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A new amphipod species from the Indian Ocean (Crustacea: Amphipoda: Lysianassoidea: Podoprionidae)

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Abstract

A new species of the genus *Podoprion* is described. The species can be distinguished from the other species in the genus, *Podoprion bolivari* Chevreux, 1891, *P. ruffoi* Lowry & Stoddart, 1996, and *P. mediterraneum* Kaim-Malka, 2004, by the shape of gnathopod 2 propodus, coxa 4, number and size of serrations on pereopod 5 basis, and characters of the mouthparts. Material was collected by baited trap at 1185 m off the coast of Pakistan in the northern Arabian Sea.

Key words Crustacea, Amphipoda, Lysianassoidea, Podoprionidae, *Podoprion*, new species, Indian Ocean, deep sea

Introduction

As part of a recent cruise to the Pakistan margin (northern Arabian Sea, Indian Ocean), baited traps were set to collect and study the scavenging amphipod community at various depths. Three of the traps were successful in collecting specimens and at 1200 m, three species of amphipod were collected; *Hirondellea* sp. nov., *Abyssorchomene abyssorum* Stebbing, 1888, and *Podoprion addyi* sp. nov., which is described here.

The Family Podoprionidae Lowry and Stoddart, 1996, currently contains a single genus *Podoprion* Chevreux, 1891. *Podoprion*, until recently, contained only two species; *Podoprion bolivari* Chevreux, 1891 and *Podoprion ruffoi* Lowry & Stoddart, 1996. *Podoprion bolivari*, a relatively shallow-water species, has been reported on a number of occasions in the Atlantic Ocean and Mediterranean Sea at 12–120 m depth (Chevreux, 1891; Ledoyer, 1977; Karaman, 1973). *Podoprion ruffoi* has so far only been reported once, off the coast of Namibia, in 410–460 m depth, from the stomach contents of a fish (Lowry & Stoddart, 1996). A recent addition to the genus, *Podoprion mediterraneum* Kaim-Malka, 2004, has been taken in baited traps set in the Toulon Canyon in the Mediterranean at 500 m. It is likely that members of this genus are opportunistic deep-sea scaven-

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gers (Kaim-Malka, 2004). The new species constitutes a considerable range expansion for the genus, and is the first record of a species of *Podoprion* in the Indian Ocean.

Methods

Dissected parts were mounted in polyvinyl-lactophenol stained with lignin pink. Figures were drawn with the aid of a camera lucida and inked digitally using the procedures outlined in Coleman (2004). Type specimens have been deposited at the Natural History Museum, London (NHM). Setal and mouthpart classifications follow Watling (1989), and Lowry and Stoddart (1992, 1995). The following abbreviations have been used: A, antenna; C, cephalon; G, gnathopod; H, habitus; l, left; LL, lower lip; Md, mandible; Mx, maxilla; Mxp, maxilliped; P, pereopod; r, right; T, telson; U, uropod; E, epimere. All parts are left side unless otherwise indicated. UTC, Universal Time Constant.

Systematics

Family Podoprionidae Lowry & Stoddart, 1996

Diagnosis. Head deeper than long, lateral cephalic lobe weak, ventrolateral flap well-developed. Epistome and upper lip fused. Antenna 2: peduncular article 1 not greatly enlarged; peduncular article 3 without a distal hook. Mandible: incisors large, asymmetrical, grossly serrate; left lacinia mobilis stemmed, distally cusped; accessory setal row well developed, without distal setal tuft, with more than 5 accessory setae, with intermediate setae; molar a large, broad, weakly setose tongue. Maxilla 1: outer plate narrow with 11 setal-teeth in compressed arrangement; palp 2-articulate. Maxilliped: outer plate with apical slender and robust setae, with medial robust setae; palp well-developed, unguis present. Gnathopod 1 chelate; coxa reduced; posterior margin of propodus smooth; dactylus simple, without subterminal tooth. Gnathopod 2: posterodistal corner of propodus with medial setae. Pereopods 3 to 5 simple; propodus without distal spurs. **Pereopod 5 basis expanded with large serrations on posterior margin.** Pereopod 4: coxa deeper than wide, with large posteroventral lobe. Gills: from gnathopod 2 to pereopod 7, not pleated. Uropod 3 biramous, outer ramus 2-articulate. Telson cleft. (after Lowry & Stoddart, 1996, bold type indicates changes).

Generic composition. *Podoprion*, Chevreux, 1891.

Etymology. The family name was taken from the generic name *Podoprion* (Gr. *Podo*, meaning foot; Gr. *Prion –os*, meaning saw) (Lowry & Stoddart, 1996).

Habitat. Demersal scavengers.

Remarks. The family Podoprionidae Lowry and Stoddart, 1996, has an incisor process and an outer plate of maxilla 1 that is unique among the lysianassoids (Lowry & Stoddart, 1996). Three other genera have a chelate gnathopod 1 similar to *Podoprion*: *Opisa*

Boeck, 1876; *Podoprionella*, Sars, 1895; *Podoprionides* Walker, 1906. The posterior margin of pereopod 5 is armed with large serrations (6–8 in the case of this species). Some species of *Podoprionellla, Podoprionides*, and some species of *Ichnopus* Costa, 1853, and *Socarnopsis catacumba* (Clark & Barnard, 1985), have this character. However, in other respects these taxa are not closely related to *Podoprion* and therefore the allied generic names are misleading.

Podoprion Chevreux, 1891

Podoprion Chevreux, 1891: 6; Della Valle, 1893: 774; Stebbing, 1906: 18; Chevreux & Fage, 1925: 32; Barnard, 1969:358; Diviacco & Ruffo, 1989: 535; Barnard & Karaman, 1991: 518; Lowry & Stoddart, 1996: 238.

Type species. *Podoprion bolivari* Chevreux, 1891, monotypy.

Diagnosis. As for family.

Species composition. *Podoprion* contains four species: *P. bolivari* Chevreux, 1891; *P. ruffoi* Lowry & Stoddart, 1996; *P. mediterraneum* Kaim-Malka, 2004; and *P. addyi* sp. nov.

Podoprion addyi sp. nov.

Figures 1–3.

Type material. Holotype: ovigerous female, 13 mm, (NHM 2004.3048); paratypes: 3 adult males (NHM 2004.3049-3051), 19 ovigerous females (NHM 2004. 3052-3061), 5 juveniles/immature females (NHM 2004.3062-3066), collected off the coast of Pakistan in the northern Arabian Sea, RRV *Charles Darwin*, (cruise 151), station number 56141 # 13; site A1200, baited trap attached to Profilur autonomous lander; deployed at 1541 (UTC) 16/10/03, 22º 59.776' N, 66º 24.758' E at 1184 m, recovered at 0420 (UTC), 17/10/03; bottom time, 11.7 hrs; bottom temperatures max = 7.31 ºC, min = 7.20 ºC, mean = 7.26 ºC. Paratypes: 5 ovigerous females (NHM 2004.3067-3071), station 56141 # 01; site A1200, trap attached to Profilur autonomous lander, deployed at 0108 16/10/03, 22º 59.784' N, 66º 24.786' E at 1182 m, recovered at 1240 (UTC) 16/10/03; bottom time, 10.5 hrs; bottom temperatures max = 7.34 ºC, min = 7.28 ºC, mean = 7.31 ºC.

Diagnosis. Eyes apparently absent. Gnathopod 1, propodus subequal to carpus. Gnathopod 2, subchelate, propodus margins subparallel, subquadrate, short, palm slightly obtuse with distally straight, smooth margin, dactylus not reaching palm corner. Pereopod 4 coxa, posterior excavation shallow, posteroventral lobe large, anterior and posterior margins converging, distally rounded. Pereopod 5, basis expanded, posterior margin with 6–8 serrations. Epimeron 3, subquadrate, posteroventral corner weakly produced. Male antenna 1 and 2, calceoli present.

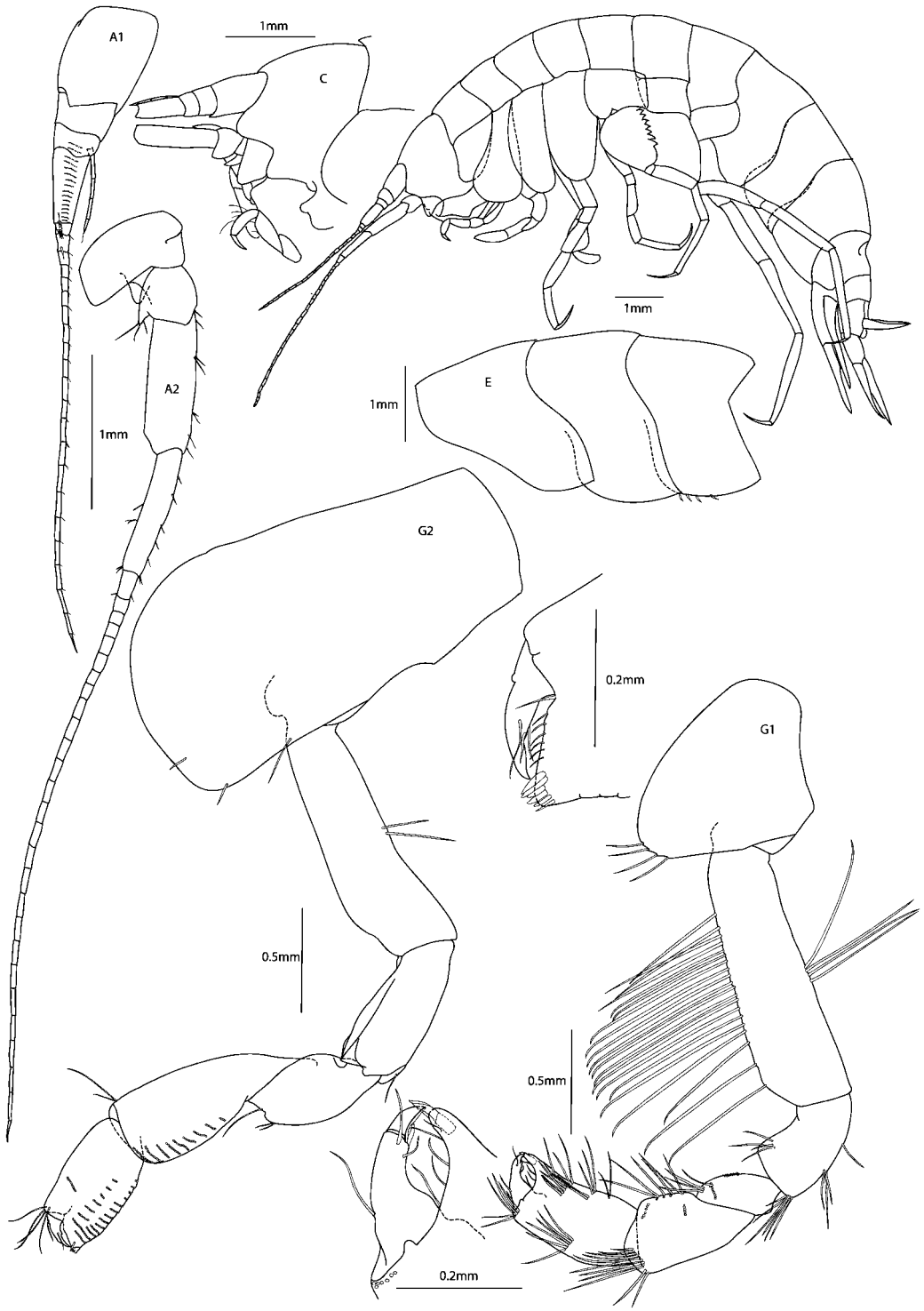

FIGURE 1: *Podoprion addyi*, ovigerous female, 13 mm, holotype.

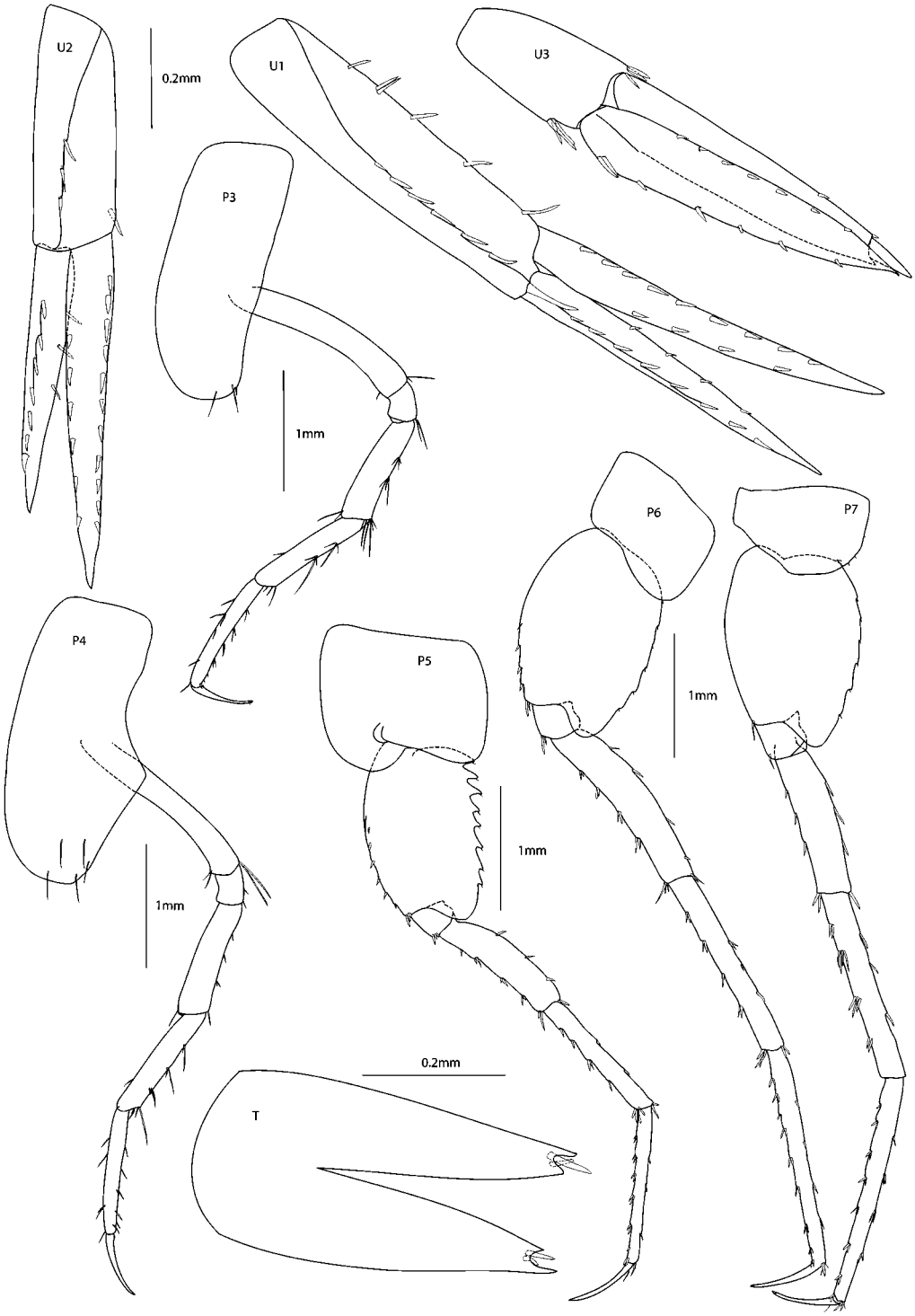

FIGURE 2: *Podoprion addyi*, ovigerous female, 13 mm holotype.

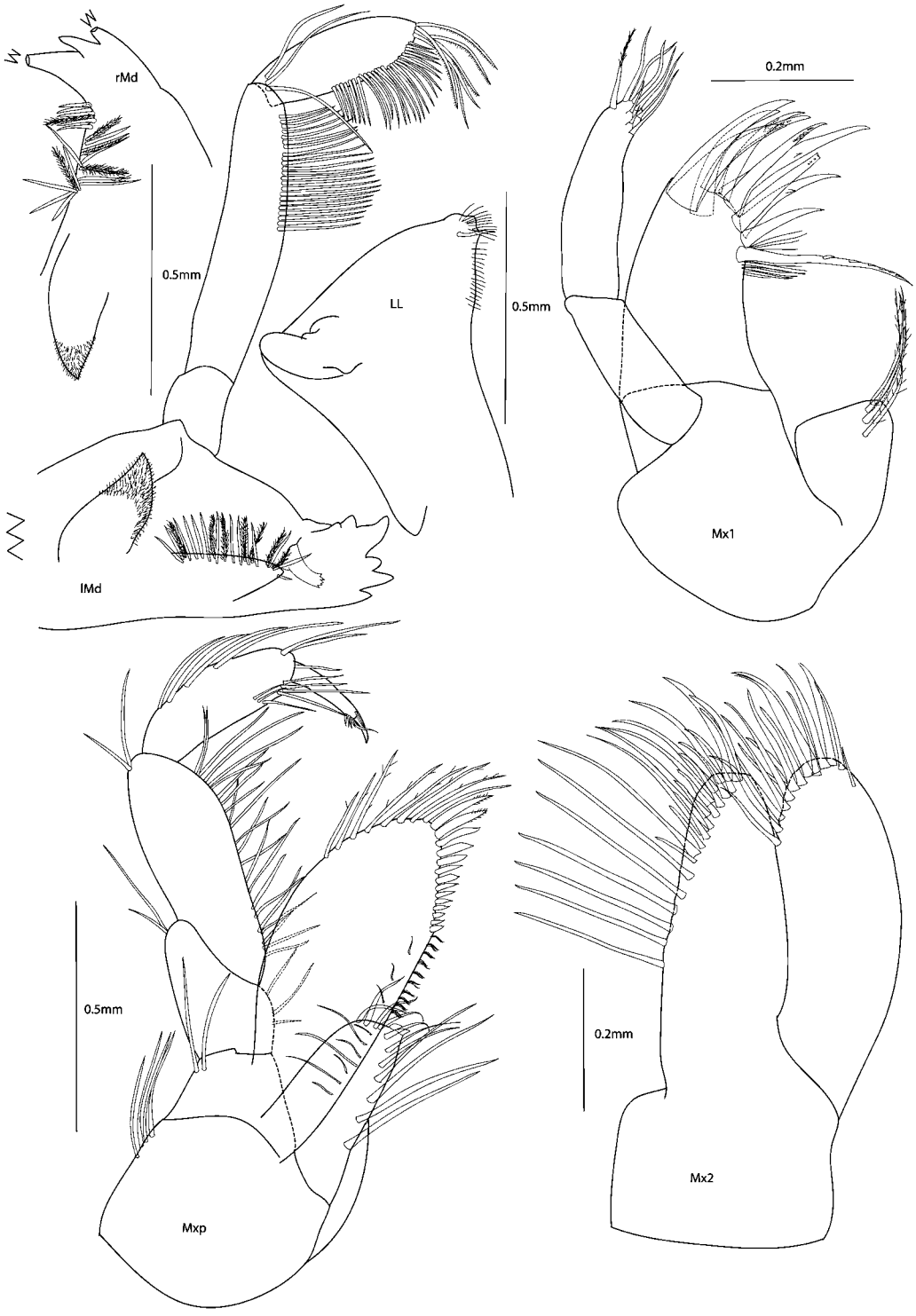

FIGURE 3: *Podoprion addyi*, ovigerous female, 13 mm holotype.

Description. Holotype ovigerous female, 13mm. *Head:* deeper than long, lateral cephalic lobe moderate; rostrum absent; eyes apparently absent. *Antenna 1:* medium length, 0.3 x body; peduncular article 1 short, length 1.2 x breadth with short posterodistal spine; peduncular article 2 short, 0.3 x article 1; peduncular article 3 short, 0.3 x article 1; primary flagellum 22 articulate, with strong 1-field callynophore, without flagellar robust setae, calceoli absent; accessory flagellum very short, 0.23 x primary flagellum, 4 articulate, article 1 long, 2.6 x article 2. *Antenna 2:* length 1.4 x antenna 1; peduncle without strong brush setae, article 1 deep, article 3 short with a distal tooth, 0.4 x article 4, peduncular articles 4 and 5 not enlarged; flagellum 27-articulate, calceoli absent.

Mouthpart bundle: subquadrate. Epistome and upper lip fused, straight. *Mandible:* incisors asymmetrical, large, left complex with six teeth, right with three large teeth; lacinia mobilis a distally cusped blade; accessory row without distal setal tuft, left row with 13, right with 14 long serrate setae, interspersed with pappose setae; molar a large, broad, weakly setose tongue; mandibular palp attached level with molar; article 1 short, length 1.2 x breadth; article 2 slender, length 4.2 x breadth with three A3 setae, without B3 setae, with 25 D3 setae and six apical E3 setae, four of which robust and pectinate. *Maxilla 1:* inner plate broad, short, with five pappose setae; outer plate 11 setal teeth in compressed arrangement with ST1-ST3 large, slender, smooth to weakly cuspidate, ST2 large slender, four-cuspidate, ST4 large, slender, 5-cuspidate, ST5 slender, six-cuspidate, ST6 slender, four + cuspidate – tip broken, ST7 displaced from ST6, elongate, slender, six-cuspidate, STA large, slender, displaced from STB, without cusps, STB long slender one-cuspidate, STC slender, one-cuspidate, STD short, slender without cusps; palp large, slender, 2-articulate, article 1 long, 0.88 x article 2, article 2 with six slender apical setae and two subterminal setae, robust flag seta present. *Maxilla 2:* inner and outer plates narrow, inner plate slightly shorter than outer plate (0.9 x). *Maxilliped:* inner plate large, subrectangular, with three apical nodular setae, oblique setal row strong with 11 pappose setae; outer plate small, subovate, with eight apical weakly plumose to pectinate setae, with 14 robust medial setae decreasing in size, and ten pairs of short robust medial setae; palp large, 4-articulate, article 2 broad, length 2.8 x breadth, dactylus well developed, with four short simple and two long simple subterminal setae, unguis present.

Gnathopod 1: chelate; coxa reduced, anterior margin convex, anteroventral corner rounded, posterior margin straight, 4 simple setae on ventral margin; basis long, slender, length 5.4 x breadth, anterior and posterior margins smooth with long simple setae; ischium length 1.45 x breadth; merus, posterior margin with groups of long simple setae and a patch of short setae; carpus length 1.8 x breadth, with long simple setae along posterior margin; propodus subequal to carpus, subrectangular, length 1.7 x breadth, margins subparallel, posterior margin smooth, subtly sinusoidal, with 4 groups of simple slender setae, palm extremely obtuse, margin concave with three simple setae, posterodistal corner with two robust setae; dactylus with subterminal spines and setae. *Gnathopod 2:* subchelate; coxa large, distally expanded, subequal in size to coxa 3; ischium long, length 2.2 x

breadth, carpus long, length 2.1 x breadth, posterior margin broadly but shallowly lobate; propodus subquadrate, short, length 1.2 x breadth, palm slightly obtuse with distally straight, smooth margin, posterodistal corner with six robust setae; dactylus not reaching palm corner, posterior margin smooth with three simple setae.

Pereopod 3: coxa large; merus not expanded anteriorly; merus-carpus without plumose setae; propodus with five groups of slender setae along posterior margin, with two distal locking setae; dactylus long, slender. *Pereopod 4:* coxa deeper than wide, posterior excavation shallow, posteroventral lobe large, anterior and posterior margins converging, distally rounded; merus not expanded anteriorly; merus-carpus without plumose setae; propodus with seven slender setae along posterior margin and two distal locking setae; dactylus long, slender. *Pereopod 5:* coxa distally lobate anterior lobe stronger than posterior; basis expanded, posterior margin with 8 serrations; merus slightly expanded posteriorly; propodus with six groups of robust setae along anterior margin, and two distal locking setae, with four slender setae along posterior margin; dactylus long, slender. *Pereopod 6:* coxa small, weakly lobate posteriorly; basis broad, anterior margin convex, posterior margin minutely crenate; merus not expanded posteriorly; propodus with eight groups of robust and slender setae along posterior margin and two distal locking setae; dactylus long, slender. *Pereopod 7:* basis expanded posteriorly, tapering distally, posterior margin minutely crenate, posteroventral margin rounded; merus not expanded posteriorly, with four robust setae; propodus with seven groups of robust setae along anterior margin and two distal locking setae, with ten robust setae along posterior margin; dactylus long, slender.

Oostegites: present on gnathopod 2 to pereopod 5. Gills: from gnathopod 2 to pereopod 7, not pleated.

Pleonites 1 to 3: dorsally smooth. *Epimeron 1:* anteroventral corner rounded, quadrate posteriorly. *Epimeron 2:* posteroventral corner weakly produced acute. *Epimeron 3:* subquadrate, posteroventral corner weakly produced. *Urosomites*: urosomite 1 with anterodorsal notch. *Uropod 1:* without fine setae; peduncle with six dorsolateral, one apicolateral, four dorsomedial, and one apicomedial robust setae; rami subequal in length; outer ramus with eight lateral and four medial robust setae; inner ramus with nine lateral and four medial robust setae. *Uropod 2:* peduncle with three dorsomedial setae and one apicolateral seta; outer ramus longer than inner ramus; outer ramus with 11 lateral and six medial robust setae; inner ramus with seven lateral and three medial robust setae; inner ramus with slight constriction. *Uropod 3:* peduncle short, length 1.8 x breadth, without dorsolateral flange, with three apicomedial robust setae, with three apicolateral robust setae; without plumose setae; rami lanceolate, inner ramus subequal to outer ramus, outer ramus 2-articulate, article 2 short, article 1 with two lateral robust setae; inner ramus with seven lateral and seven medial robust setae, slender plumose setae absent. *Telson:* longer than broad, length 2.1 x breadth, deeply (66%) cleft, distal margins incised, with one long and one short apical robust setae on each lobe.

Male. As for female except *Antenna 1:* calceoli present. *Antenna 2:* peduncle with strong brush setae, calceoli present.

Etymology. This new species is named in honour of John Addy, who initiated the BP funded Deep-Sea Biodiversity Research Fellowships, enabling much needed taxonomic research to be carried out.

Distribution. Off the coast of Pakistan in the northern Arabian Sea, Indian Ocean at depths of ~1200 m.

Remarks. The new species can be distinguished from *Podoprion bolivari* Chevreux, 1891 by the shape of the propodus of gnathopod 2 (not tapering distally), the shape of coxa 4 (distally rounded rather than square), the number and size of serrations on pereopod 5 basis (up to eight small versus six large in *P. bolivari*); and from *P. ruffoi* Lowry & Stoddart, 1996 and *P. mediterraneum* Kaim-Malka by the gnathopod 2 propodus (palm more obtuse), the shape of coxa 4 (distally rounded rather than square), shape and size of serrations on pereopod 5 basis, and small characters of the mouthparts. *P. ruffoi* differs from *P. bolivari* in having: more cuspidate setal teeth on the outer plate of maxilla 1, a larger carpus of gnathopod 1, subchelate gnathopod 2 with slightly obtuse palm, and telson not as deeply cleft. The differences between *P. bolivari*, *P. ruffoi*, and *P. mediterraneum* were tabulated by Kaim-Malka (2004). As noted by Kaim-Malka (2004) the number of serrations on the pereopod 5 basis varies according to the size of the animal. In the case of *P. addyi* the serrations range between 5 (juveniles) and 8 (largest females).

Podoprion bolivari has been reported in the Atlantic Ocean (Spain, Bay of Biscay (Chevreux, 1891)) and Mediterranean Sea (France, Marseille (Ledoyer, 1977); Yugoslavia, Boka Kotorska (Karaman, 1973)), 12–120 m depth. *Podoprion ruffoi* was collected off the coast of Namibia, in 410–460 m depth, from the stomach contents of the psychrolutid fish *Ebinania costacanariae* (Cervigon, 1961) (Lowry & Stoddart, 1996). *Podoprion mediterraneum*, was recently reported from the Toulon Canyon, at 500 m (Kaim-Malka, 2004). The addition of *Podoprion addyi* sp.nov., constitutes a considerable range-extension for the genus and is the first record of a species of *Podoprion* from the Indian Ocean.

Key to the genus *Podoprion*

1. Coxa 4 distally rounded, gnathopod 2 dactyl not reaching palm edge ..... *P. addyi*
- Coxa 4 distally truncate, gnathopod 2 dactyl reaching palm edge 2
2. Gnathopod 2 propodus tapering distally ..... *P. bolivari*
- Gnathopod 2 proposus not tapering distally 3
3. Pereopod 5 basis (adult) with 6–8 large serrations, epimeron 2 and 3 posteroventral corner narrowly rounded ..... *P. ruffoi*
- Pereopod 5 basis (adult) with more than 9 large serrations, epimeron 2 and 3 posteroventral corner acutely produced ..... *P. mediterraneum*.

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