ZooKeys 18: 171–180 (2009)
doi: 10.3897/zookeys.18.198
www.pensoftonline.net/zookeys

RESEARCH ARTICLE

A peer-reviewed open-access journal
ZooKeys
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Leipanthura casuarina, new genus and species of anthurid isopod from Australian coral reefs without a "five-petalled" tail (Isopoda, Cymothoida, Anthuroidea)

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Academic editor: *Niel Bruce* | Received 11 May 2008 | Accepted 21 May 2009 | Published 26 August 2009

urn:lsid:zoobank.org:pub:636265D7-DB86-4FDE-987B-A0BB59E78327

Citation: Poore GCB (2009) *Leipanthura casuarina,* new genus and species of anthurid isopod from Australian coral reefs without a "five-petalled" tail (Isopoda, Cymothoida, Anthuroidea). In: Bruce N (Ed) Advances in the taxonomy and biogeography of Crustacea in the Southern Hemisphere. ZooKeys 18: 171–180. doi: 10.3897/zookeys.18.198

Abstract

A new minute anthurid isopod, 2.7 mm long, is described. It is notable in having a uropod with almost cylindrical terminal rami, lacking the typical anthuroid uropodal structure in which the flattened exopod is attached to the peduncle dorsolaterally and more proximal to the terminal endopod. The species has all the other features of Anthuroidea (cylindrical body, mandibular spine row absent or evident as lamina dentata, maxilla 2 fused with the lower lip as a hypopharynx) and many features of the family Anthuridae (paired statocysts, fused pleonites, compact mandible, pereopods 2 and 3 propodus with single palmar robust seta) and is placed in this family as a new genus and species, *Leipanthura casuarina*, close to *Anthura*, *Exallanthura* and *Ptilanthura. Leipanthura casuarina* is also unusual in lacking pereopod 7 in the adult.

Keywords

Crustacea; Isopoda; Cymothoida; Anthuroidea; Anthuridae; *Leipanthura*; new genus; new species; coral reef; Australia

Introduction

The Anthuroidea Leach, 1814 are a distinctive group of mostly marine isopods. All have a characteristic uropodal structure in which the flat exopod is attached to the

peduncle dorsolaterally and proximal to the terminal endopod such that Leach likened the "tail" (pleotelson and two uropods) of the type species to a five-petalled flower. In addition, all species have a cylindrical body without dorsal coxal plates, the mandibular spine row absent or evident as lamina dentata, and maxilla 2 fused with the lower lip as a hypopharynx. While most literature deals with them as members of the suborder Anthuridea Monod, 1922, a recent revision places them as a superfamily within Cymothoida Wägele, 1989 (Brandt and Poore 2003). The superfamily was revised (as Anthuridea) by Poore (2001). In that work, more than 500 species were listed in 57 genera in six families following a cladistic analysis of family and generic relationships. Schotte et al. (2008 onwards) also listed the species.

The discovery of three tiny individuals of a new species with anthuroid features but lacking the characteristic uropodal structure, necessitates a reappraisal of superfamily and family definitions. While it is tempting to treat the new species as a new family (or superfamily!), it has so many characteristics of the family Anthuridae Leach, 1814 that only a new genus can be justified.

The family diagnosis, differentiating Anthuridae from the other five anthuroid families, repeats that of Poore (2001) but adds characters dealing with pereopod 7 and the uropod. The generic diagnosis follows the format used by Poore (2001) for anthurid genera. Pereopods, antennae and mouthparts were drawn in situ after ensuring the limbs sat in one plane. Mouthparts were confirmed from a dissection of the paratype. Material is deposited in the Museum of Tropical Queensland, Queensland Museum, Townsville (QM) and Western Australian Museum, Perth (WAM).

Anthuridae Leach, 1814

Diagnosis. Body 10–15 times as long as wide, non-males occasionally more elongate; pereonite 7 wider than long, much shorter than pereonite 6. Pleonites 1–5 together not more than twice as long as wide, fused; without marginal plumose setae on pleonal epimera or posterior borders of pleonites 4 and 5. Antenna 2 flagellum of fewer than 10 articles, shorter than peduncle. Mouthparts not produced anteriorly. Mandible compact and with weakly-toothed transverse incisor. Maxillipedal endite reaching palp article 3, or absent or obsolete; palp broad (c. twice as long as wide), with 5 free articles or with 2 or more articles fused. Pereopods 2 and 3 carpus not or weakly produced distally on lower margin; propodus palm with 1 distal robust seta only. Pereopods 4–7 propodus palm with 1 distal robust seta. Pereopod 7, if present, having propodus without distal serrate setae. Pleopod 1 exopod operculiform alone. Statocysts paired.

Remarks. This family diagnosis is slightly modified from that of Poore (2001) who adjusted earlier concepts, e.g., of Wägele (1981), by removing some genera to Expanathuridae Poore, 2001. The significant change in this new diagnosis is to accommodate the absence of pereopod 7.

The new genus, *Leipanthura*, could be identified in a first couplet of a key to genera of Anthuridae as follows:

1 Uropodal exopod terminal, cylindrical .....***Leipanthura***
– Uropodal exopod subterminal, dorsal, leaf-like .... all other genera (see key in Poore, 2001)

Alternatively, it would be necessary to replace the final couplets of Poore's (2001: 105) key to genera of Anthuridae to accommodate *Leipanthura* as follows:

22 Mandibular palp of 3 articles **23**
– Mandibular palp of 1 article **24**
23 Uropodal exopod terminal, cylindrical .....***Leipanthura***
– Uropodal exopod subterminal, dorsal, leaf-like ..... ***Anthura***
24 Pereopod 7 present.....***Ptilanthura***
– Pereopod 7 absent..... ***Exallanthura***

***Leipanthura* gen. n.**
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Diagnosis. Body irregularly darkly pigmented. Pleonites 1–5 together longer than greatest width, fused, suture between pleonites 1 and 2 visible only laterally; pleotelson without indication of posterior margin of pleonite 6. Antenna 2 flagellum of 6 articles, longer than article 5 of peduncle. Maxillipedal endite absent; palp articles 1–5 fused. Pereopod 1 propodus cylindrical, not in contact with merus. Pereopods 4–6 carpus with upper margin nearly as long as lower margin, distal margin transverse and without distal lobe, without robust setae on lower margin or on distal angle. Pereopod 7 absent. Uropodal exopod cylindrical, articulating distally in same horizontal plane as endopod.

Type species. *Leipanthura casuarina*, new species, here designated.

Etymology. *Anthura*, from Greek *anthos*, a flower, and *oura*, a tail, describes the telson and uropods of *Anthura gracilis* "… which, when alive, much resemble a five-petaled flower …" (Leach 1814). Greek *leipo*, meaning to be without, reflects the absence of the anthuroid tail in this monotypic genus.

Remarks. Several features place this enigmatic new genus well within the family Anthuridae. The overall narrow body form, arrangement of pereonites, short antennal flagella, compact mouthparts, simple pereopods with few robust setae, fused pleonites, operculiform first pleopodal exopods, and pleotelson with paired statocysts are typically anthurid. The species is notable within Anthuridae for the absence of pereopod 7 in an adult female. The observation that the holotype bears oostegites confirms that this is a neotenous characteristic (all isopods hatch without pereopods 7, this stage being called the manca). The condition is seen in one other anthurid, *Exallanthura* Kensley, 1980, four genera of Paranthuridae Menzies & Glynn, 1968 (Poore 1984 2001) and *Curassanthura* Kensley, 1981 in Leptanthuridae Poore, 2001 (Wägele 1982). *Exallanthura* also shares with *Leipanthura* a completely fused maxillipedal palp but differs in having a well developed anterodorsal uropodal exopod, more

swollen pereopod 1 propodus and a mandibular palp of one article. The only species, *Exallanthura sexpes* Kensley, 1980, is known from only two individuals that may be mancas; as is commonly the case with specimens of anthurids they lack features that would identify them as fully developed males (multiarticulate antenna 1) or females (oostegites). *Ptilanthura* Harger, 1878 has a similar uropod, mandibular palp, maxilliped and pereopod 1 to *Exallanthura* but examples possess pereopod 7 (Kensley 1996).

Leipanthura shares fused maxillipedal palp articles with one other genus, *Anthura* Leach, 1814, which is a monotypic genus also with pigmented integument. *Anthura gracilis* Montagu, 1808 has a typical anthuroid uropod, swollen pereopod 1 propodus with a toothed palm, and long pleotelson (Wägele 1980).

The flattened uropodal peduncle and its almost cylindrical rami that characterise the new genus are unique within Anthuroidea and must be regarded as a reversal to the form seen in Gnathiidae, the probable sister taxon of Anthuroidea (Brandt and Poore 2003; Cohen and Poore 1994). Placing the genus outside Anthuroidea demands numerous convergences in many other characters.

***Leipanthura casuarina* sp. n.**

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Figs 1–4

Material examined. Holotype. Australia, Queensland, Great Barrier Reef, Lizard I., Casuarina Beach, 14.6839°S, 145.4453°E, N.L. Bruce, 15 April 2008 (CReefs stn CGLI31B), dead coral heads, QM W13791 (ovigerous female, 2.5 mm).

Paratype. Collected with holotype, QM W31120 (juvenile, 2.6 mm, plus 1 microslide).

Non-type. Australia, Western Australia, Ningaloo Reef, off Frazer I., 22.65830°S, 113.61809°E, L. Hughes and C. Bagnato, 25 May 2009 (CReefs stn NR09-60B), reef slope, coral heads, 6.8 m, WAM C40642 (juvenile, 2.7 mm).

Etymology. Casuarina, from the type locality and continuing the convention initiated by Poore and Lew Ton (1985) of naming Australian anthuroids after Australian plant genera (noun in apposition).

Description of holotype. Total length, 2.5 mm. Body with well-spaced patches of brown pigment all over (see fig. 4); 14 times as long as wide. Head longer than wide, smooth, with short, broad rostral projection; eyes lateral, of about a dozen ommatidia. Pereonites smooth, of equal width, pereonites 2–5 of similar lengths, pereonite 6, 0.8 length of pereonite 5, pereonite 7, 0.4 length of pereonite 6. Fused pleonites 1–5 smooth, pleonite 1 indicated ventrolaterally as a slight notch on deep pleural flange, others with minute lateral seta, pleonite 5 posterolaterally lobed around base of pleotelson and uropods; pleotelson half as long as pleonites 1–5, as long as width at base, evenly convex dorsally, tapering to broadly semicircular apex with pair of distal setae, with pair of large statocysts clearly visible.

Figure 1. *Leipanthura casuarina* sp. n. **a** holotype female (right lateral view, pereopods not shown, oostegites indicated, pleopod 1 in operculate position) **b** paratype juvenile (right lateral view, pereopods shown, pleopods exposed) **c** head and right antennae 1 and 2, holotype female (dorsal view); **e** pleon and pleotelson, holotype female (dorsal view, uropods in situ) **u** left uropod, paratype juvenile (ventral view); left mouthparts, holotype female, in situ (**md** mandible **mx** maxilla 1 **mp** maxilliped). Scale bar = 0.5 mm, refers to **a** and **b** only.

Antenna 1 peduncle with stout article 1, shorter and progressively narrower articles 2 and 3; flagellum about as long as last peduncle article, of short article 1, longer article 2 and article 3 with 3 aesthetascs and 3 setae. Antenna 2 peduncle longer than peduncle of antenna 1, articles 4 and 5 longer than wide; flagellum of 6 minute articles.

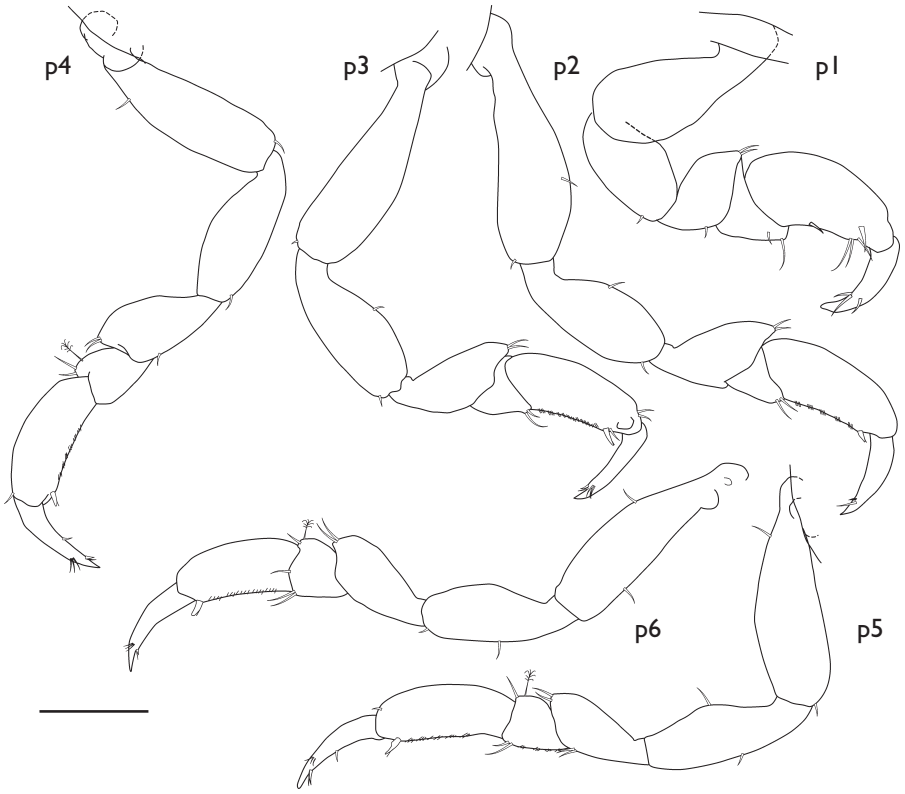

Figure 2. *Leipanthura casuarina* sp. n., paratype juvenile. **p1**-**p6**, pereopods 1–6 (drawn in situ to same scale). Scale bar = 0.1 mm.

Upper lip domed anteriorly. Mandible with incisor barely toothed, lamina dentata with 3 teeth (molar process not seen); palp of 3 articles, article 2 longer than 1, article 3 half as long as 2, with 3 short distal setae. Maxilla 1 outer lobe with 2 or 3 subdistal teeth (inner lobe not seen). Maxillipedal of fused articles with 1 mesial seta, 1 lateral seta, 2 subterminal facial setae, and 5 setae on lateral apical lobe (fused article 5); epipod rounded.

Pereopod 1 subchelate, with stout proximal articles bearing few setae; carpus cupping propodus, with short square free distal margin, with 2 setae on lower margin; propodus slightly swollen but proximally not overlapping carpus on upper margin, palm axial, concave, with 2 distal setae, another longer seta more distally and laterally; dactylus closing on palm, unguis about one-third its length. Pereopod 2 more slender than first, 1.3 times as long (measured through main axes of articles), proximal articles bearing few setae; merus overlapping carpus and base of propodus on upper margin; carpus triangular, with 2 setae on lower margin; propodus slightly tapering and curved, about 2.5 times as long as wide, palm concave, with palmar comb setae and 1 distal flagellated robust seta; dactylus slightly curved, unguis microscopically dentate. Pereopod 3 similar to pereopod 2, dactylus straighter. Pere-

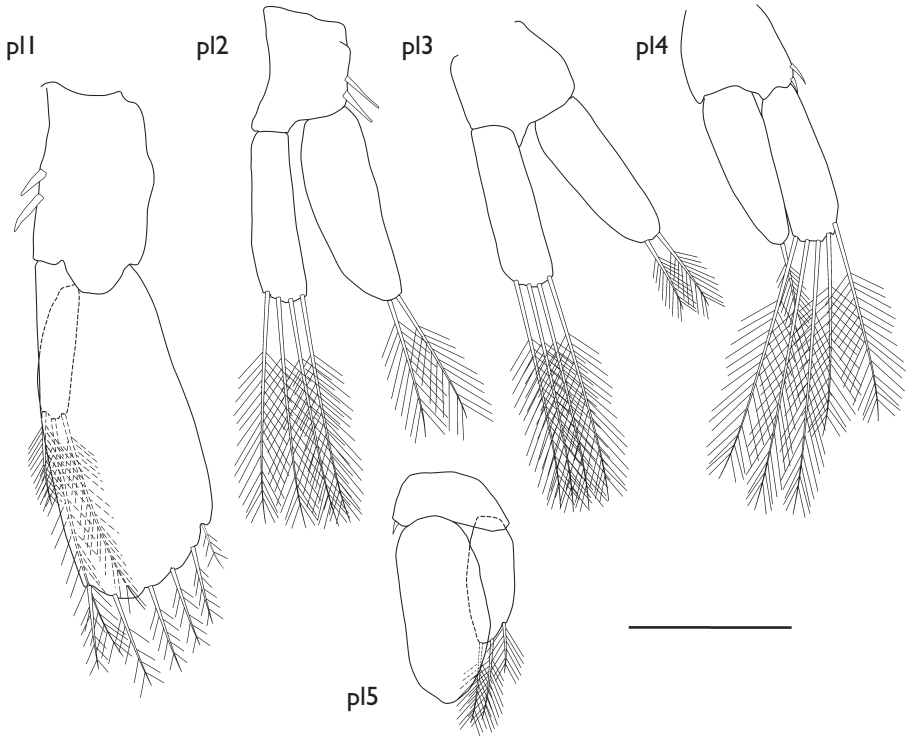

Figure 3. *Leipanthura casuarina* sp. n., paratype juvenile. **pl1**-**pl5**, pleopods 1–5 (drawn to same scale). Scale bar = 0.1 mm.

opods 4–6 similar in form and length to each other, about as long as pereopods 2 and 3, proximal articles with few setae; merus with convex upper margin; carpus with free upper margin about 0.7 length of lower margin, with setae on distal angles; propodus curved, about 2.5 times as long as width, palm with 1 flagellated robust seta distally; dactylus curved, unguis one-quarter length.

Figure 4. *Leipanthura casuarina* sp. n., alcohol-preserved non-type specimen, WAM C40642. Photograph and image preparation by Ken Walker, Museum Victoria, 18 June 2009. Scale bar = 0.25 mm.

Pleopod 1 scarcely thickened, not indurate, exopod overlapping endopod and all other pleopods and base of uropods; endopod one-third as wide and half as long as exopod, with 3 distal seta; exopod 2.1 times as long as wide, with 6 distal marginal seta. Pleopods 2–5 progressively shorter, between 0.58 (pl2) and 0.44 (pl5) as long as pleopod 1; pleopods 2–4 with tapering endopods (2, 2, 1 apical setae) and more rectangular exopods (4, 4, 4 apical setae); pleopod 5 endopod oval, broad (without apical setae) and shorter oval exopod (3 apical setae).

Uropodal peduncle widest distally, mesially expanded, with oblique distal margin; endopod suboval in dorsal view, wider than deep, with 3 apical setae mesially and 3 setae ventrolaterally; exopod cylindrical, about half as long as endopod, with 1 lateral seta and 2 dorsal apical setae.

Oostegites on pereopods 2–5.

Remarks. The illustration of the female (fig. 1a) shows pleopod 1 in its operculate position; that of the juvenile (fig. 1b) with the pleopods open. Apart from the absence of oostegites, the juvenile paratype seems indistinguishable from the female.

The specimen from Ningaloo Reef, WA, on the opposite side of Australia from the type locality, was not dissected (fig. 4) but differed in ways that could be interpreted as being of taxonomic value only after looking at more than the three specimens available now. General proportions and shapes were similar. Nevertheless, the distal palmar setae on pereopods 2–6 were noticeably trifid (flagellated and simple in type specimens) and the numbers of setae differed. The WA specimen possessed four setae on the mandibular palp article 3 (not three), three apical setae on the uropodal endopod (not two), and three setae ventrolaterally on the uropodal exopod (not two).

The species, at 2.7 mm long, is one of the smallest anthuroids known, considerably narrower than some expanathurids of similar lengths (Poore and Lew Ton 2002).

Acknowledgements

I thank Niel Bruce, Museum of Tropical Queensland, Townsville, for drawing this interesting species to my attention and providing the material. Special thanks too to Ken Walker, Museum Victoria, for taking the photograph using a Leica MZ16 microscope, Leica DF500 digital camera, and Automontage® software. This material from Lizard Island and Ningaloo Reef was collected under the auspices of the CReefs project organised by the Australian Institute of Marine Science (AIMS). The CReefs Australia Project is generously sponsored by BHP Billiton in partnership with The Great Barrier Reef Foundation, the Australian Institute of Marine Science and the Alfred P. Sloan Foundation; CReefs is a field program of the Census of Marine Life.

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