European Journal of Taxonomy 740: 55–76
https://doi.org/10.5852/ejt.2021.740.1281

ISSN 2118-9773
www.europeanjournaloftaxonomy.eu
2021 · García-Herrero Á. *et al.*

Research article

urn:lsid:zoobank.org:pub:9E9E2D9D-1AD9-43B3-84FD-02C546EDEE6B

Two new tanaidaceans (Crustacea: Peracarida) from Portuguese submarine canyons (NE Atlantic, West Iberian Margin)

Álvaro GARCÍA-HERRERO [1,*], Patricia ESQUETE [2] & Marina R. CUNHA [3]

[1,2,3] CESAM (Center of Environmental and Marine Studies), Departamento de Biologia,
Universidade de Aveiro, Campus de Santiago, 3810-193, Aveiro, Portugal.
[1] Independent researcher.

[*] Corresponding author: alvarogarcia27@hotmail.es
[2] Email: pesquete@ua.pt
[3] Email: marina.cunha@ua.pt

[1] urn:lsid:zoobank.org:author:1A1B932B-C9AD-4650-A502-98982509D122
[2] urn:lsid:zoobank.org:author:DD6A9296-5310-4816-A125-9E37691E14AF
[3] urn:lsid:zoobank.org:author:553A98B5-0AE0-424F-9ED5-EC50F129519C

Abstract. The Tanaidacea are ubiquitous and amongst the most abundant taxa in the deep sea. However, their diversity in submarine canyons remains largely unknown. Here, two new species and a new genus of Paratanaoidea are described. *Paranarthrura cousteaui* sp. nov. is distinguished by the combination of the following characters: post-cheliped sclerites not fused, presence of one seta in the maxilliped endite, one long midventral seta in cheliped, one penicillate seta in the basis of pereopods 4–6, uropod endopod bi-articulated and uropod exopod shorter than endopod article 1. This species was found at the upper reaches of three Portuguese canyons, Cascais, Setúbal and Nazaré Canyons, and the adjacent open slope, between 897 and 1001 m water depths. *Tirana vallis* gen. et sp. nov. presents a combination of the characters that define the other two genera of Paranarthrurellidae, *Paranarthrurella* and *Armatognathia*, but also unique characters within the family: the antenna, cheliped and uropod are more elongate than the rest of the species; the pereopods 4–6 carpus spines reach at least half of the length of the propodus and the propodus of pereopods 4–6 have ramified subdistal spines. This species was found at the middle reaches of Setúbal Canyon (3214–3219 m water depth).

Keywords. Tanaidomorpha, Agathotanaidae, Paranarthrurellidae, *Paranarthrura*, *Tirana*.

García-Herrero A., Esquete P. & Cunha M.R. 2021. Two new tanaidaceans (Crustacea: Peracarida) from Portuguese submarine canyons (NE Atlantic, West Iberian Margin). *European Journal of Taxonomy* 740: 55–46. https://doi.org/10.5852/ejt.2021.740.1281

Introduction

Submarine canyons are deep-sea geomorphic features distributed along continental margins worldwide, with high variability of topographic, hydrographic, sedimentological and biogeochemical conditions (Tyler *et al.* 2009; Harris & Whiteway 2011). This morphological and ecological heterogeneity results in variations of the diversity patterns of the macrofaunal assemblages along the canyons (e.g., Almeida *et al.* 2018) and submarine canyons have been defined as areas of organic matter accumulation with a high density of benthic biomass compared with the open slopes (Vetter & Dayton 1998; Duineveld *et al.* 2001; Cunha *et al.* 2011). However, despite the fact that Tanaidacea Dana, 1849 are amongst the dominant taxa in benthic macrofaunal assemblages (e.g., Cunha *et al.* 2011; Gunton *et al.* 2015), only one study focusing on tanaidaceans from submarine canyons has been published to date (Sganga & Roccatagliata 2016).

The knowledge of the deep-sea Tanaidacea along the Portuguese margin is scarce: except for the Gulf of Cadiz and Horseshoe Continental Rise, where tanaidacean fauna have been the subject of taxonomic studies (Błażewicz-Paszkowycz *et al.* 2011a, 2011b; Esquete & Cunha 2017, 2018), few published works (Norman & Stebbing 1886; Stephensen 1915; Băcescu 1978) and repository datasets (IFREMER 2020; Orrel 2020) have added localized records to the area. In 2006, two research cruises were carried out aiming at a multidisciplinary study of three of the largest marine canyons from the Portuguese margin: Nazaré, Cascais and Setúbal (Fig. 1). The benthic macrofauna samples revealed a great diversity and heterogeneity of the assemblages (Cunha *et al.* 2011), and particularly of tanaidaceans. The forty tanaid species recorded in the Portuguese canyons will be reported elsewhere but from these, two were identified as new for science are herein formally described as a new species belonging to the family Agathotanaidae Lang, 1971 and a new species and new genus of the family Paranarthrurellidae Błażewicz, Jóźwiak & Frutos, 2019.

The family Agathotanaidae is currently composed of 56 species belonging to seven genera (WoRMS 2020), 13 of which have been found in the Northeast Atlantic as the outcome of two exhaustive works (Bird & Holdich 1988; Bird 2010). This is not considered a strictly deep-sea family, because some populations of well-known species, such as *Paranarthrura subtilis* Hansen, 1913 and *Agathotanais ingolfi* Hansen, 1913 have been found at depths shallower than 200 m (Bamber 1986; Bird 2010). Morphological distinction of Agathotanaidae from Anarthruridae Lang, 1971 has been historically controversial, and its taxonomic status has been changing between family, subfamily and tribe (Lang 1971; Sieg 1983, 1986a; Larsen & Wilson 2002). Currently, Agathotanaidae is accepted as a distinct family, not based on specific characters or apomorphies but rather on a particular combination of characters that also occur in species belonging to Anarthruridae, making it difficult to discern between the two families (Bird 2004). These difficulties were reflected in the status of the genus *Paranarthrura*, which was described by Hansen (1913) as a Tanaididae Nobili, 1906, and subsequently moved to the family Anarthruridae by Lang (1971), to the tribe Anarthrurini Lang, 1971 by Sieg (1986b), the tribe Agathotanaini Lang, 1971 by Bird & Holdich (1988), and to the family Agathotanaidae by Larsen & Wilson (2002) (see also Anderson 2020). Although a solid diagnosis was provided by Larsen (2005), several authors pointed out the heterogeneity of the species included in the genus, which is probably polyphyletic (Bird & Holdich 1989; Larsen 2007; Bird 2010).

Błażewicz *et al.* (2019) erected the family Paranarthrurellidae to accommodate *Armatognathia* Kudinova-Pasternak, 1987 and *Paranarthrurella* Lang, 1971, previously defined as family incertae sedis. Panarthrurellidae was supported by molecular phylogenetic analysis using COI and 18S genes. The same study defined two new species from *Armatognathia* and seven from *Paranarthrurella*, but also synonymised *Cheliosetosatanais* Larsen & Araujo-Silva, 2014 with *Panararthrurella*. Original descriptions of these genera can be found in Kudinova-Pasternak (1987), Lang (1971) and Larsen & Araújo-Silva (2014).

Material and methods

The specimens examined in this work were obtained from two research cruises aiming the study of three submarine canyons at the central Portuguese continental margin: Nazaré, Cascais and Setúbal,

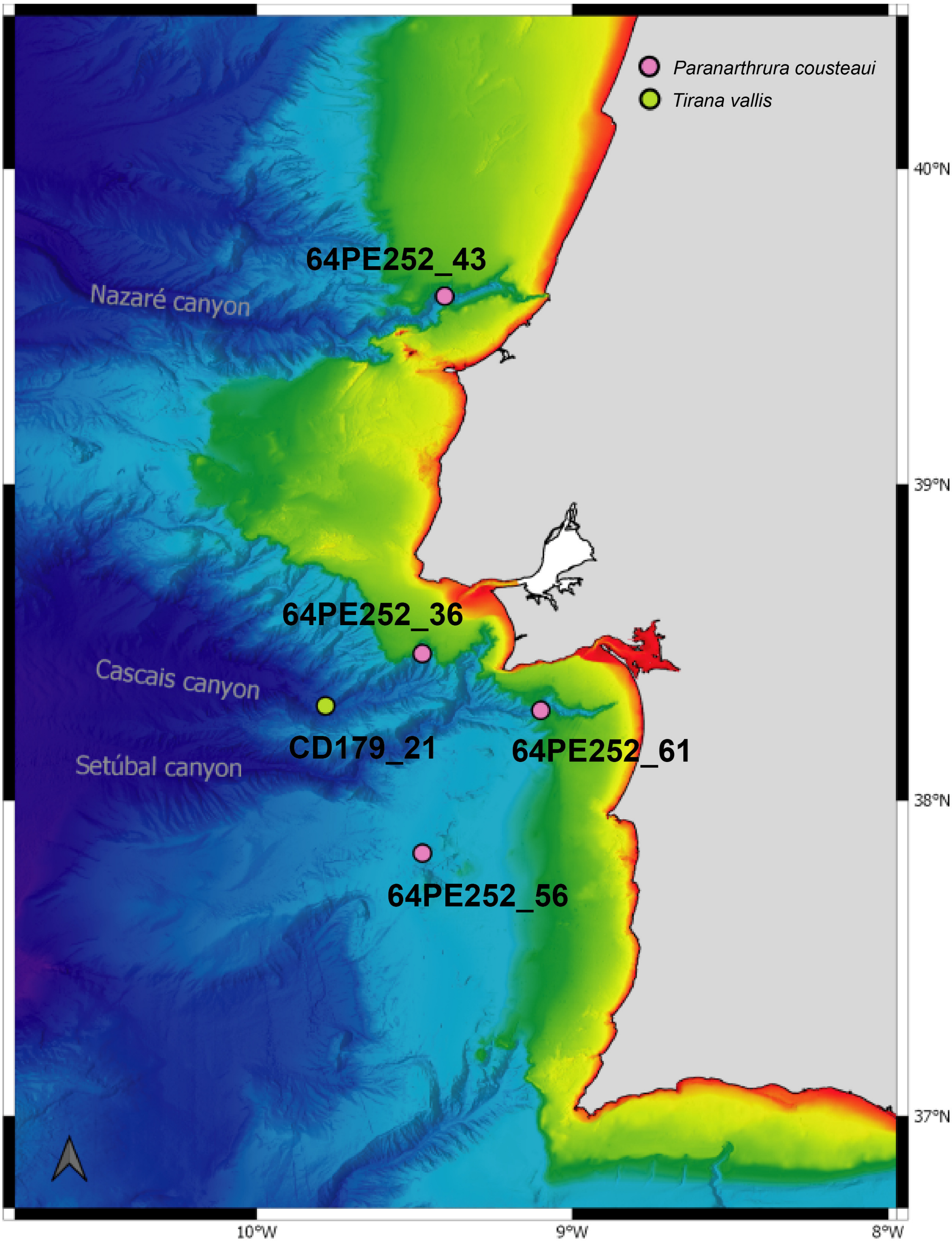

Fig. 1. Sampling sites.

as well as two sampling sites located in the upper slope (Fig. 1) under the project HERMES (Hotspot Ecosystem Research on the Margins of European Seas): Cruise 64PE252 (RV *Pelagia*, 30th August–21st September, 2006) was conducted by the Royal Netherlands Institute for Sea Research (de Stigter *et al.* 2007). Samples where extracted using a NIOZ boxcore equipped with a cylindrical coring barrel of 30 cm diameter (sampling area 0.07 m^2) and 55 cm in length. Cruise CD179 (RSS *Charles Darwin*, 14th April–17th May 2006) was conducted by the National Oceanography Centre, Southampton (Billet *et al.* 2006). Samples were collected using a NOC-UKORS Megacore equipped with 12 megacorer tubes (100 mm diameter) (in ST CD179_21-1) or 9 megacorer + 3 multicores (in ST CD179_21-2). In all cruises the sample material was sieved (1 mm, 500 µm and 300 µm) and fixed immediately in 10% buffered formalin diluted in seawater, or in 96% ethanol (in the case of cruise 64PE252) (see Cunha *et al.* 2011 more details on sampling). Specimens were dissected whenever necessary, mounted in slides with glycerol and examined under a Leica MZ 125 stereoscope and an Olympus BX50 microscope. Length measurements were made axially at the longest part of the structure.

The body length was measured from the tip of the rostrum to the tip of pleotelson. Identification of developmental stages follows Bird & Holdich (1988, 1989). All setae mentioned in the descriptions are simple unless otherwise specified. ‘Penicillate’ setae are those with setules densely covering their distal part, forming a terminal plume. ‘Plumose’ setae are those entirely covered by setules, form their insertion in the cuticle to the terminal end. ‘Setulose’ setae are those with setules only on the posterior half middle of the seta. If not commented, illustrations are performed in dorsal view. This terminology is used according to Esquete *et al.* (2012, 2016). Illustrations were done under a camera lucida, and modified with Adobe Illustrator CS6 software. Type material has been deposited in the Museo Nacional de Ciencias Naturales, Madrid, Spain (MNCN); further material is at the Biological Research Collection of Departamento de Biologia, Universidade de Aveiro (COBI-DBUA).

Figure 1 was performed using the software QGIS ver. 3.10 (QGIS Development Team 2020) and EMODnet digital bathymetry of the EMODnet Bathymetry Consortium (2018).

Results

Systematics

Phylum Arthropoda Latreille, 1829
Subphylum Crustacea Brünnich, 1772
Class Malacostraca Latreille, 1802
Order Tanaidacea Dana, 1849
Suborder Tanaidomorpha Sieg, 1980
Superfamily Paratanaidoidea Lang, 1949
Family Agathotanaidae Lang, 1971
Genus *Paranarthrura* Hansen, 1913

Paranarthrura cousteaui sp. nov.
urn:lsid:zoobank.org:act:3AFA3BE0-25D4-4FDC-B03F-57B7F75F27D1
Figs 2–5

Diagnosis

Preparatory male

Paranarthrura with antenna six-articled. Maxilliped endite with one seta. Cheliped carpus with one long midventral seta. Pereopods 4–6 basis with one penicillate seta. Presence of rudimentary pleopods fused to each pleonite. Uropod endopod bi-articulated; exopod shorter than endopod article 1.

Neuter

As preparatory male, but without pleopods (Fig. 2G).

Etymology

This species is named in honour to Jacques-Yves Cousteau (1910–1997), for his life-long intensive work in raising awareness to the sea life and great contributions to the knowledge of the marine environment.

Material examined

Holotype

PORTUGAL • preparatory ♂ (tergal plate on pereonite 4 broken); West Iberian Margin, Nazaré Canyon; 39°35.80′ N, 9°24.25′ W; depth 897 m; 11 Sep. 2006; stn 64PE252_43bc1; MNCN 20.04/12538.

Paratype

PORTUGAL • 1 preparatory ♂ (dissected); same collection data as for holotype; MNCN 20.04/12539.

Other material

PORTUGAL • 1 manca II; West Iberian Margin, Setúbal Canyon; 38°17.10′ N, 9°06.00′ W; depth 970 m; 17 Sep. 2006; stn 64PE252_61bc3; DBUA0002189.01 • 1 manca II; West Iberian Margin, Cascais Canyon; 38°27.89′ N, 9°28.51′ W; depth 935 m; 18 Sep. 2006; stn 64PE252_36bc1; DBUA0002189.02 • 1 neuter (broken specimen); West Iberian Margin, off Sines; 37°49.98 N, 9°28.49 W; depth 1001 m; 10 Sep. 2006; stn 64PE252_56bc3; DBUA0002189.03.

Description

Preparatory male (MNCN 20.04/12538)

Body (Fig. 2A–B). Well calcified, 6.2 times as long as wide (holotype length: 2.1 mm; width 0.33 mm). Cephalothorax without eyes or eye lobes, subrectangular posteriorly, narrower anteriorly, 0.20 of body length. Rostrum (Fig. 2A, C) absent. Pereon 0.62 of body length, pereonites decreasing in width posteriorly. Pereonites 1–6: 0.5, 0.6, 0.6, 0.9, 0.9 and 0.7 times as long as wide respectively, each with hyposphaenium (Fig. 2B); pereonites 2–6 subhexagonal. Coxal setae visible in dorsal view. Pleon 0.14 of body length, with five free pleonites. Pleonite 5 longest, 0.3 times as long as previous, with anterodorsal and lateral seta (Fig. 2B). Pleotelson semicircular, 0.04 of body length, carrying a pair of setae in posterior margin. Uropods not visible in dorsal view.

Antennule (Fig. 2C). Four-articled. About as long as cephalothorax, 5.2 times as long as wide. Article 1, 2.8 times as long as wide, with one subdistal seta and three short medial penicillate setae on outer margin. Article 2, 2.1 times as long as wide, with one short subdistal seta on inner margin, one long dorsodistal penicillate seta, and one long subdistal seta on outer margin. Article 3, 0.9 times as wide as long, with two distal setae on inner margin and one subdistal seta on outer margin. Article 4, 2.7 times as long as wide, with six long and one short distal setae.

Antenna (Fig. 2D, ventral view). Six-articled, 7.5 times as long as wide. Article 1 fused with body, not visible on dorsal view. Article 2, 1.4 times as long as wide, with dorsodistal seta. Article 3, 1.1 times as long as wide, with dorsodistal seta. Article 4 longest, 3.9 times as long as wide, with three subdistal setae. Article 5 naked, 2.8 times as long as wide. Terminal article 0.3 times as long as previous, with five distal setae.

Mouthparts. Labrum (Fig. 3A–C) conical on ventral view, not compressed, longer than wide and distally setulose. Mandible right (Fig. 4A) and left similar and reduced, without molar process or *lacinia mobilis*; incisor denticulate. Labium not recovered. Maxillule (Fig. 4B–C) endite setulose distally, with eight distal setae, four shorter and four longer; palp with two distal setae. Maxilla not recovered. Maxilliped

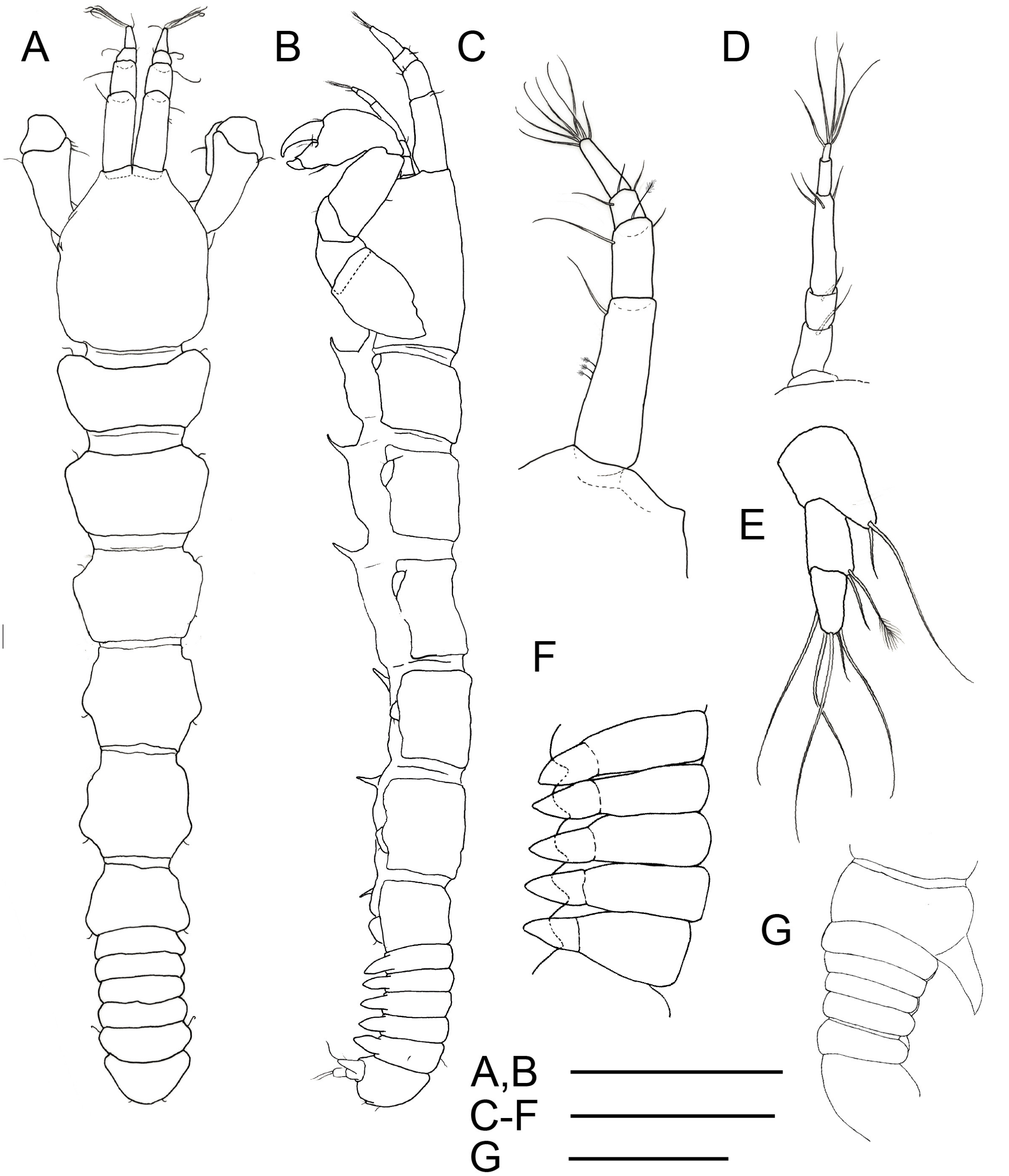

Fig. 2. *Paranarthrura cousteaui* sp. nov. **A–E**. Dissected paratype, adult, ♀ (DBUA0002189.03). **A**. Habitus dorsal view. **B**. habitus lateral view. **C**. Left antennule. **D**. Right antenna in ventral view. **E**. Left uropod. **F–G**. Dissected paratype, manca II (MNCN 20.04/125339). **F**. Detail of pleopods. **G**. Pleon. Scale bars: A–B = 500 µm; C–F = 100 µm; G = 50 µm.

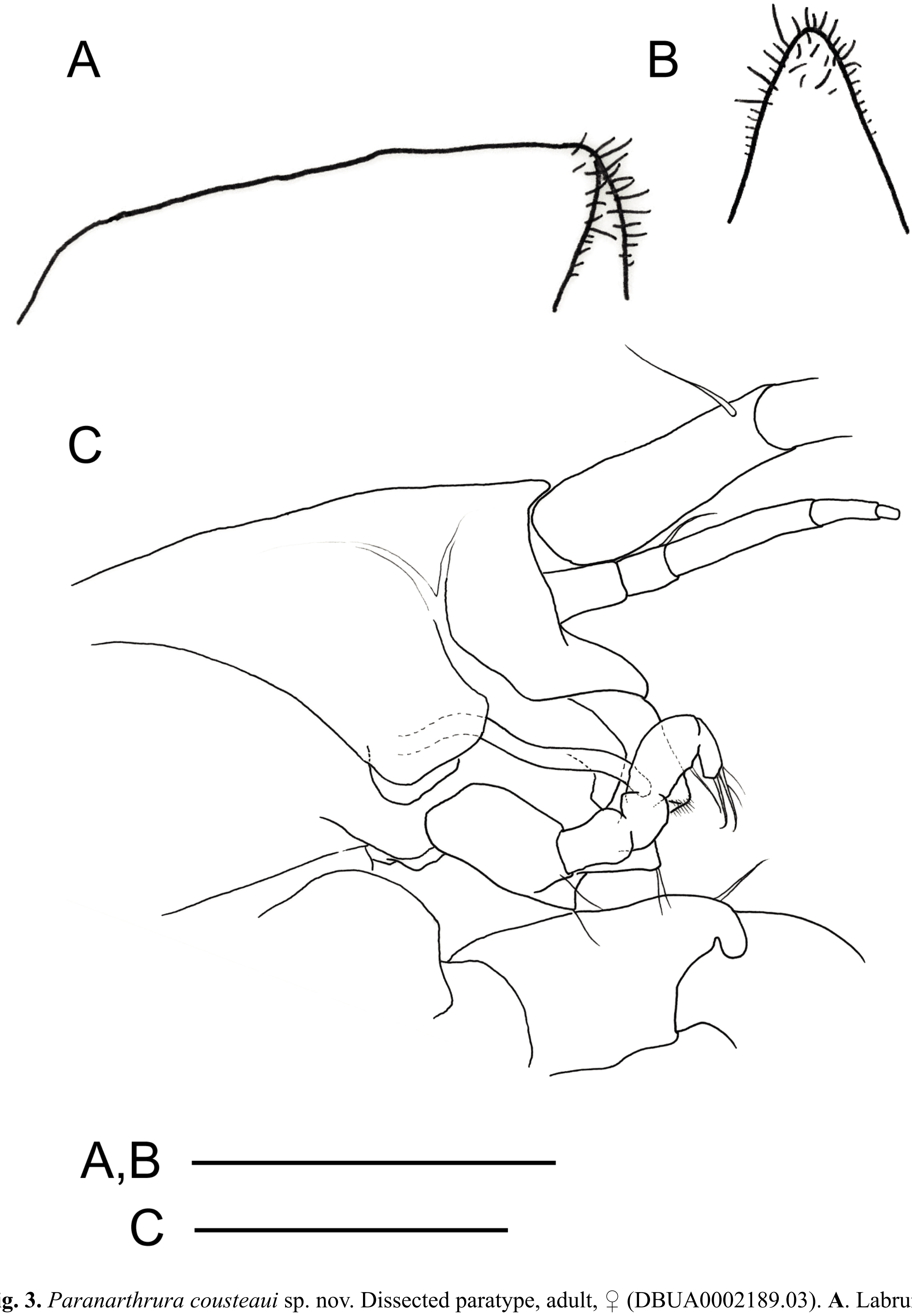

Fig. 3. *Paranarthrura cousteaui* sp. nov. Dissected paratype, adult, ♀ (DBUA0002189.03). **A**. Labrum in lateral view. **B**. Labrum in ventral view. **C**. Relative position of mouthparts (right cheliped removed). Scale bars: A–B = 50 µm; C = 100 µm.

(Fig. 4D) basis fused, elongate, 1.6 times as long as wide, with one seta near the palp insertion. Endites not fused, with one inner distal short seta each. Palp article 1, 1.5 times as long as wide, naked. Article 2, 1.0 times as long as wide, with three inner setae, one of them longer. Article 3, 1.4 times as long as wide, 1.5 times as long as previous, with three inner setae. Article 4, 2.1 times as long as wide, distally setulose, with four simple and two pinnate setae.

Cheliped (Figs 4E, 5A–B). Attached via ventral pseudocoxa, naked, 1.4 times as long as wide. Basis 1.2 times as long as wide, seta not seen. Merus subtriangular, 0.9 times as long as wide, with midventral seta. Carpus 1.7 times as long as wide, with two midventral setae, short and long, and two short middorsal and posterodorsal setae. Propodus 2.0 times as long as wide, ventral protuberance with one ventral seta and inner row of three setae near ventral margin. Cutting edge of fixed finger coarse, not distinct claw, with three setae, near dactylus insertion. Dactylus and unguis not fused, together 3.3 times as long as wide. Dactylus with one simple dorsal seta.

Pereopod 1 (Fig. 5C). Coxa with seta. Basis 4.1 times as long as wide, naked. Ischium wider than long, naked. Merus twice as long as wide, with ventrodistal spine, reaching about half-length of carpus. Carpus 2.6 times as long as wide, bearing three serrate spines: one dorsodistal and two ventrodistal. Propodus slightly curved, 4.7 times as long as wide, ventral margin proximally with four spinules,

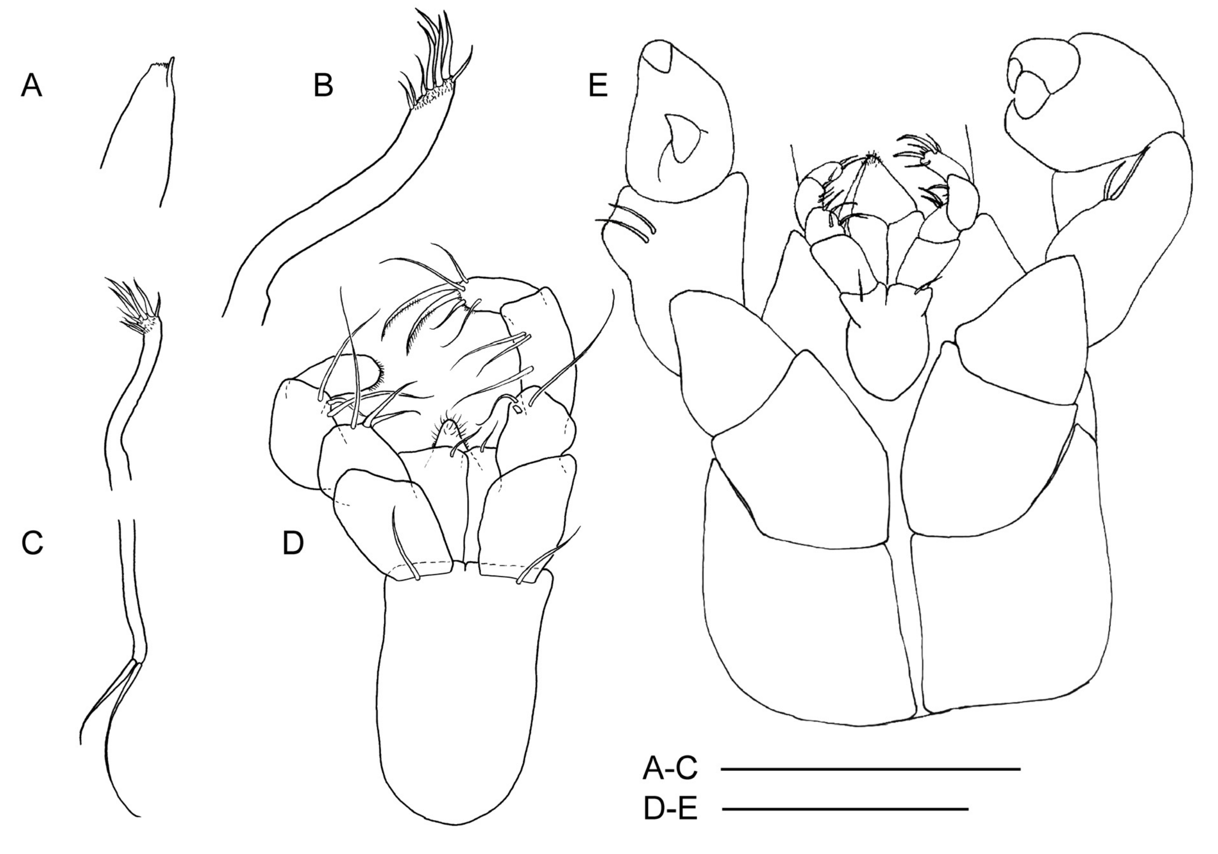

Fig. 4. *Paranarthrura cousteaui* sp. nov. Dissected paratype, adult, ♀ (DBUA0002189.03). **A**. Right mandible. **B**. Maxillule endite. **C**. Maxillule. **D**. Maxilliped (right palp-4 setae not drawn) and labrum. **E**. Ventral view of cephalothorax. Scale bars: A, B, D = 50 µm; C, E = 100 µm.

bearing three subdistal simple setae, two ventral, and one dorsal. Dactylus and unguis together 1.1 times as long as propodus, unguis 0.53 times as long as dactylus.

Pereopod 2 (Fig. 5D). Coxa with anterior seta. Basis naked, 6.2 times as long as wide. Ischium wider than long, with ventral seta. Merus 1.7 times as long as wide, with long, ventrodistal simple spine, as long as carpus. Carpus 2.0 times as long as wide, bearing three serrate spines, one dorsodistal and two ventrodistal. Propodus slightly curved, 3.7 times as long as wide, with small dorsodistal spiniform apophysis, ventral margin with four spinules, bearing one subdistal simple spine. Dactylus and unguis combined 1.3 times as long as propodus, unguis 0.6 times as long as dactylus.

Pereopod 3 (Fig. 5E). Similar to pereopod 2, except for: basis 3.9 times as long as wide. Merus 2.1 times as long as wide, with spine reaching just 80% length of carpus. Carpus 2.7 times as long as wide. Propodus 3.5 times as long as wide. Dactylus and unguis combined 1.5 times as long as propodus.

Pereopod 4 (Fig. 5F). Coxa with anterior seta. Basis 3.2 times as long as wide, with one midventral penicillate seta. Ischium wider than long, with two ventral setae. Merus 1.7 times as long as wide, bearing two ventrodistal simple spines (both 50% length of carpus). Carpus 2.4 times as long as wide, bearing three subdistal serrate spines. Propodus 3.1 times as long as wide, with dorsodistal spiniform apophysis, two ventrodistal and one dorsodistal simple spines. Dactylus and unguis combined 1.7 times as long as propodus, unguis 0.5 times as long as dactylus.

Pereopod 5 (Fig. 5G). Similar to pereopod 4, except for: basis 3.6 times as long as wide. Merus 1.84 times as long as wide. Carpus with an extra distal simple seta. Unguis broken

Pereopod 6 (Fig. 5H). Similar to pereopod 4, except for: Basis 3.7 times as long as wide. Merus 1.6 times as long as wide, bearing two ventrodistal serrate spines. Carpus 2.8 times as long as wide. Propodus 3 times as long as wide, with dorsodistal spiniform apophysis, two distal serrate spines in dorsal margin and two distal serrate spines in ventral margin. Dactylus and unguis together 1.4 times as long as propodus.

Pleopods (Fig. 2B, F). Rudimentary, uniramous, naked and fused to pleonites, with faint fusion line.

Uropods (Fig. 2B, E). Biramous. Exopod fused to protopod, with long and short distal setae, not reaching beyond mid-length of endopod article 1. Endopod bi-articulated, 2.7 times as long as wide. Article 1, 1.5 times as long as wide, with two distal setae on outer margin, one of them penicillate. Article 2, 1.0 times as long as wide, bearing one subdistal long setae on inner margin and four distal setae, one of them shorter.

Manca II

Antennule with aesthetasc, only two setae on pereopod 1 propodus; only one seta on pereopod 5 ischium; pleopods absent (Fig. 2G); uropod endopod article 1 naked, terminal article with four setae only.

Remarks

For most of the species of *Paranarthrura* the males were described with their original description, exceptions being *Paranarthrura bacescui* Kudinova-Pasternak, 1986, *Paranarthrura coimbrai* Larsen & Bird, 2013, *Paranarthrura fortispina* Sieg, 1986 and *Paranarthrura meridionalis* Sieg, 1986 (see Kudinova-Pasternak 1986; Sieg 1986b; Larsen *et al.* 2013). However, males of *P. fortispina* were later described (Jóźwiak & Błażewicz-Paszkowycz 2011). The presence of pleopods is common and one of the main differences with females, together with the body length and relative size of the pleon. Because of the poor condition of the neuter specimens in our collection, we describe *P. cousteaui* sp. nov. from a preparatory male holotype.

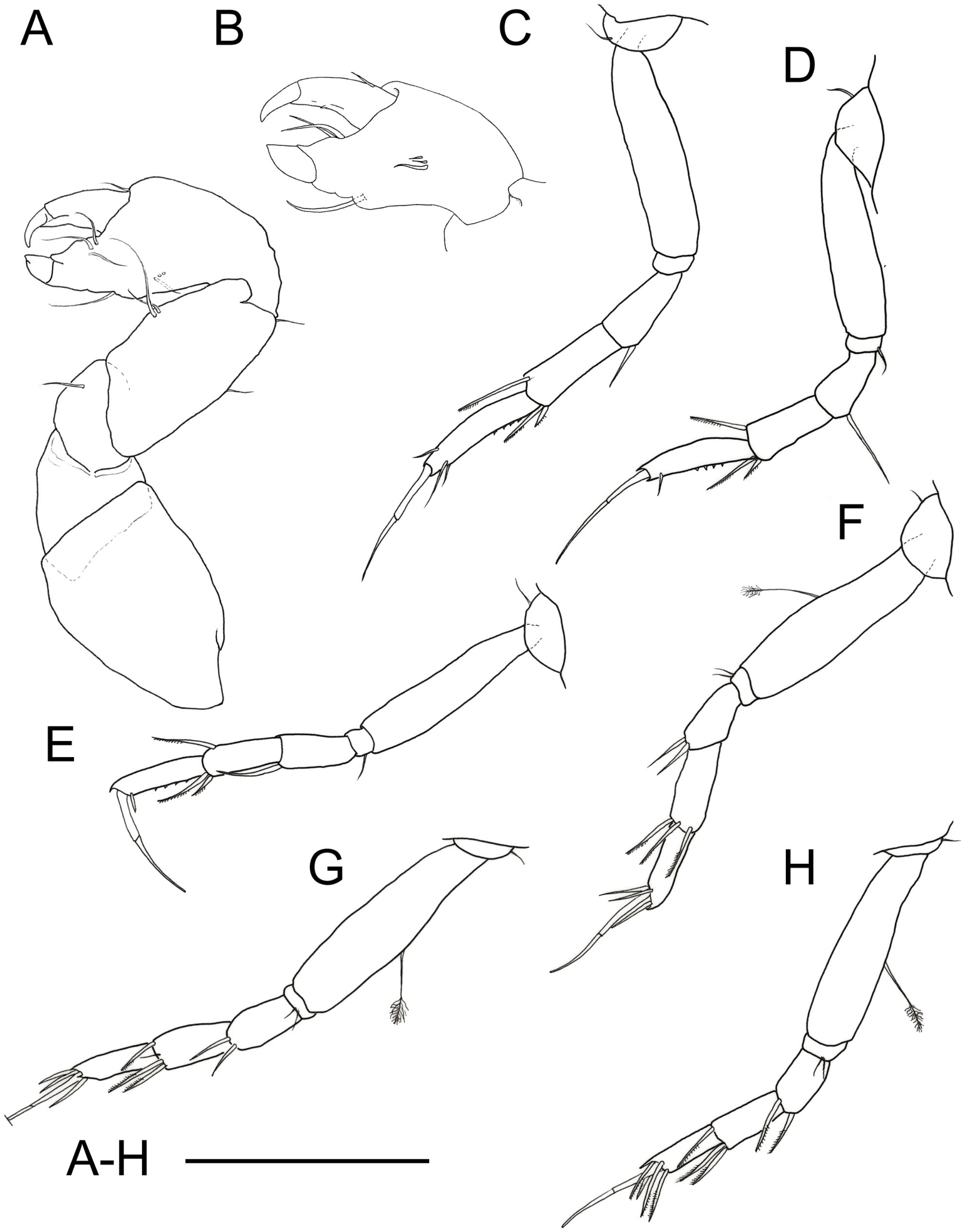

Fig. 5. *Paranarthrura cousteaui* sp. nov. Dissected paratype, adult, ♀ (DBUA0002189.03). **A**. Left cheliped outer view. **B**. Right cheliped inner view. **C–E**. Left pereopods 1–3. **F**. Right pereopod 4. **G–H**. Left pereopods 5–6. Scale bar = 100 µm.

Paranarthrura cousteaui sp. nov. is distinguished from the other species of the genus by the unique combination of the following characters: post-cheliped sclerites unfused; presence of one long midventral seta in cheliped carpus; presence of dorsal seta on cheliped dactylus; presence of one penicillate seta in the basis of pereopods 4–6; one seta in the maxilliped endite uropod endopod bi-articulated and uropod exopod shorter than endopod article 1.

From the 19 species of the genus, only ten have a uropod endopod bi-articulated. These are: *Paranarthrura angolensis* Guerrero-Kommritz, Schmidt & Brandt, 2002; *P. arctowskii* Jóźwiak & Błażewicz-Paszkowycz, 2011; *P. bacescui* Kudinova-Pasternak, 1986; *P. bispinosa* Larsen, 2005; *P. coimbrai* Larsen & Bird, 2013; *P. crassa* Bird & Holdich, 1989; *P. fortispina* Sieg, 1986; *P. insignis* Hansen, 1913; *P. lusitanus* Bird & Holdich, 1989 and *P. tenuimanus* Larsen, 2005. Of these, three species have been found in the North-East Atlantic (*P. crassa*, *P. insignis* and *P. lusitanus*). Bird & Holdich (1989) noted the relevance of the cephalothorax shape and chelipeds setae to distinguish among these three sympatric species. Like *P. cousteaui* sp. nov., *P. crassa* presents a maxilliped basis with endites not fused, cheliped carpus with long midventral seta and strong chela; it differs from the new species in having a stouter antennule with different chaetotaxy (group of four penicillate subdistal setae instead of just two), presence of strong *lacinia mobilis* in the left mandible, two setae in the endite of maxilliped, the post-cheliped sclerites clearly visible dorsally, and non-serrated spines in pereopods 4–6. *Paranarthrura insignis* shares with *P. cousteaui* sp. nov. the following characters: post-cheliped sclerites unfused ventrally; pereopod 1 chaetotaxy on carpus, propodus, dactylus and unguis and chaetotaxy on chela. It can be distinguished by the following characters: post-cheliped sclerites hardly visible dorsally; antennule article 1 considerably shorter than the three others combined; protuberance from ventral margin of chelipedal propodus with two setae and uropodal endopod article 1 shorter than article 2. *Paranarthrura lusitanus* shares with *P. cousteaui* sp. nov. the post-cheliped sclerites unfused ventrally. It can be distinguished in having a shorter body (1.4 vs 2.1 mm); shorter cheliped, less prominent from ventral view; post-cheliped sclerites hardly visible dorsally; presence of two subdistal penicillate setae in antennule article 1; presence of two penicillate setae in the basis of pereopod 6.

Paranarthrura angolesis from the South East Atlantic shares with *P. cousteaui* sp. nov. the following characters: post-cheliped sclerites not fused, presence of serrate spines on pereopods and number and relative length of uropod endopod article; it can be distinguished from the new species by the endopod with "setose setae" (sensu Guerrero-Kommritz *et al.* 2002), a more slender chela (2.5 times as long as broad, instead of 2.1) and four setae on maxilliped articles 2 and 3 instead of three. *Paranarthrura bispinosa* from the Gulf of Mexico, shares with *P. cousteaui* sp. nov. the short uropod exopod not as long as endopod article 1 and penicillate setae on the basis of the pereopods 4–5 and the presence of distoventral spiniform apophysis in pereopods 2–3 propodus; it differs by the maxilliped endites fused to basis, presence of several penicillate setae on antennule (five in article 1 and two in article 2) and antenna (three in article 3 and one in article 4), cheliped chaetotaxy (absence of midventral seta in merus, subdistal setae in carpus and dorsal in propodus, and presence of one midventral seta in carpus and one dorsal seta in dactylus) and slender chela. *Paranarthrura tenuimanus* also from the Gulf of Mexico, has very short setae on maxilliped endite, no long seta on cheliped carpus and no dorsal spine on dactylus.

Paranarthrura cousteaui sp. nov. can be distinguished from species with a two-articled uropod endopod from other geographic locations as follows: *P. arctowskii* from the Antarctic has post-cheliped sclerites unfused medioventrally two setae on maxilliped endite, and a longer uropod exopod; and *P. bacescui* from the Indian Ocean show relatively longer uropod endopod segments.

Distribution and ecology

Paranarthrura cousteaui sp. nov. was found in the three Portuguese canyons sampled and at the open slope off Sines (Southern distribution limit), between 897 and 1001 m depth, in silty clay and, in Setúbal Canyon, amongst arborescent foraminifera (see de Stigter *et al.* 2007 for more environmental information of sampling sites). *Paranarthrura cousteaui* sp. nov. was found sympatric with other tanaidacean species: *Atlantapseudes curvatus* Esquete & Cunha, 2017 and *Typhlamia sandersi* (Kudinova-Pasternak, 1985) at the open slope off Sines; *A. curvatus*, *P. intermedia* Kudinova-Pasternak, 1982, *Collettea* sp. and *Typhlotanais* sp. at Setúbal Canyon; Anarthruridae (undetermined) and *Pseudotanais falcicula* Bird & Holdich, 1989 at Cascais Canyon and *Collettea* sp. at Nazaré Canyon. Original descriptions of these species can be found in Kudinova-Pasternak (1982, 1985), Bird & Holdich (1989), and Esquete & Cunha (2017).

Family Paranarthrurellidae Błażewicz, Jóźwiak & Frutos, 2019

Genus ***Tirana*** Esquete, gen. nov.
urn:lsid:zoobank.org:act:8DA0AF85-5BE1-43B5-8510-56C14B79333E

Type species

Tirana vallis gen. et sp. nov.

Diagnosis

Neuter

Body elongate (8.9 times as long as broad). Pereonites subrectangular or subsquare, pereonites 1–3 slightly wider anteriorly, pereonite 6 slightly wider posteriorly. Pleonites without hyposphaenia. Antenna article 2 with dorsodistal spine, article 4 elongate (> 10 times as long as broad). Mandible molar with spiniform prolongations. Maxilliped endites with slender gustatory cusps. Cheliped carpus slender (1.8 times as long as wide). Chela slender (1.8 times as long as broad). Pereopods 4–6 carpus with one spine more than 0.5 times as long as propodus; propodus with ramified subdistal spines. Pleopods well developed, birramous, with long plumose setae. Uropods rami slender (> 5.0 times as long as broad), endopod article 1 about as long as article 2.

Etymology

Following the steps of Błażewicz *et al.* (2019) for the species of the genus *Paranarthrurella*, we name the new genus after a folk dance from Portugal named 'tirana', object of great traditional and cultural value. Gender: feminine.

Remarks

The new genus presents a combination of the characters that define the other two species of the family, *Paranarthrurella* and *Armatognathia*: It shares with *Paranarthrurella* an elongate body, maxilliped endites with slender gustatory cusps, and an uropod endopod article 1 about as long as article 2, and with *Armatognathia* it shares the presence of a distal spine in antenna article 2, presence of well-developed pleopods, and a molar with spiniform processes. Furthermore, females of (the new genus) have well-developed pleopods, which are present in *Armatognathia* and absent in most species of *Paranarthrurella*. Despite being described as "absent" in the diagnosis of *Paranarthrurella* provided by Błażewicz *et al.* (2019), illustrations of neuter specimens of *P. rocknroll* Błażewicz & Jóźwiak, 2019 and *P. corroboree* Błażewicz & Jóźwiak, 2019 show what seem to be rudimentary pleopods. However, those are significantly different from the ones of *Tirana* gen. nov.

Tirana gen. nov. also presents unique characters within the family: the antenna article 4 is more elongate (10 times as long as broad) than in the other species of the family (4–5 times as long as broad); the cheliped is more slender (1.8 times as long as broad) than in the other species (< 1.6); the pereopods 4–6 carpus spines reach at least half of the length of the propodus; the propodus of pereopods 4–6 have ramified subdistal spines; finally, the uropod rami are more slender than in the other species of the family (> 5.0 times as long as broad, while in the other species is < 4.0).

Tirana vallis gen. et sp. nov.
urn:lsid:zoobank.org:act:83F4E8E6-F501-43C1-89B7-5040180FE8C6
Figs 6–8

Etymology

The species name, '*vallis*' (Latin for valley), refers to the type location of the species in the marine canyons, since there is no a literal translation of 'canyon' in the Latin language.

Material examined

Holotype

PORTUGAL • ♀; West Iberian Margin, Cascais Canyon; 38°17.97′ N, 9°46.89′ W, depth 3214 m; 27 Apr. 2006; stn CD179_21-2; MNCN 20.04/12540.

Paratypes

PORTUGAL • 1 manca, 1 juv., 1 ♀ (dissected); same collection data as for holotype; DBUA0002211.02.

Description of holotype

Body (Fig. 6A–B). 8.9 times as long as wide (3.7 mm length, 0.5 mm width). Cephalothorax without eyes or eyelobes, elongate (1.3 times as long as wide) and subhexagonal, 0.15 of body length, narrower than pereon. Rostrum rounded. Pereon 0.63 of body length, pereonites 2–5 subhexagonal. Pereonites 1–6: 0.7, 0.9, 1.1, 0.9, 1.2 and 0.8 times as long as wide respectively. Coxal setae visible in dorsal view. Pleonites altogether shorter than last two pereonites together, 0.14 of body length. Pleonite 5 slightly longer than rest of them. All pleonites with a mediodorsal seta. Pleotelson 0.09 of body length, widest in its medial part, with posterior protuberance carrying four setae on distal margin.

Antennule (Fig. 6C). Five-articled. Article 1 longest and widest, 3.4 times as long as wide, with three outer penicillate setae in medial and distal position, respectively, three penicillate setae on subdistal outer margin, and one seta on subdistal inner margin. Article 2, 1.7 times as along as wide, with one seta on inner margin and three setae on outer margin (two of them penicillate), all subdistal. Article 3, as long as wide, with one long distal seta on outer margin and two on inner margin. Article 4, 4.4 times as long as wide, with one distal seta on inner margin. Article 5 minute, with five terminal setae and one aesthetasc (not figured).

Antenna (Fig. 6D, ventral view). Six-articled. Article 1 short and naked. Article 2, 2.1 times as long as wide, with one outer seta in medial margin and a dorsodistal spine. Article 3, 1.5 times as long as wide, with dorsodistal spine. Article 4 longest, 9.9 times as long as wide, with four subterminal setae, two penicillate. Article 5, 5.0 times as long as wide, with one long terminal seta. Article 6 minute, carrying five terminal setae, two of them longer.

Mouthparts (described from paratype DBUA0002211.02). Labrum (Fig. 7A, ventral view) rounded, posteriorly setulated. Left mandible (Fig. 7B–C) incisor process naked, slightly concave; *lacinia mobilis* long and wide; molar process with rounded tip, wide on its basis, with several distal spiniform

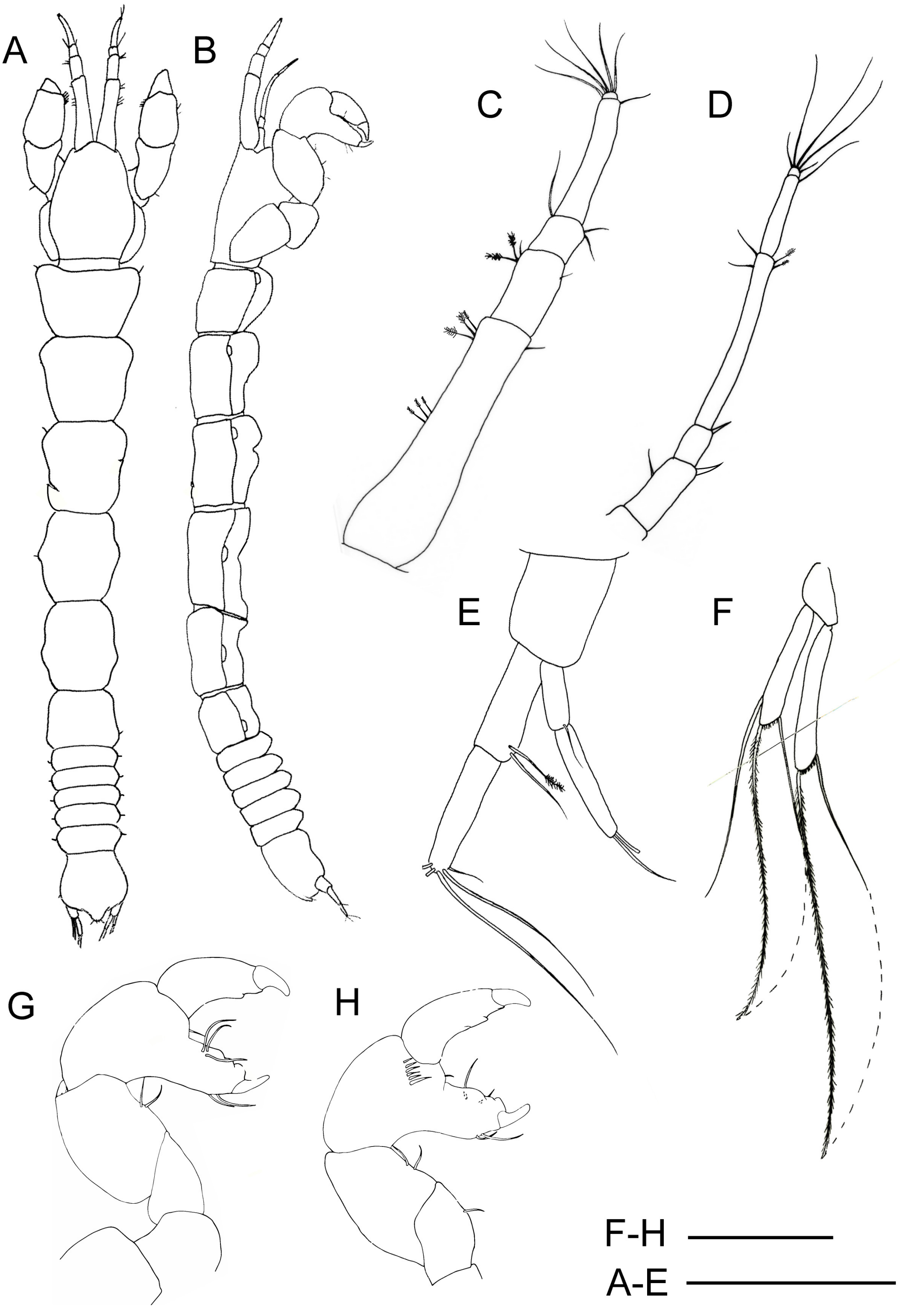

Fig. 6. *Tirana vallis* gen. et sp. nov. Holotype, adult, ♀ (MNCN 20.04/12540). **A**. Habitus dorsal view. **B**. Habitus lateral view. **C**. Left antennule, dorsal view. **D**. Right antenna, lateral view. **E**. Left uropod. **F**. Pleopod 3 (all setae are plumose). **G**. Left cheliped, outer view. **H**. Left cheliped, inner view. Scale bars: A–B = 1 mm; C–D, F–H = 100 µm; E = 50 µm..

processes. Right mandible (not figured) as left but without *lacinia mobilis.* Labium composed of two lobes, quadrangular, naked (not figured). Maxillule (Fig. 7D) endite with row of spines on outer margin, distally with microtrichia, seven rounded-tip spines. Maxilla ovoid, naked (not figured). Maxilliped (Fig. 7E) basis narrower posteriorly, partially fused, with seta near palp insertion. Endites not fused, bearing one pair of slender gustatory cusps, and one pair of simple setae posteriorly to them. Palp 4-articled. Article 1 naked. Article 2 subtriangular with three inner setae. Article 3 longest, with three inner pinnate setae and one simple seta. Terminal article long with five terminal and one subterminal pinnate setae.

Cheliped (Fig. 6G–H). Attached ventrally via large sclerite. Basis naked, 1.4 times as long as wide, posteriorly rounded. Merus naked, 1.3 times as long as wide with one medioventral seta. Carpus 1.8 times as long as wide, with two medioventral seta. Propodus robust, 1.8 times as long as wide, with inner row of seven setae. Ventral margin of fixed finger with two pinnate setae near dactylus insertion and cutting edge crenulated with three setae. Dactylus robust, 2.1 times as long as wide, not fused with unguis. Dactylus and unguis together not reaching end of propodus and claw.

Pereopod 1 (Fig. 8A–A'). Coxa with seta. Basis 4.5 times as long as wide, with two mediodorsal setae. Ischium wider than long, with ventral seta. Merus 2.4 times as long as wide, with subdistal ventral seta and distoventral pinnate spine. Carpus 4.3 times as long as wide, with two ventrodistal pinnate spines and one distodorsal pinnate spine. Propodus 5.5 times as long as wide, ventral margin serrates with two dorsodistal spines, one of the setulose and the other simple, and one ventrodistal simple spine. Dactylus as long as unguis, naked, together as long as propodus.

Pereopod 2 (Fig. 8B–B'). Coxa with seta. Basis 4.5 times as long as wide, with three mediodorsal setae. Ischium wider than long, with ventral seta. Merus 2.5 times as long as wide, with long ventrodistal seta and pinnate spine. Carpus 3.5 times as long as wide, bearing one dorsodistal long pinnate spine and one short simple spine, and one ventrodistal long pinnate spine and one short simple spine. Propodus 6.1 times as long as wide, ventral margin serrated, with one one subdistal long seta, one subdistal short seta and one subdistal pinnate spine in dorsal margin and one pinnate spine in ventral margin. Dactylus and unguis naked, together about as long as propodus.

Pereopod 3 (Fig. 8C). Similar to pereopod 2, except for: seta from coxa not illustrated. Basis 4.1 times as long as wide, with one mediodorsal seta. Merus 2.8 times as long as wide. Carpus 3.6 times as long as wide. Propodus 5.6 times as long as wide.

Pereopod 4 (Fig. 8D). Coxa with seta. Basis 3 times as long as wide, with mediodorsal penicillate seta. Ischium wider than long, with two ventral setae. Merus 2.7 times as long as wide, with two ventrodistal pinnate spines. Carpus 2.3 times as long as wide, one dorsodistal, two in mediodistal and one ventrodistal pinnate spines. Propodus 6.2 times as long as wide, ventral margin serrated, with two dorsodistal and one ventrodistal pinnate spines. Dactylus and unguis naked, together 0.8 times as long as propodus.

Pereopod 5 (Fig. 8E–E'). As pereopod 4, except for: basis 5.0 times as long as wide. Merus 3.8 times as long as wide. Carpus 2.8 times as long as wide, with dorsodistal seta, and simple spine, and one dorsodistal and two ventrodistal pinnate spines. Propodus 6.0 times as long as wide with a mediodorsal penicillate seta, (not figured in Fig. 8E') one dorsodistal simple spine and two ramified ventral-subdistal spines. Dactylus and unguis naked, together 0.7 times as long as propodus.

Pereopod 6 (Fig. 8F–F'). As pereopod 4, except for: basis 4.7 times as long as wide. Merus 2.3 times as long as wide. Carpus 2.9 times as long as wide Propodus 6.0 times as long as wide with a mediodorsal penicillate seta (not figured in Fig. 8E') three dorsodistal distal simple and two and two ramified ventral-subdistal spines. Dactylus and unguis naked, together 0.7 times as long as propodus.

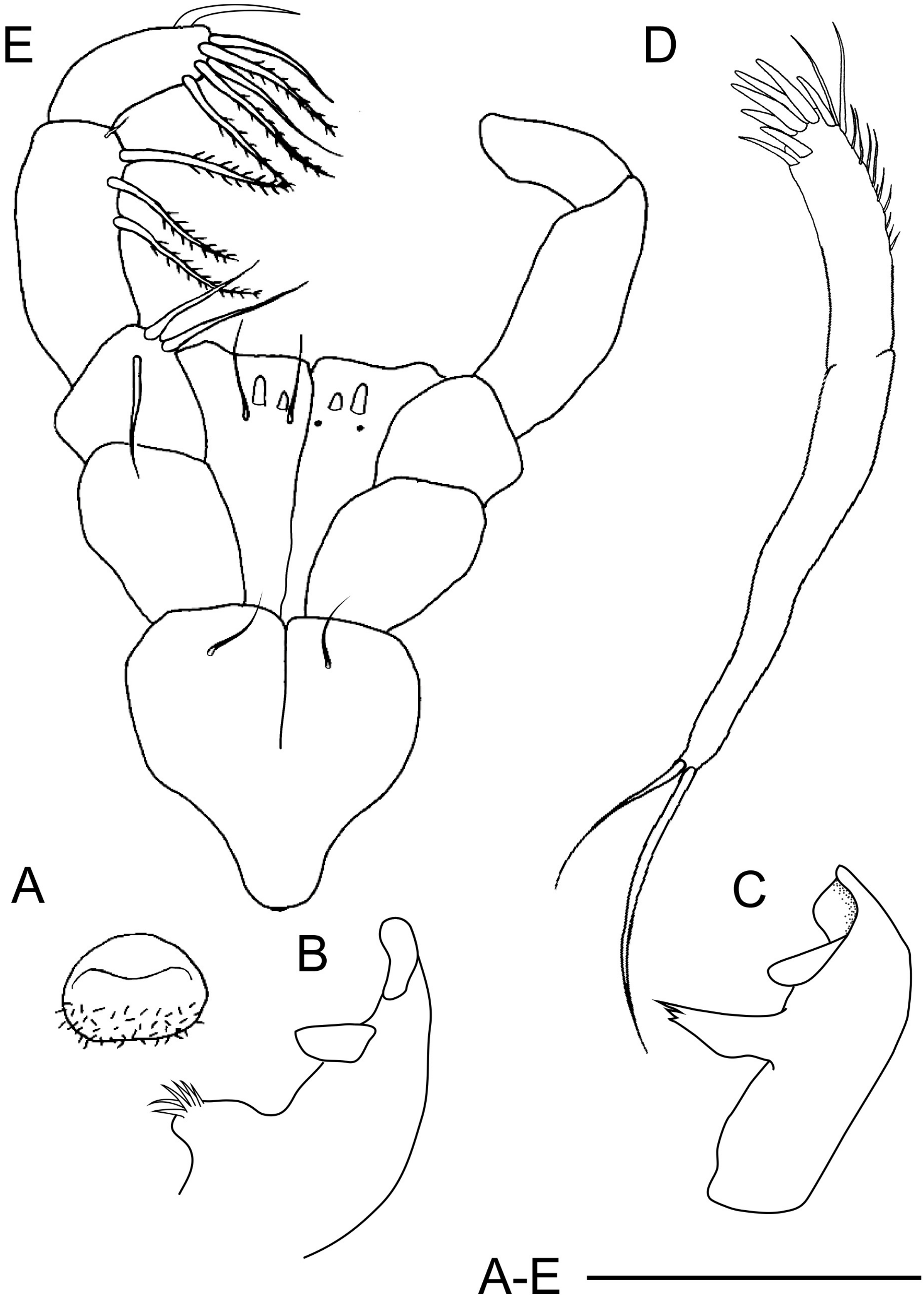

Fig. 7. *Tirana vallis* gen. et sp. nov. Paratype, adult, ♀ (DBUA0002211.02). **A**. Labrum. **B–C**. Left mandible. **D**. Maxillule. **E**. Maxilliped. Scale bar = 100 µm.

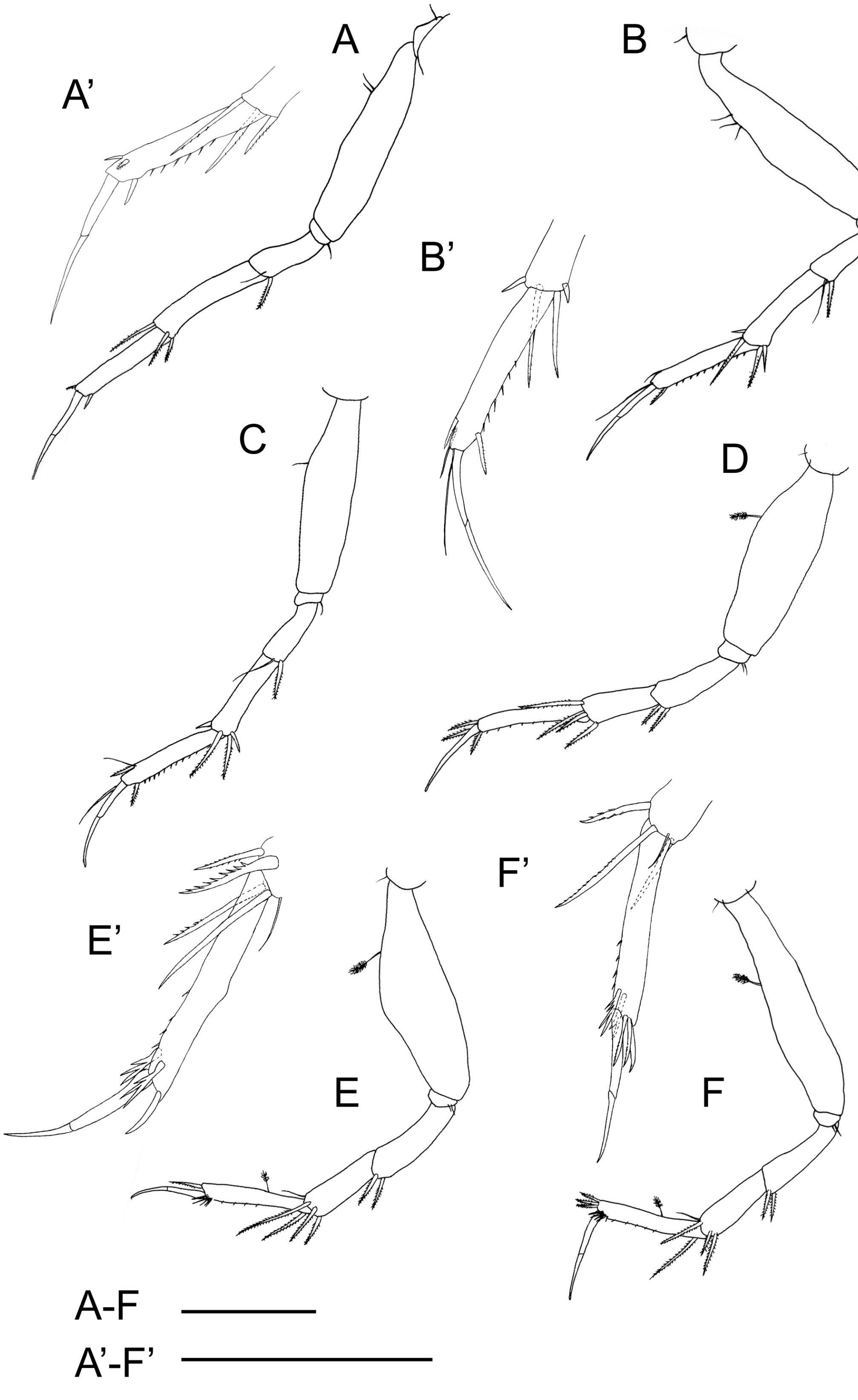

Fig. 8. *Tirana vallis* gen. et sp. nov. Holotype, adult, ♀ (MNCN 20.04/12540). **A–F**. Pereopods 1–6. **A'–F'**. Detail in dactylus and unguis pereopods 1–3, 5 and 6. Scale bars = 100 µm.

Pleopods (Fig. 6F). Present in all pleonites, all with same chaetotaxy. Protopod naked. Endopod long and narrow, 5.1 times as long as broad, with eight terminal long plumose setae and one subdistal seta on inner margin. Exopod long and narrow, 6.1 times as long as broad bearing seven long plumose setae.

Uropods (Fig. 6E). Biramous. Protopod naked, 1.5 times as long as broad. Endopod 2-articled, 2.3 times as long as protopod. Article 1 with two subdistal setae, one penicillate. Article 2, 1.2 times as long as article 1, with five setae, two of them broken in holotype. Exopod 1.7 times as long as protopod. Article 1 with distal seta. Article 2, 1.8 times as long as article 1, with two distal setae, one of them broken in holotype.

Distribution and ecology

Tirana vallis gen. et sp. nov. was found in the middle reaches of Cascais Canyon (North-east Atlantic, West Iberian Margin), between 3214 and 3219 m depth (see Billet *et al.* 2006 and Cunha *et al.* 2011 for more information). It was found sympatric with other tanaidacean species: *Agathotanais ingolfi* Hansen, 1913, *Paragathotanais* sp., *Paranarthrura intermedia* Kudinova-Pasternak, 1982, *Anarthrura* sp., *Araphuroides* cf. *parabreviremis* Sieg, 1986, *Cristatotanais contoura* Błażewicz-Paszkowycz, Bamber & Cunha, 2011, and *Typhlotanais* cf. *spinicauda* Hansen, 1913.

Discussion

The genus *Paranarthrura* is well represented in the North-East Atlantic Ocean; seven out of 19 species have been found there (*P. insignis*, *P. borealis* Bird & Holdich, 1989, *P. subtilis*, *P. crassa*, *P. lusitanus*, *P. intermedia* and *P. tridens* Bird & Holdich, 1989) (Bird & Holdich 1989; Bird 2010). These species are present at different bathymetric ranges, and we can find both euribathyal species, as *P. insignis* (385–5000 m) or *P. intermedia* (1400–4190 m), and species with a more restricted bathymetry, as *P. subtilis* (582–1739 m) or *P. tridens* (4426–4829 m). *Paranarthrura cousteaui* sp. nov. is the eighth species found in this region, so far recorded in the upper bathyal zone, between 897 and 1001 meters deep.

The family Paranatrhurellidae is currently composed of sixteen species, from which two are known from the North-East Atlantic, *Paranarthrurella arctophylax* (Norman & Stebbing, 1886) and *P. voeringi* (Sars, 1877). *Paranarthrurella voeringi* has been found from Faroe Islands in its lowest latitude to Svalbard archipelago in the North (Sars 1877; Jóźwiak *et al.* 2009; Błażewicz *et al.* 2019), while the northern limit of *P. arctophylax* is close to Iceland, and its southern limit is the Bay of Biscay (Norman & Stebbing 1886). Błażewicz *et al.* (2019) also found two additional *Paranarthrurella* species from north-east Iceland yet to be described.

Species of *Armatognathia* have been found exclusively in bathyal and abyssal zones from 3450 to 4892 meters, being *Armatognathia shiinoi* (Kudinova-Pasternak, 1973) the species found shallowest, occurring from 3450 to 3460 meters (Kudinova-Pasternak 1973), and *Armatognathia swing* Błażewicz & Jóźwiak, 2019 the deepest, occurring from 4713 to 4892 meters. On the other hand, *Paranarthrurella* can be considered a deep-sea euribathyal genus, as it contains species as *P. voeringi* found at 760 meters (Jóźwiak *et al*. 2009) as well as abyssal species like *P. dissimilis* (Lang, 1972), only known from its type location, the Sargasso Sea, at a depth of 6000 m (Lang 1972). Moreover, the species *P. caudata* (Kudinova-Pasternak, 1965) has been found in the hadal range from 7947 to 8006 m (Kudinova-Pasternak 1965). Occurring between 2314 and 3219 m deep, *T. vallis* gen. et sp. nov. is within this wide range and can be considered a bathyal species. It is the third formally described genus from Paranarthrurellidae and the first species found in the margins of the Iberian Peninsula, therefore expanding the distribution of the family in the Easter Atlantic to the south. Original descriptions of some of the species mentioned here can be found in Kudinova-Pasternak (1973).

Acknowledgements

The authors want to thank to the crews of the RV *Pelagia* (NIOZ) and RV *Charles Darwin* (National Oceanography Centre, Southampton), as well as the project HERMES, for the invaluable support to develop the cruises and obtain this samples. A. García-Herrero is supported by Erasmus + Programme, and P. Esquete is funded by national funds (OE), through FCT – Fundação para a Ciência e a Tecnologia, I.P., in the scope of the framework contract foreseen in the numbers 4, 5 and 6 of the article 23, of the Decree-Law 57/2016, of August 29, changed by Law 57/2017, of July 19. Thanks are due to FCT/MCTES for the financial support to CESAM (UIDP/50017/2020+UIDB/50017/2020), through national funds. Thanks are due to the two anonymous referees whose comments greatly improved our manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

References

Almeida M., Cunha M.R., Lampadariou N., Esquete P. & Company J.B. 2018. Suprabenthic crustacean assemblages subjected to high-energy hydrodynamic events in the Blanes Canyon and adjacent slope (NW Mediterranean Sea). *Progress in Oceanography* 169: 138–150. https://doi.org/10.1016/j.pocean.2018.02.022

Anderson G. 2020. Tanaidacea – Forty Years of Scholarship. Version 3.0, January, 2020. Available from http://aquila.usm.edu/tanaids30/5/ [accessed 12 Mar. 2021].

Băcescu M. 1978. *Atlantapseudes nigrichela* n.g., n.sp., tanaïdacé nouveau capturé par le navire «Thalassa» dans les eaux portugaises. *Cahiers de Biologie marine* 19 (3): 317–322

Bamber R. 1986. *The Marine Fauna of the Cullercoats District*. No. 20. *Tanaidacea.* Report of the Dove Marine Laboratory, Third Series 33.

Bird G. 2004. Tanaidacea (Crustacea) of the Northeast Atlantic: non-filiform species of Anarthruridae Lang from the Atlantic Margin. *Zootaxa* 471 (1): 1–44. https://doi.org/10.11646/zootaxa.471.1.1

Bird G.J. 2010. Tanaidacea (Crustacea, Peracarida) of the North-east Atlantic: the Agathotanaidae of the AFEN, BIOFAR and BIOICE projects, with a description of a new species of *Paragathotanais* Lang. *Zootaxa* 2730 (1): 1–22. https://doi.org/10.11646/zootaxa.2730.1.1

Bird G.J. & Holdich D.M. 1988. Deep-sea Tanaidacea (Crustacea) of the North-east Atlantic: the tribe Agathotanaini. *Journal of Natural History* 22 (6): 1591–1621. https://doi.org/10.1080/00222938800771001

Bird G.J. & Holdich D.M. 1989. Deep-sea Tanaidacea (Crustacea) of the North-east Atlantic: the genus *Paranarthrura* Hansen. *Journal of Natural History* 23: 137–167. https://doi.org/10.1080/00222938900770091

Billet D.S.M., Masson D.G, Amaro T., Arzola R.G., Boorman B., Da Silva A.A., Dinley J., Dolan E., Huvenne V., Ingels J., Mendes Alves D., Murty S., Pattenden A. & Rothe N. 2006. *RRS Charles Darwin Cruise 179, 14 Apr–17 May 2006. Hotspot ecosystem research in the Setúbal, Lisbon, Cascais and Nazaré canyons on the Portuguese continental margin*. National Oceanography Centre Southampton Cruise Report 13, Southampton. Available from https://eprints.soton.ac.uk/43104/ [accessed 12 Mar. 2021].

Błażewicz-Paszkowycz M., Bamber R.N. & Cunha M.R. 2011a. New tanaidomorph Tanaidacea (Crustacea: Peracarida) from submarine mud-volcanoes in the Gulf of Cadiz (North-east Atlantic). *Zootaxa* 2769: 1–53. https://doi.org/10.11646/zootaxa.2919.1.1

Błażewicz-Paszkowycz M., Bamber R.N. & Cunha M.R. 2011b. Apseudomorph tanaidaceans (Crustacea: Peracarida) from mud-volcanoes in the Gulf of Cadiz (North-east Atlantic). *Zootaxa* 2919: 1–36. https://doi.org/10.11646/zootaxa.2919.1.1

Błażewicz-Paszkowycz M., Jennings R.M., Jeskulke K. & Brix S. 2014. Discovery of swimming males of Paratanaoidea (Tanaidacea). *Polish Polar Research* 35 (2): 415–453. https://doi.org/10.2478/popore-2014-0022

Błażewicz M., Jóźwiak P., Jennings R.M., Studzian M. & Frutos I. 2019. Integrative systematics and ecology of a new deep-sea family of tanaidacean crustaceans. *Scientific Reports* 9 (1): 18720. https://doi.org/10.1038/s41598-019-53446-1

Cunha M.R., Paterson G.L.J., Amaro T., Blackbird S., de Stigter H.C., Ferreira C., Glover A., Hilário A., Kiriakoulakis K., Neal L., Ravara A., Rodrigues C.F., Tiago A. & Billet D.S.M. 2011. Biodiversity of macrofaunal assemblages from three Portuguese submarine canyons (NE Atlantic). *Deep Sea Research Part II: Topical Studies in Oceanography* 58: 2433–2447. https://doi.org/10.1016/j.dsr2.2011.04.007

de Stigter H. & shipboard scientific party. 2007. *Report of the Cruise 64PE252 with RV Pelagia. Anthropogenic lead on the Portuguese Continental Margin*. Royal Netherlands Institute for Sea Research, Texel.

Duineveld G., Lavaleye M., Berghuis E. & De Wilde P. 2001. Activity and composition of the benthic fauna in the Whittard Canyon and the adjacent continental slope (NE Atlantic). *Oceanologica Acta* 24: 69–83. https://doi.org/10.1016/S0399-1784(00)01129-4

EMODnet Bathymetry Consortium. 2018. EMODnet Digital Bathymetry (DTM). https://doi.org/10.12770/18ff0d48-b203-4a65-94a9-5fd8b0ec35f6

Esquete P. & Cunha M. 2017. The Apseudomorpha (Crustacea: Tanaidacea) of the Gulf of Cadiz and Horseshoe Continental Rise (NE Atlantic): a taxonomic review with new records, species, and ecological data. *Zootaxa* 4276 (1): 61–95. https://doi.org/10.11646/zootaxa.4276.1.3

Esquete P. & Cunha M. 2018. Additions to the Tanaidomorpha (Crustacea: Tanaidacea) from mud volcanoes and coral mounds of the Gulf of Cadiz and Horseshoe Continental Rise. *Zootaxa* 4377 (4): 517–541. https://doi.org/10.11646/zootaxa.4377.4.3

Esquete P., Bamber R.N., Moreira J. & Troncoso J.S. 2012. Redescription and postmarsupial development of *Apseudopsis latreillii* (Crustacea: Tanaidacea). *Journal of the Marine Biological Association of the United Kingdom* 92: 1023–1041. https://doi.org/10.1017/S0025315411002086

Esquete P., Ramos E. & Riera R. 2016. New data on the Tanaidacea (Crustacea: Peracarida) from the Canary Islands, with a description of a new species of *Apseudopsis*. *Zootaxa* 4093 (2): 248–260. https://doi.org/10.11646/zootaxa.4093.2.6

Guerrero-Kommritz J., Schmidt A. & Brandt A. 2002. *Paranarthrura* Hansen, 1913 (Crustacea: Tanaidacea) from the Angola Basin, description of *Paranarthrura angolensis* n. sp. *Zootaxa* 116: 1–12. https://doi.org/10.11646/zootaxa.116.1.1

Gunton L.M., Gooday A.J, Glover A.G. & Bett B.J. 2015. Macrofaunal abundance and community composition at lower bathyal depths in different branches of the Whittard Canyon and on the adjacent slope (3500 m; NE Atlantic). *Deep Sea Research Part I: Oceanographic Research Papers* 97: 29–39. https://doi.org/10.1016/j.dsr.2014.11.010

Hansen H.J. 1913. Crustacea, Malacostraca. II. IV. The Order Tanaidacea. *The Danish Ingolf Expedition* 3 (3): 1–145. Available from http://biodiversitylibrary.org/page/25160547 [accessed 12 Mar. 2021].

Harris P. & Whiteway T. 2011. Global distribution of large submarine canyons: geomorphic differences between active and passive continental margins. *Marine Geology* 285 (1–4): 69–86. https://doi.org/10.1016/j.margeo.2011.05.008

IFREMER (French Research Institute for Exploitation of the Sea). 2020. Ifremer BIOCEAN database (Deep Sea Benthic Fauna). Occurrence dataset. https://doi.org/10.15468/yxphxa

Jóźwiak P. & Błażewicz-Paszkowycz M. 2011. New records of the family Agathotanaidae (Crustacea: Tanaidacea) in the Antarctic, with remarks on *Arthrura monacantha* (Vanhöffen, 1914). *Zootaxa* 2785: 32–52. https://doi.org/10.11646/zootaxa.2785.1.2

Jóźwiak P., Stepien A. & Błażewicz-Paszkowycz M. 2009. A revision of the genus *Paranarthrurella* Lang, 1971a (Crustacea:Tanaidacea). *Zootaxa* 2238: 56–68. https://doi.org/10.11646/zootaxa.2238.1.5

Kudinova-Pasternak R.K. 1965. Deep-sea Tanaidacea from the Bougainville Trench of the Pacific. *Crustaceana* 8: 75–91. https://doi.org/10.1163/156854065X00578

Kudinova-Pasternak R.K. 1973. Tanaidacea (Crustacea, Malacostraca) collected on the R/V "Vitjas" in regions of the Aleutian Trench and Alaska. *Transactions of the Institute of Oceanology* 86: 341–381.

Kudinova-Pasternak R.K. 1982. Deep-sea Tanaidacea (Crustacea, Malacostraca) from Mediterranean Sea. *Trudy Instituta Okeanologii. Transactions of the Institute of Oceanology* 117: 151–162.

Kudinova-Pasternak R.K. 1985. Tanaidacea (Crustacea, Malacostraca) collected on the summit and at foot of Great-Meteor Seamount. *Trudy Instituta Okeanologii Akademii Nauk SSSR* 120: 52–64.

Kudinova-Pasternak R.K. 1986. Abyssal Tanaidacea (Crustacea, Malacostraca) from the south-western part of the Indian Ocean. The suborder Tanaidomorpha. *Zoologicheskii Zhurnal* 65: 66–75.

Lang K. 1971. Taxonomische und phylogenetische Untersuchungen über die Tanaidaceen. 6. Revision der Gattung *Paranarthrura* Hansen, 1913, und Aufstellung von zwei neuen Familien, vier neuen Gattungen und zwei neuen Arten. *Arkiv för Zoologi* 23 (2): 361–401

Lang K. 1972. *Bathytanais bathybrotes* (Beddard) und *Leptognathia dissimilis* n. sp. (Tanaidacea). *Crustaceana* Supplement 3: 221–236.

Larsen K. 2005. *Deep-Sea Tanaidacea (Peracarida) from the Gulf of Mexico*. Brill, Leiden.

Larsen K. 2007. Family Agathotanaidae Lang, 1971a. *Zootaxa* 1599: 41–60. https://doi.org/10.5281/zenodo.178729

Larsen K. & Araújo-Silva C. 2014. A new genus of Colletteidae (Crustacea Peracarida: Tanaidacea) from the Pacific with comments on dimorphic males with species specific characters. *Journal of the Marine Biological Association of the United Kingdom* 94 (5): 969–974. https://doi.org/10.1017/S0025315414000101

Larsen K. & Wilson G.D.F. 2002. Tanaidacean phylogeny, the first step: the superfamily Paratanaidoidea. *Journal of Zoological Systematics and Evolutionary Research* 40: 205–222. https://doi.org/10.1046/j.1439-0469.2002.00193.x

Larsen K., Bird G. & Ota M. 2013. The ANDEEP Tanaidacea (Crustacea: Peracarida) revisited I: the family Agathotanaidae Lang, with description of four new species. *Zootaxa* 3630 (3): 424–444. https://doi.org/10.11646/zootaxa.3630.3.2

Norman A.M. & Stebbing T.R.R. 1886. V. On the Crustacea Isopoda of the 'Lightning', 'Porcupine', and 'Valorous' Expeditions. Part I.— Apseudidae, Tanaidae, Anthuridae. *Transactions of the Zoological Society of London* 12 (4): 77–141. https://doi.org/10.5962/bhl.title.10645

Orrell T. 2020. NMNH Extant Specimen Records. Version 1.36. National Museum of Natural History, Smithsonian Institution. Occurrence dataset https://doi.org/10.15468/hnhrg3

QGIS Development Team. 2020. QGIS Geographic Information System. Open Source Geospatial Foundation Project. Available from https://qgis.org [accessed 12 Mar. 2021].

Sars G.O. 1877. Prodromus descriptionis crustaceorum et pycnogonidarum, quae in expeditione norvegica anno 1876, observavit. *Archiv for Mathematik og Naturvidenskab* 2: 337–371. Available from https://www.biodiversitylibrary.org/page/29979671 [accessed 12 Mar. 2021].

Sganga D.E. & Roccatagliata D. 2016. A new genus and species of Apseudomorpha (Crustacea: Tanaidacea) from the Mar del Plata submarine Canyon, South West Atlantic, and replacement of the preoccupied name *Hoplomachus* Guţu, 2002. *Marine Biodiversity* 46 (3): 687–698. http://dx.doi.org/10.1007/s12526-015-0422-9

Sieg J. 1983. Evolution of Tanaidacca. *In*: Schram F.R. (ed.) *Crustacean Phylogeny, Deep-Sea Tanaidacea: Agathotanaini Crustacean Issues 1*: 229–256. Balkemer, Rotterdam.

Sieg J. 1986a. Crustacea Tanaidacea of the Antarctic and the Subantarctic. 1. On material collected at Tierra del Fuego, Isla de los Estados, and the west coast of the Antarctic Peninsula. *In*: Korniker L.S. (ed.) *Biology of the Antarctic Seas 18. Volume 45 in the Antarctic Research Series*: 1–180. American Geophysical Union, Washington DC.

Sieg J. 1986b. Tanaidacea (Crustacea) von der Antarktis und Subantarktis. II. Tanaidacea gesammelt von Dr. J.W. Wägele während der Deutschen Antarktis Expedition 1983. *Mitteilungen aus dem Zoologischen Museum der Universität Kiel* 2 (4): 1–80.

Stephensen K. 1915. Isopoda, Tanaidacea, Cumacea, Amphipoda (excl. Hyperiidea). *Report on the Danish Oceanographic Expeditions 1908–10 to the Mediterranean and Adjacent Seas 2, Biology* D1: 1–53.

Tyler P., Amaro T., Arzola R., Cunha M.R., de Stigter H., Gooday A., Huvenne V., Ingels J., Kiriakoulakis K., Lastras G., Masson D., Oliveira A., Pattenden A., Vanreusel A., Van Weering T., Vitorino J., Witte U. & Wolff G. 2009. Europe's Grand Canyon: Nazaré submarine canyon. *Oceanography* 22 (1): 46–57. https://doi.org/10.5670/oceanog.2009.05

Vetter E.W. & Dayton P.K. 1998. Macrofaunal communities within and adjacent to a detritus-rich submarine canyon system. *Deep Sea Research Part II: Topical Studies in Oceanography* 45: 25–54. https://doi.org/10.1016/S0967-0645(97)00048-9

WoRMS Editorial Board. 2020. World Register of Marine Species.
Available from http://www.marinespecies.org [accessed 4 Nov. 2020]. https://doi.org/10.14284/170

Manuscript received: 12 August 2020
Manuscript accepted: 17 January 2021
Published on: 23 March 2021
Topic editor: Rudy Jocqué
Desk editor: Pepe Fernández