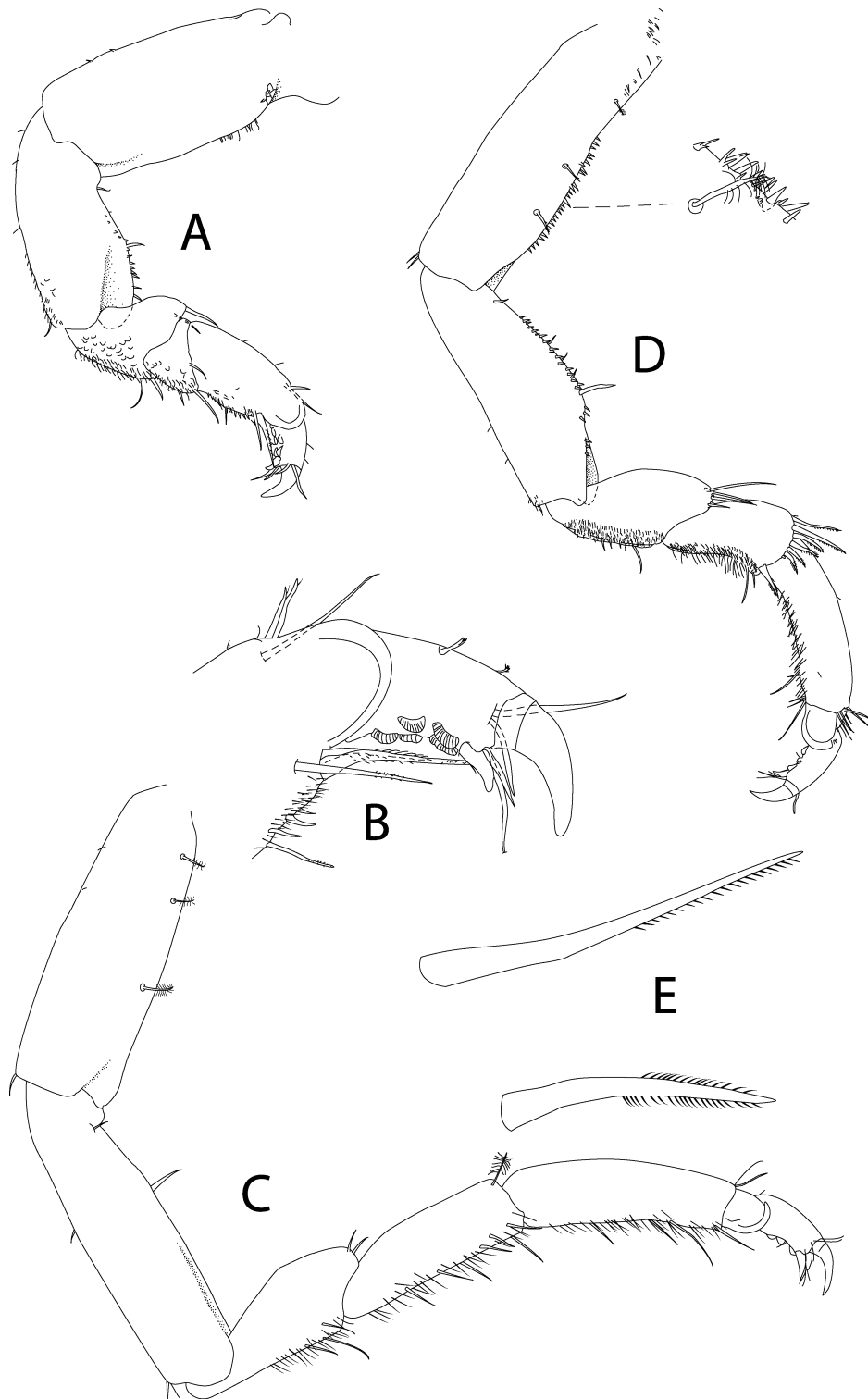


FIGURE 3. *Paradella tiffany* sp. nov. Holotype. A, pereopod 1; B, pereopod 1 dactylus; C, pereopod 2; D, pereopod 7; E, robust setae from distal margin of pereopod 7 carpus.

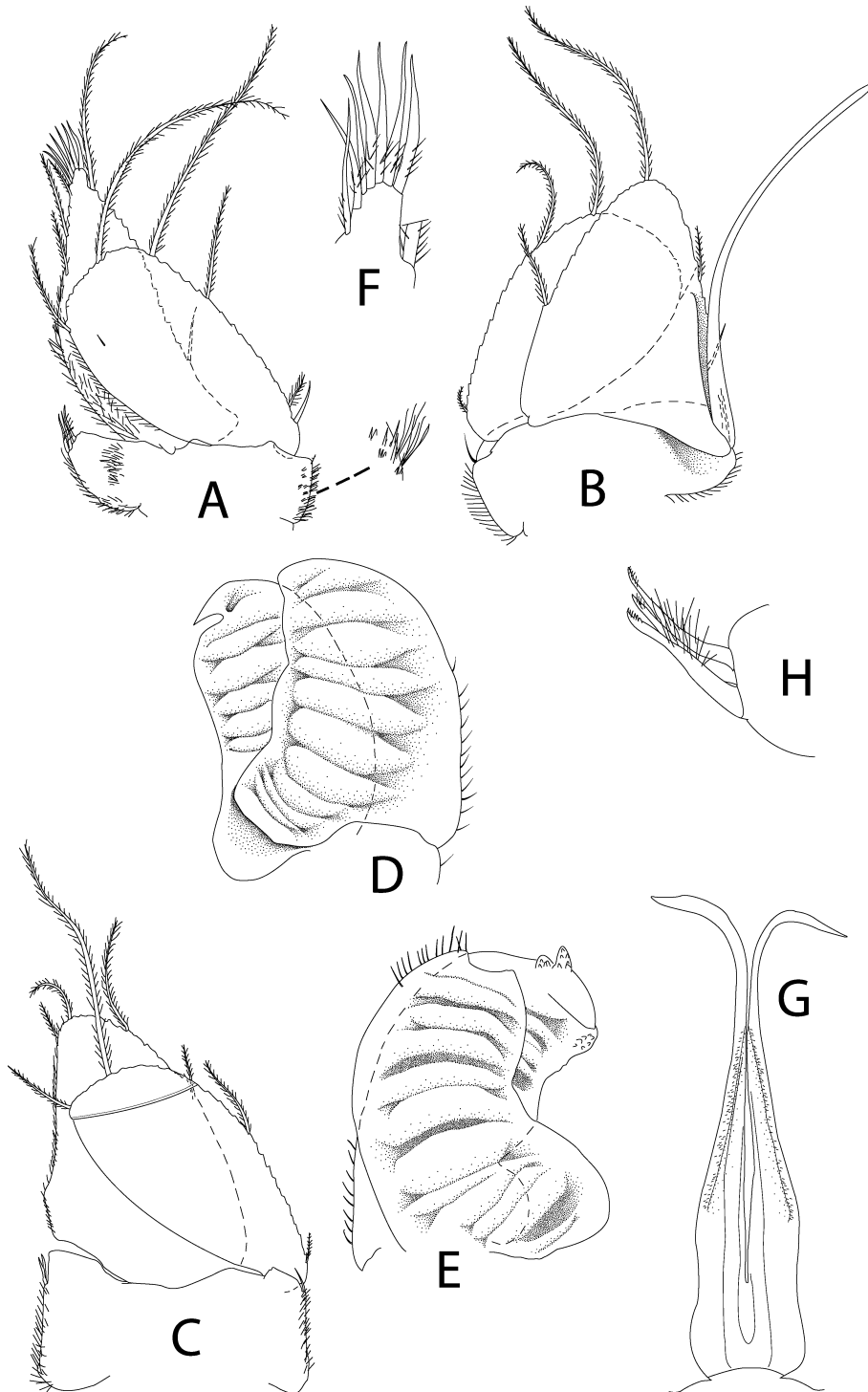


FIGURE 4. *Paradella tiffany* sp. nov. Holotype. A–E, pleopods 1–5 respectively; F, distal angle, pleopod 1 endopod; G, penial processes; H, coupling hooks, pleopod 1. **Note:** the curving of both the appendix masculina and the penial processes, results from being placed in mounting medium, and is an artefact.

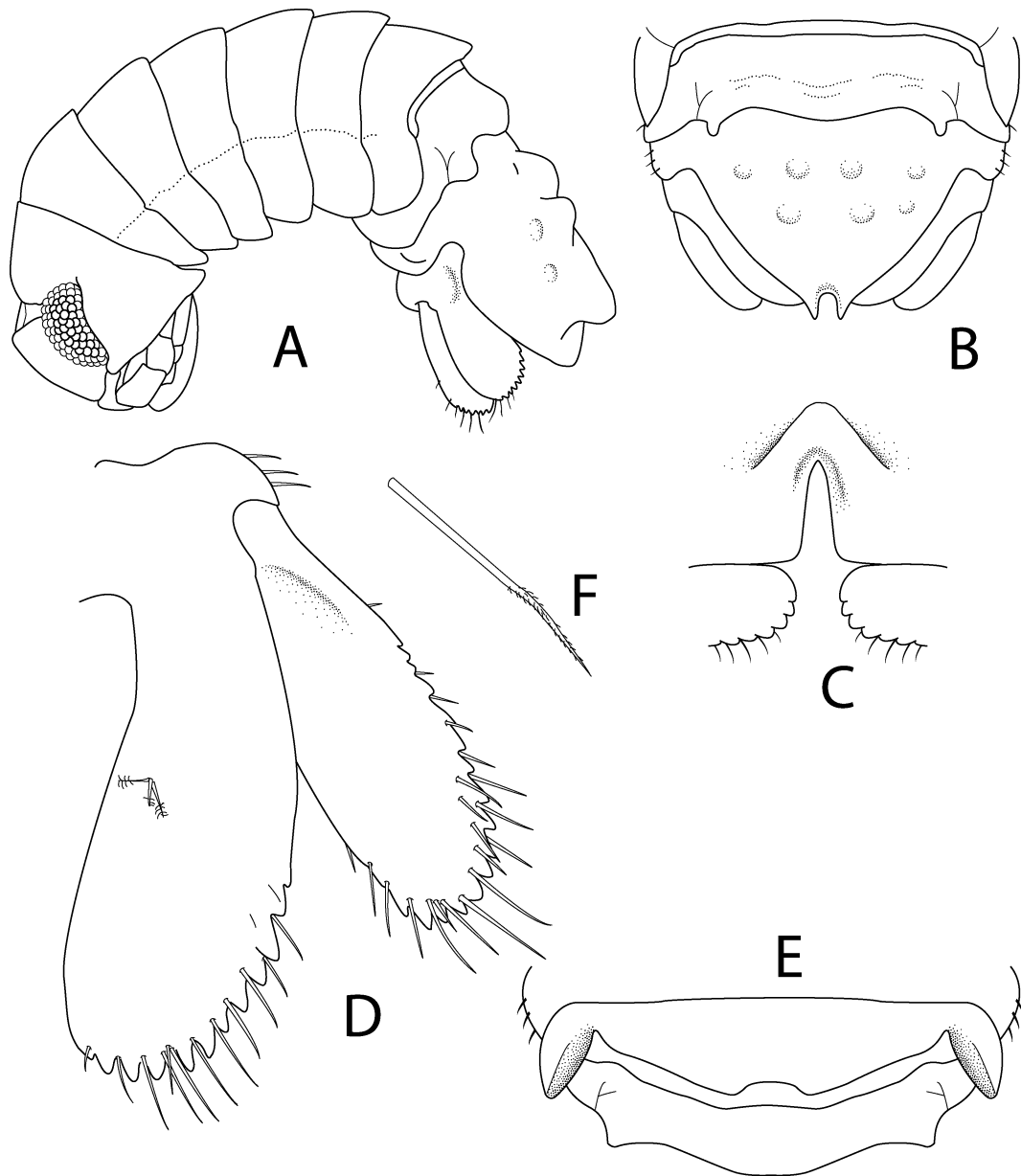


FIGURE 5. *Paradella tiffany* sp. nov. Paratypes. All female except E. A, lateral view; B, dorsal view of pleon; C, posterior view, pleotelson sinus; D, uropod; E, dorsal view of pereonite 7 and pleon, immature male; F, seta from distal margin, uropodal exopod.

Epistome anteriorly truncate, without lateral constriction. Right *mandible* incisor with 4 cusps, spine row of 2 broad-based multidigitate spines, 1 bluntly serrate and 2 serrate spines; molar process round; palp article 2 0.7 times as long as article 1, distolateral mar-

gin with 5 biserrate setae, becoming progressively longer distally; article 3 with 10 serrate setae, terminal seta being largest. *Maxillule* mesial lobe with 3 long, strongly pectinate RS and 2 shorter simple RS, lateral lobe with 11 peripheral RS on gnathal surface, twelfth seta set between these; 2 proximomesial RS weakly and bluntly serrate, distolateral RS smooth. *Maxilla* lateral lobe and middle lobe each with 4 curved nodular and finely serrate RS, mesial lobe with 8 serrate and biserrate RS. *Maxilliped* endite lateral margin sinuate, distal margin with 1 simple acute RS at sublateral angle, 3 blunt simple RS and 5 CP RS; longitudinal row of 4 toothed scales lateral to coupling hook; palp article 2–4 weakly lobed; articles 2–5 with about 13, 13, 8 and 7 setae respectively.

Pereopod 1 robust, *basis* about 2.1 times as long as greatest width, approximately 3 times as long as propodus; proximal superior margin with few scale-setae; *ischium* 0.8 times as long as propodus, twice as long as greatest width, superior margin with 1 proximal and one mid-distal acute short simple RS, distal superior margin with distinct spine-like scales, distal inferior margin with short setulose fringe; *merus* about 0.4 as long as *ischium*, 0.8 times as long as greatest width, superior distal angle with 2 acute simple RS, inferior margin heavily scaled, with dense setulose fringe, inferior distal angle with 2 simple setae; *carpus* approximately as long as wide, inferior margin 0.8 times as long as *merus*, heavily scaled, with dense setulose fringe, inferior distal angle with 2 simple setae; *propodus* 2.0 times as long as greatest width, inferior margin with prominent scales, distal angle with 1 simple and 1 serrate RS; *dactylus* 0.6 times as long as propodus, unguis inferior margin with prominent serrate cuticular scales, secondary unguis recurved simple. Pereopods 2 and 3 elongate and slender to pereopod 1. *Pereopod 2* *basis* 3.3 times as long as greatest width, inferodistal angle with single simple seta, superior margin with 3 widely spaced palmate setae; *ischium* as long as *basis*, 3.8 times as long as greatest width, superior distal margin with single acute RS at mid-point, inferior margin with 2 short simple setae, distal angle with 1 short simple seta; *merus* 0.5 times as long as *ischium*, distal half of inferior margin setulose fringe, with 3 distal simple setae superior distal angle with 2 short, simple setae; 1 palmate seta, inferior margin setulose with 8 widely-spaced simple setae; *carpus* 1.1 times as long as *merus*, 3.1 times as long as wide, anterodistal angle with single palmate seta, inferior margin setulose, with 8 simple setae; *propodus* 0.8 times as long as *ischium*, 4.2 times as long as wide, superior distal angle with 2 setae, inferior margin setulose, with 4 simple setae. *Pereopods 5–7* similar, longer than pereopods 2 and 3. *Pereopod 7* *basis* 3.6 times as long as greatest width, inferodistal angle with 2 simple setae, superior margin heavily scaled, with 3 widely-spaced small sensory palmate seta; *ischium* 0.8 times as long as *basis*, 2.7 times as long as greatest width, superior margin with prominent scales, with 1 short proximal and 1 prominent acute RS at midlength, inferior distal angle with 1 short acute RS; *merus* 0.5 times as long as *ischium*, 1.6 times as long as wide, superior distal margin with 4 long simple setae, inferior margin setulose with 1 simple seta and several short setae; *carpus* 0.9 times as long as *merus*, 1.5 times as long as wide, anterodistal angle with 6 serrate and biserrate RS, inferior margin setulose, inferodistal margin with

1 biserrate and 1 simple RS; *propodus* 0.8 times as long as ischium, 4.1 times as long as wide, superior distal angle with 7 setae, inferior margin finely setulose, with 4 simple setae; dactylus 0.4 as long as propodus.

Penial processes 4.7 as long as basal width, 10.4 times as long as individual width at point of fusion, distally acute; fused along basal 0.17 of length, sperm duct fused at basal 0.04 of length.

Pleopod 1 exopod and endopod with 32 and 27 PMS respectively; endopod 0.9 as long as exopod, 2.3 times as long as greatest width, proximal lateral margin weakly concave, with distinct heel; distalmost setae of the form of RS; exopod with oblique axis, distal margin subtruncate; peduncle medial margin with 3 coupling hooks. *Pleopod 2* exopod and endopod with 35 and 28 PMS respectively; *appendix masculina* 23 times as long as basal width, 1.8 times as long as endopod, apex narrowly rounded, endopod mesial margin straight, lateral margin weakly convex, proximomedial margin with prominent posteriorly directed lobe; exopod 0.9 times as long as endopod, distal margin subtruncate. *Pleopod 3* exopod and endopod with 17 and 15 PMS respectively. *Pleopod 4* both rami with prominent thick ridges; endopod distal mesial angle with prominent excision, proximomedial lobe present; exopod lateral margin with c. 12 fine simple setae. *Pleopod 5* both rami with prominent thick ridges; exopod with 3 scale patches, 2 distal and 1 proximal to suture, lateral margin with ~14 short simple setae, distal margins with longer scale-setae; endopod with scale-setae on distal margin only. *Uropod* rami subequal in length, distal margins crenate; endopod broadly rounded, 2.8 times as long as wide, mesial and lateral margins upturned, proximal lateral margin with laterally directed spur; endopod lateral margin convex.

Female. Body shape similar to that of male, pereonite 7 posterior margin lacking posteriorly directed process. Pleon with medial portion indistinctly raised and thickened. Pleotelson with 6 irregular nodules arranged in two transverse rows, the lateral nodules being weak. Posterior margin of pleotelson with medial, vertical, ventrally open, narrow slit, dorsally overridden by bluntly rounded lobe. Uropod rami subequal in length, not extending beyond posterior margin of pleotelson; both rami distally rounded, margins crenate. Brood pouch structure not known.

Remarks: No species of *Paradella* has been described in which the male has a huge, flat and distally bifid process on pereonite 7. Further identifying characters include the large posteriorly expanded coxae on pereonite 7, the large and broadly rounded uropods which extend well past the posterior margin of the pleotelson, the endopods of which have strongly raised margins giving a bowl-like appearance, and the pleotelson dorsum having four distinct acute sub-medial nodules and two weak lateral nodules. Females can be identified by having two pairs of sub-medial nodules on the dorsum of the pleotelson, these being laterally flanked by weak and poorly defined nodules. The male is further characterised by two apparently unique characters: the plumose marginal setae on the distal margins of the endopod of pleopod 1 are short, stout and formed much as robust setae other than

that they are plumose; the lateral margins of the pleon are extended forming a dorsally bent and flat lobe.

In the East Pacific *Paradella* is represented by *P. bakeri* (Menzies, 1962b) from Chile, *P. setosa* Glynn, 1968 from Pacific Panama and *P. diana*e (Menzies, 1962a) from Baja California (type locality) which is also known from numerous localities around the world where it has been introduced (e.g. Bey *et al.* 2001; Hass & Knott 1998; Javed & Ahmed 1987). Adult males of all these species lack a process on pereonite 7 and lack the large, broadly rounded and bowl-shaped uropods that extend well beyond the posterior of the pleotelson. Most species, including at least one undescribed species from Baja California, have the uropods narrowly rounded or terminally acute.

The genus *Dynoides* Barnard, 1914 is represented in the East Pacific, including Mexico, by several species (Carvacho & Haasmann 1984; Espinosa-Pérez & Hendrickx 2002), two of which have prominent posteriorly directed processes. Species of *Dynoides* are easily distinguished from *Paradella tiffany* by the processes being rounded in cross-section rather than flat and arising on the pleon, not pereonite 7. The genus *Dynoides* is otherwise abundantly distinct from *Paradella*.

Etymology: This species is named for the Tiffany & Company, recognising their support of the Natural History Museum of Los Angeles County (noun in apposition).

Acknowledgements

This publication was supported by NSF grant DEB0129317. We thank Anne-Nina Lörz (NIWA) and Joel Martin (LACM) for their critical appraisal of the manuscript. We thank our colleague and fellow crustacean biologist, Todd Haney for making specimens available and for introducing RW to the region around Bahia de los Muertos. Our appreciation and thanks go to Steve Melendrez and Lai Shan Mui for digitally inking the figures.

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