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Additions to the Tanaidomorpha (Crustacea: Tanaidacea) from mud volcanoes and coral mounds of the Gulf of Cadiz and Horseshoe Continental Rise

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Abstract

The Tanaidacea collection from various research cruises carried out in the Gulf of Cadiz and Horseshoe Continental Rise between 2004 and 2012 yielded four species new to science that are described herein. Two belong to genera recorded for the first time since the original descriptions of their type species: *Cetiopyge,* described from the Gulf of Mexico and *Gamboa* from shallow waters of Macaronesia. The other two belong to the genera *Collettea* and *Paragathotanais*, both with a worldwide distribution. Additionally, specimens of *Tumidochelia uncinata* are described and illustrated to complete previous descriptions. Identification keys to all known genera of Nototanaidae, and the Eastern Atlantic species of *Paragathotanais* and *Collettea* are provided. This works raises the number of tanaidacean species known from the deep-sea habitats in the study region to a total of 22.

Key words: Cold seeps, Atlantic Ocean, *Gamboa, Cetiopyge, Collettea, Tumidochelia*

Introduction

Mud volcanoes are seepage-related geomorphological structures with a variety of substrates and geochemical conditions, resulting in a complex mosaic of environments. These habitats are characterised by diverse microbial and microeukaryotic assemblages that include methanotrophic bacteria and bacterivorous ciliates (Coelho *et al*. 2016); they host a fauna with high levels of novelty and uniqueness greatly contributing to the regional biodiversity (Cunha *et al.* 2013). Likewise, cold water coral and carbonate mounds are heterogeneous structures creating a variety of microhabitats that consequently enhance the number of attending species, and are therefore often considered as biodiversity hotspots (De Mol *et al.* 2012; Van Rooij *et al.* 2011).

The tanaidomorphan crustaceans from the mud volcanoes of the Gulf of Cadiz (GoC) were first studied by Błażewicz-Paszkowycz *et al.* (2011a); their work revealed a total of nine new species present in these chemosynthesis-based ecosystems, and later on the same authors reported seven species of apseudomorphans (Błażewicz-Paszkowycz *et al.* 2011b). Additional samples taken from the GoC mud volcanoes and extended to coral and carbonate mounds, and to the deep Horseshoe Continental Rise (HCR) field during further research cruises yielded additional tanaidacean material, including a new species of the Apseudomorpha (Esquete & Cunha 2017), and the new or little known species that are described below. Two of these species belong to genera that are recorded for the first time since they were described: *Cetiopyge* Larsen & Heard, 2002, described from the Gulf of Mexico, and *Gamboa* Bamber, 2012, from shallow waters of Macaronesia.

Additionally, specimens of the akanthophoreid *Tumidochelia uncinata* (Hansen, 1913) are described in order to complement previous descriptions. Identification keys for the genera of Nototanaidae and the Eastern Atlantic species of *Paragathotanais* are provided, and the identification key to species of *Collettea* provided by Drumm & Bird (2016) is updated in order to accommodate a newly described species.

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Materials and methods

Study area. The extensive methane seepage area located in the Southwest Iberian Margin (SWIM) in the Northeast Atlantic Ocean (Fig. 1); encompasses numerous mud volcanoes and other gas-related geomorphological structures. Most mud volcanoes pierce the thick accretionary prism in the Gulf of Cadiz and, in some cases, are associated with the deep-rooted SWIM strike-slip faults extending west towards the Horseshoe Continental Rise to depths greater than 4500 m (Cunha *et al*. 2013; Hensen *et al*. 2015). Additionally, authigenic carbonates and fossil cold-water coral mounds are widespread features on both the Iberian and Moroccan margins at depths ranging 200–1200 m (De Mol *et al*. 2012; Van Rooij *et al*. 2011). More details on the environmental settings of the study area can be found in Błażewicz-Paszkowycz *et al*. (2011a) and Esquete & Cunha (2017).

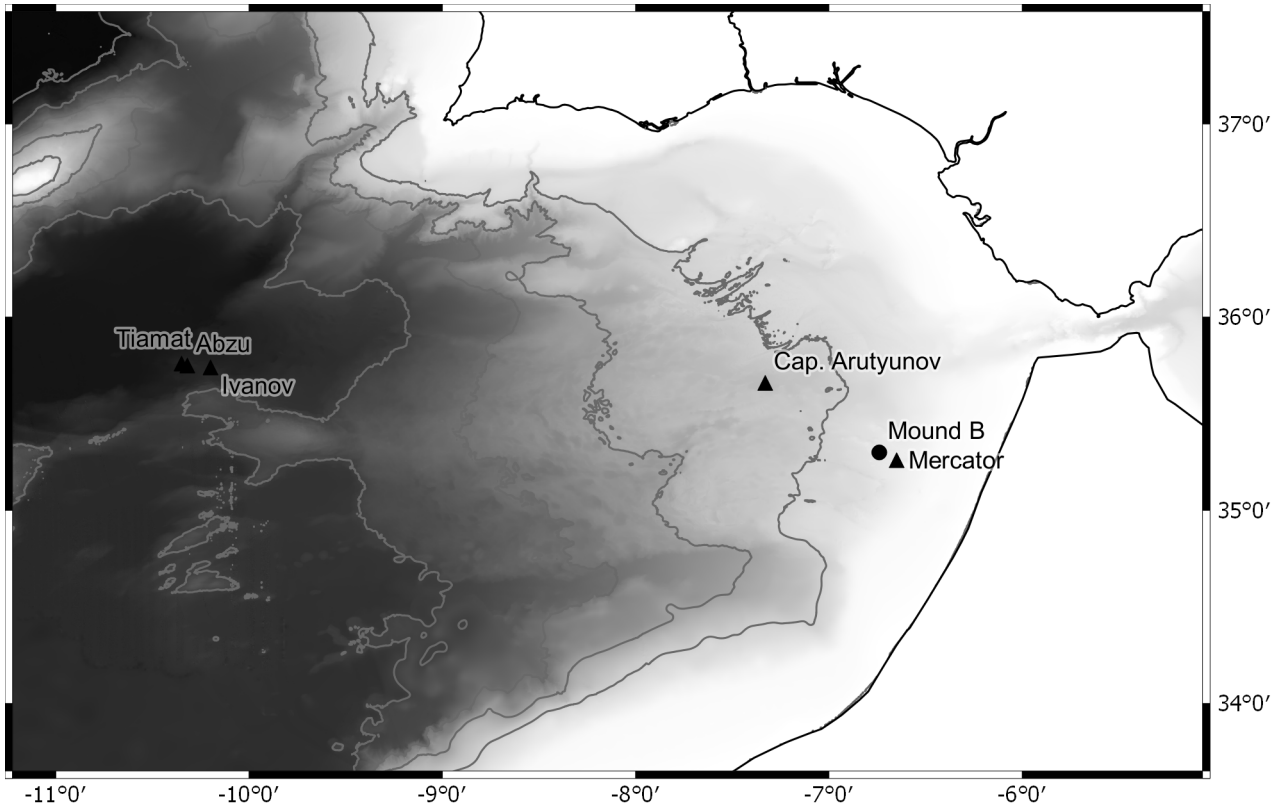

FIGURE 1. Map of the Gulf of Cadiz and Horseshoe Abyssal Plain showing the structures mentioned in this study. Triangles: Mud volcanoes. Circles: Carbonate mounds.

Material examined and laboratory methods. We examined the tanaidacean specimens from the GoC and HCR deposited at the Biological Research Collection of the Departamento de Biologia, Universidade de Aveiro (DBUA). The material examined here comes from five research cruises carried out between 2004 and 2012, in the framework of various international projects (Table 1). The sampling methods are described in Esquete & Cunha (2017). Additional material was loaned by the Zoological Museum University of Copenhagen (ZMUC; Denmark) and the Natural History Museum University of Oslo (NHMUO; Norway). Type material has been deposited in the Museo Nacional de Ciencias Naturales (MNCN; Madrid, Spain).

Morphological terminology follows that of Bamber & Costa (2009). Measurements were made axially, dorsally on the body and antennae, and laterally on other appendages. Total body length was measured from the frontal border of the cephalothorax to the distal border of the pleotelson. Identification keys were generated from DELTA databases (following Dallwitz *et al*. 2000) and subsequently edited for clarity of language.

Other abbreviations: CFR, Clara Ferreira Rodrigues; Coll., collector; MRC, Marina Ribeiro da Cunha.

Results

Systematics

Order TANAIDACEA Dana, 1849

Suborder TANAIDOMORPHA Sieg, 1980

Superfamily PARATANAOIDEA Lang, 1949

Family AGATHOTANAIDAE Lang, 1971

Genus *Paragathotanais* Lang, 1971

***Paragathotanais crateris* sp. nov.**
(Figs. 2–3)

Material examined. Holotype—♂ (MNCN 20.04/11444), cruise M86-5, station M86-5_369, USNEL boxcore, HCR, Abzu MV, 08.03.2012, 35º45.045'N, 10º19.018'W, 4550 m depth crater of MV; mud breccia covered by hemipelagic sediments.

Allotype—neuter (MNCN 20.04/11445), cruise M86-5, station M86-5_329, USNEL boxcore, HCR, M. Ivanov MV, 01.03.2012, 35º44.338'N, 10º12.056'W, 4492 m depth, crater of MV; mud breccia covered by hemipelagic sediments. All coll. MRC.

Further paratypes—**Horseshoe Continental Rise—Mud volcanoes. M. Ivanov MV:** station. M86-5_329, USNEL boxcore, 01.03.2012, 35º44.338'N, 10º12.056'W, 4492 m depth, crater of MV; mud breccia covered by hemipelagic sediments, one ♂, one ♀ (DBUA0002216.01); station. M86-5_388, USNEL boxcore, 11.03.2012, 35º44.327'N, 10º11.965'W, 4485 m, crater of MV; mud breccia covered by hemipelagic sediments, one ♀, three neuters (DBUA0002216.02); station M86-5_407, USNEL boxcore, 14.03.2012, 35º44.342'N, 10º12.056'W, 4507 m, crater of MV, mud breccia, one neuter dissected, one ♂ dissected (DBUA0002216.03). All coll. MRC.

Etymology. From the Latin noun *crateris* –crater, as all specimens were found within the crater of mud volcanoes; noun in apposition

Diagnosis. Cephalothorax about as long as pereonites 1–2 together. Antenna article 3 without seta. Maxilliped basis without setae, endite with two tubercles. Pereopods 4–6 dactylus with two distal spines. Uropod endopod more than twice as long as basis.

Description of male DBUA0002216.01A. *Body* (Fig. 2B) slender, 8.4 times longer than broad, length 4.2 mm. *Cephalothorax* about as long as pereonites 1–2 together, 1.7 times as long as broad. *Pereon* 0.6 times as long as body; pereonite 1 0.9 times as long as broad, pereonites 2 and 3 about as long as broad, pereonites 4 and 5 1.3 times as long as broad, pereonite 6 1.1 times as long as broad. *Pleonites* (Fig. 2C) all similar, pleonite 6 with pair of marginal setae. *Pleotelson* (Fig. 2C) distally tapering, with distal pair of setae.

Antennule (Fig. 2D) article 1 2.3 times as long as broad, with one simple and three penicillate setae on outer margin. Article 2 0.9 times as long as broad, outer margin distal corner with one simple and two penicillate setae, inner margin distal corner with one simple seta. Article 3 0.8 times as long as broad, inner margin distal corner with one simple and one penicillate setae. Article 4 0.9 times as long as broad, with distal tuft of seven simple setae.

Antenna (Fig. 2E) basal article fused to cephalothorax. Article 2 with one dorsodistal seta. Article 3 about as long as broad, naked. Article 4 1.3 times as long as two preceding articles, distally with two penicillate and one simple setae. Article 5 0.3 times as long as article 4, distally narrowing. Terminal article minute with two setae, one longer.

Mouthparts. *Labrum* (Fig. 3A) semicircular, with setules. *Left mandible* (Fig. 3B) pars incisiva with subdistal and distal lobes, lacinia mobilis spiniform with blunt tip; pars molaris distally tapering with setules. *Right mandible* (Fig. 3B) as left but without lacinia mobilis, pars incisiva distally crenulated. *Maxillule* (Fig. 3C) endite with eight distal spines, palp not recovered.

Maxilliped (Fig. 3A) endites with distal pair of tubercles; palp article 1 naked, article 2 with three inner setae, article 3 with two inner setae, article 4 with one subdistal and five distal setae.

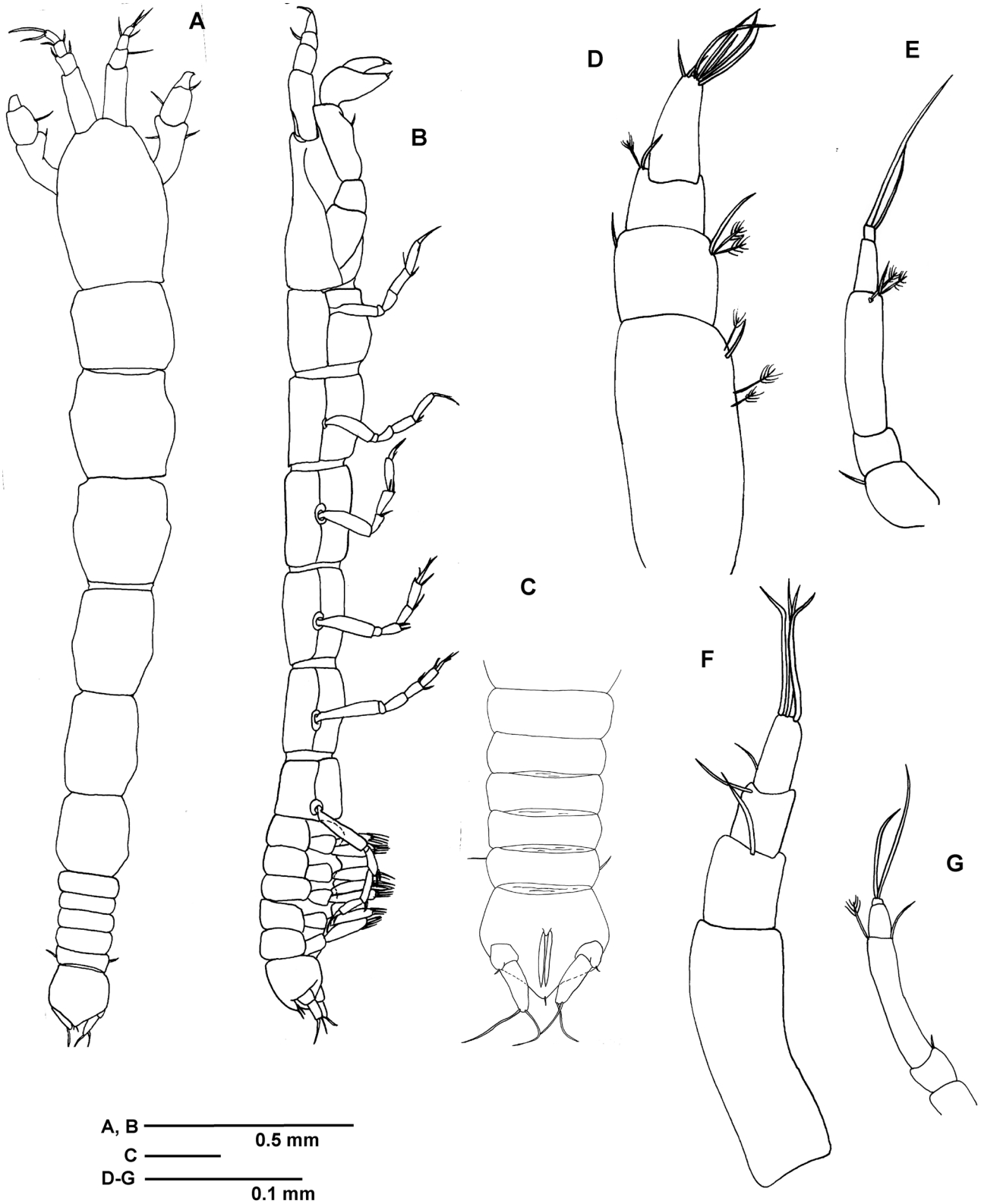

FIGURE 2. *Paragathotanais crateris* **sp. nov.** Female paratype DBUA0002216.01A: A, habitus (dorsal view); C, pleon and pleotelson (ventral view); F, antennule; G, antenna. Holotype male MNCN 20.04/11444: B, habitus (lateral view); D, antennule; E, antenna.

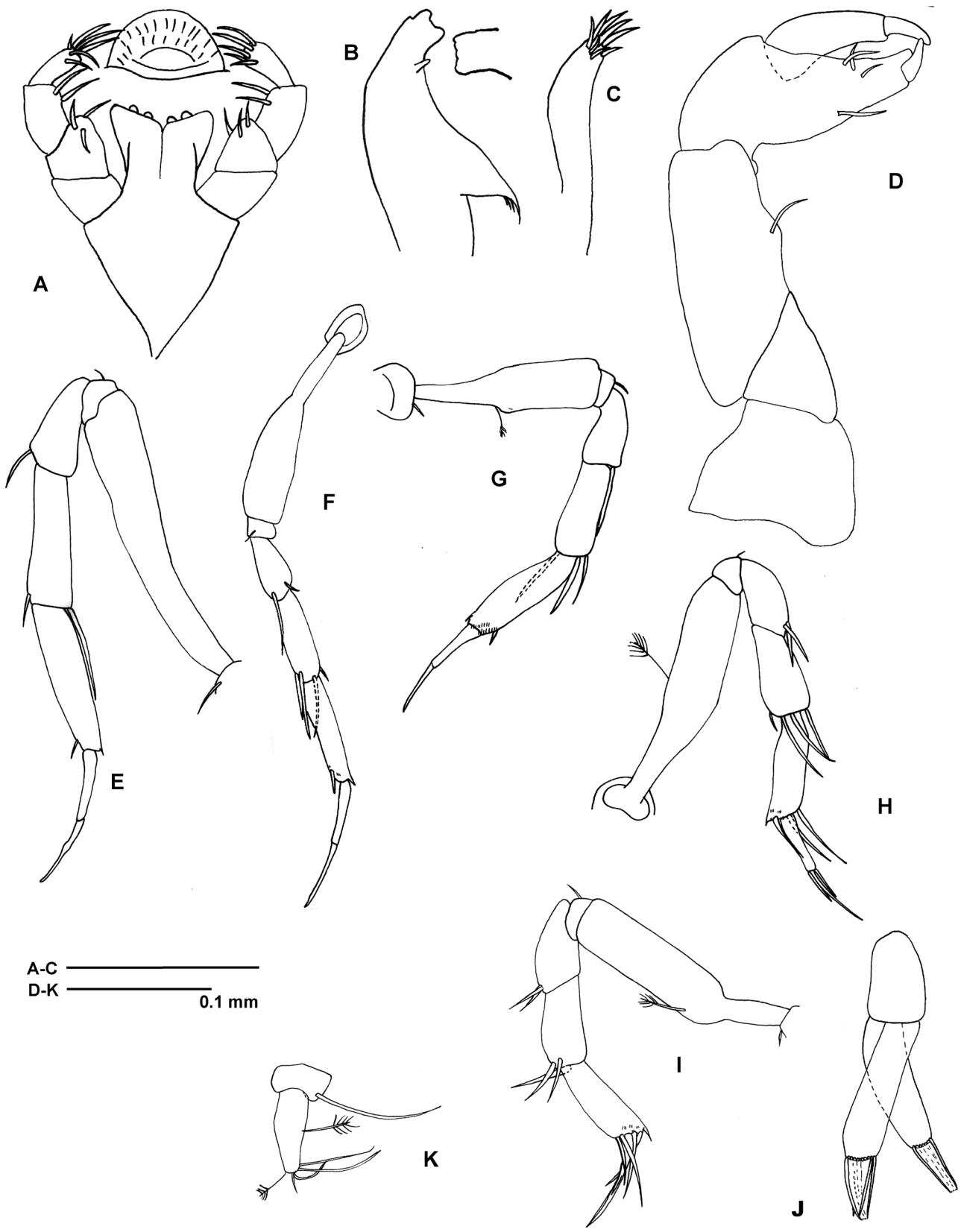

FIGURE 3. *Paragathotanais crateris* **sp. nov.** Paratype DBUA0002216.03A: A, Labrum and maxilliped; B, left mandible *pars incisiva* of right mandible; C, maxillule; D, Cheliped. DBUA0002216.03: E, pereopod 1; F, pereopod 2; G, pereopod 3; H, pereopod 4; I, pereopod 5; J, pleopod; K, uropod.

Cheliped (Fig. 3D) attached via pseudocoxa. Basis 0.7 times as long as broad, naked. Merus naked. Carpus 2.4 times as long as broad, with ventral seta. Chela about as long as carpus, fixed finger with three setae near cutting edge and one ventral seta; dactylus naked.

Pereopod 1 (Fig. 3E) coxa with seta. Basis 5.7 times as long as broad, naked. Ischium with ventral seta. Merus 0.3 times as long as basis, with one ventrodistal seta. Carpus 1.4 times as long as merus, with one ventrodistal seta and one dorsodistal seta 0.6 times as long as propodus. Propodus 1.1 times as long as carpus, ventral margin with subdistal spine, dorsal margin with spiniform apophysis. Dactylus and unguis together as long as carpus, unguis about as long as dactylus.

Pereopod 2 (Fig. 3F) basis narrower proximally, naked. Ischium with ventral seta. Merus 0.8 times as long as basis, ventrodistal margin with one short and one long seta. Carpus 1.3 times as long as merus, distally with three long setae and one short seta. Propodus 1.1 times as long as carpus, ventral margin with one subdistal spine, dorsal margin with spiniform apophysis. Dactylus and unguis together about as long as propodus, unguis about as long as dactylus.

Pereopod 3 (Fig. 3G) coxa with seta. Basis proximal half narrower, with dorsal penicillate seta. Ischium with ventral seta. Merus 0.4 times as long as basis, with ventrodistal seta, 0.8 times as long as carpus. Carpus 1.3 times as long as merus, with two ventrodistal and one dorsodistal setae. Propodus 1.3 times as long as carpus, distally with microtrichia, with dorsal apophysis and ventral subdistal short spine. Dactylus and unguis together about as long as propodus, unguis about as long as dactylus.

Pereopod 4 (Fig. 3H) basis proximal half narrower, with one ventral penicillate seta. Ischium naked. Merus 0.3 times as long as basis, with pair of ventral setae. Carpus 1.1 times as long as merus, with three distal setae and one dorsodistal seta. Propodus 1.1 times as long as carpus, with three distal setae and dorsodistal spiniform apophysis. Dactylus and unguis together 1.2 times as long as propodus, dactylus with two distal spines about 0.5 times as long as unguis.

Pereopods 5 (Fig. 3I) *and 6* similar to pereopod 4, but ischium with one seta, carpus with three setae only, propodus with four distal setae.

Pleopods (Fig. 3J) alike. Basis naked. Rami with row of distal setae only.

Uropod (Fig. 3K) Exopod slightly marked, with very long seta. Endopod 2.6 times as long as broad, with one medial penicillate seta, distally with one penicillate and four simple setae.

Distinctions of neuter MNCN 20.04/11445. *Antennule* (Fig. 2F) more slender and with fewer setae than in male. Article 1 2.9 times as long as broad, naked. Article 2 0.3 times as long as article 1, about as long as broad, with one distal seta. Article 3 0.8 times as long as article 2, 1.2 times as long as broad, with two distal setae. Article 4 1.2 times as long as article 3, 2.2 times as long as broad, with four distal setae. *Pleopods* absent.

Remarks. *Paragathotanais vikingus* Bird, 2010 from waters off Southeast Iceland is very similar to the newly described species in having a pair of marginal setae on pleonite 6, pereopods 4–6 dactylus with two equal distal spines, uropod with slightly marked exopod process; however, differs from *P. crateris* **sp. nov.** in having a more slender antennule on males, antenna article 2 without seta, mandibular *pars molaris* with no setules, maxilliped basis with setae, endite with setae instead of tubercles, chela fixed finger with three low teeth, and pereopods 4–6 carpus with row of spinules and dactylus with setules.

The presence of two distal spines on dactylus on pereopods 4–6 is a character shared with *P. triunguisus* Larsen & Bird, 2013 from Antarctic waters; this species differs from *P. crateris* in the presence of ventral spines on cheliped dactylus and pereopods 1–3 merus and carpus with very short setae. An undescribed, partially illustrated species from the Gulf of Mexico, *Paragathotanais* sp. A (see Larsen 2005), presents dorsal and ventral spines on dactylus of pereopods 4–6, but the cephalothorax is only 1.3 times as long as broad, and all pereonites are as long as broad or shorter.

Paragathotanais spinosus Larsen, 2005 from the Gulf of Mexico differs from *P. crateris* in having a proportionally shorter antennule, maxilliped endite without tubercles, cheliped basis proportionally shorter, pereopods 4–6 with one long distal spine and two more proximal, smaller spines and shorter uropod endopod

Paragathotanais gracilis Bird & Holdich, 1988 from the Northeast Atlantic has a similar labrum and a slender cheliped carpus, but differs from *P. crateris* in having only one distal spine on dactylus of pereopods 4–6 and accessory subdistal spines. Furthermore, it presents an antenna article 2 with spinules, maxilliped endites with processes and spinules but no tubercles, and cheliped dactylus with one seta.

Paragathotanais nanus Bird & Holdich, 1988 and *Paragathotanais robustus* Bird & Holdich, 1988, also from

the Northeast Atlantic have not spines on pereopods 4–6 dactyli. Both species also differ from *P. crateris* in having the female antennule article 2 distinctively longer than article 3, maxilliped endites with setae instead of tubercles, and cheliped carpus as long as broad, *inter alia.*

Paragathotanais insolitus Guerrero?Kommritz, 2003, from the Angola Basin shares with the new species the presence of paired tubercles on maxilliped endites and slender cheliped carpus, but is different from *P. crateris* in having pereopods 4–6 dactyli without spines, and uropod protopod as long as endopod, with tubercle.

Distribution and Ecology. *Paragathotanais crateris* was recovered from mud breccia and the overlaying hemipelagic sediments in two mud volcanoes of the Horseshoe Continental Rise: Abzu and Ivanov (4485–4507 m depth).

Identification key to Eastern Atlantic species of *Paragathotanais*

1(0). Cephalothorax longer than pereonites 1–2. Cheliped carpus robust (1.0 to 1.5 times as long as broad) 2
Cephalothorax as long as pereonites 1–2 or shorter; cheliped carpus slender (more than 2.0 times as long as broad) 3
2(1). Pereonites 4–5 shorter than broad. Pereopods 4–6 dactylus with accessory spines ... . ***P. vikingus***
Pereonites 4–5 as long or longer than broad. Pereopods 4–6 dactylus without accessory spines . . . . . ***P. nanus***
3(1). Antenna article 2 with spinules. Maxilliped endite with setae . . . . . ***P. gracilis***
Antenna article 2 without spinules. Maxilliped endite with paired tubercles 4
4(3). Pereopods 4–6 dactylus with accessory spines. Uropod endopod about twice as long as protopod . . . . . ***P. crateris* sp. nov.**
Pereopods 4–6 dactylus without accessory spines; uropod endopod about as long as protopod . . . . . ***P. insolitus***

Family Akanthophoreidae Sieg, 1986

Genus *Tumidochelia* Knight, Larsen & Heard, 2003

Tumidochelia uncinata (Hansen, 1913)

(Figs 4–5)

Leptognathia uncinata Hansen 1913: 83–85, pl.VIII, figs 4a–4i.
Tumidochelia uncinata Larsen & Shimomura 2007: 7–8.

Remarks. *Tumidochelia uncinata* was described by Hansen, (1913) based on specimens from the Ingolf Expedition, including a few illustrations. After comparing our specimens with the type material, we found no significant differences. Here we illustrate and describe the material from the GoC and HCR to complement previous works.

Material examined. **Horseshoe Continental Rise—Mud volcanoes. M. Ivanov MV:** station M86-5_329, USNEL boxcore, 01.03.2012, 35º44.338'N, 10º12.056'W, 4492 m depth, crater of MV; mud breccia covered by hemipelagic sediments, two neuters, dissected (DBUA0002217.01); station. M86-5_348, USNEL boxcore, 05.03.2012, 35º44.410'N, 10º12.179'W, 4497 m, mud breccia covered by hemipelagic sediments, one ♀, dissected (DBUA0002217.02). **Tiamat MV:** station M86-5_339, USNEL boxcore, 03.03.2012, 35°45.712'N, 10°21.248'W, 4551 m, crater of MV; mud breccia covered by hemipelagic sediments, one ♀(DBUA0002217.03). All coll. MRC.

Additional material examined*: Holotype*—♀ (ZMUC-CRU-8518), Ingolf expedition, station 36, Davis Strait, 61°50'N, 56°21'W, 2702 m depth. *Paratype*–juvenile (ZMUC-CRU-9275), Ingolf Expedition, station 103, 66°23'N, 8°52'W, 1090 m depth.

Diagnosis. (Female). Pereonites 2–4 about as long as wide. Pleotelson about as long as pleonites 3–5 together. Antenna article 4 with fusion line. Pereopod 1 merus and carpus spines not significantly longer than merus; dactylus and unguis together about half length of propodus. Uropod exopod shorter than endopod first segment.

Description of female DBUA0002217.02. *Body* (Fig. 4A, B) 6.5 times as long as broad, length 1.5 mm. *Cephalothorax* 1.2 times as long as broad, 0.9 times as long as first two pereonites. *Pereonite 6* the shortest, about half as long as other pereonites. *Pleon* shorter than last two pereonites together, all pleonites alike. *Pleotelson* as long as three pleonites, distally tapering.

Antennule (Fig. 4C) article 1 1.7 times as long as broad, with one distal seta on outer margin. Article 2 1.1

times as long as broad, with one distal seta on inner margin and one distal seta on outer margin. Article 3 about as long as broad, 0.5 times as long as article 2, with one distal seta on inner margin. Article 4 twice as long as broad, 1.3 times as long as article 3, with subdistal seta and tuft of six distal setae.

Antenna (Fig. 4D) article 1 with one dorsodistal seta. Article 2 about as long as broad, with one dorsodistal seta. Article 3 3.8 times as long as broad, with fusion line, with two ventrodistal setae and one mediodistal seta. Article 4 0.6 times as long as article 3, with two distal setae. Article 5 minute, with two setae.

Mouthparts. *Labrum* (Fig. 4E) triangular, with setules. *Left mandible* (Fig. 4F) pars incisiva with four cusps, lacinia mobilis with four cusps; pars molaris distally with spines. *Right mandible* (Fig. 4G) pars incisiva with three cusps, without lacinia mobilis. *Labium* (not figured) bilobed, naked. *Maxillule* endite (Fig. 4H) with one subdistal seta and eleven distal denticulate spines; palp (Fig. 4I) with two distal setae. *Maxilliped* (Fig. 4J) palp article 1 naked, article 2 with three inner setae, article 3 with three inner setae, article 4 with five setae.

Cheliped (Fig. 4K) attached via sclerite. Basis naked, posterior border broadly rounded. Merus naked. Carpus about as long as basis, widening distally, with rounded ventrodistal shield, bearing one ventral seta. Propodus as long as carpus, extending dorsally beyond dactylus insertion, with two ventral setae; fixed finger with three inner setae next to dactylus insertion, cutting edge with three denticles and three inner setae. Dactylus with dorsal seta near insertion with carpus.

Pereopod 1 (Fig. 5A) basis 2.2 times as long as broad, naked. Ischium with one ventral seta. Merus 0.5 times as long as basis, 1.3 times as long as broad, with one ventrodistal seta and one ventrodistal long spine, 0.8 times as long as carpus. Carpus 0.8 times as long as merus, distally with microtrichia, with one ventrodistal and one dorsodistal serrate spines, both 0.8 times as long as carpus. Propodus 1.6 times as long as carpus, 2.8 times as long as broad, with dorsodistal spiniform apophysis, ventrally with microtrichia, ventral margin with one subdistal serrulate spine. Dactylus and unguis together 0.8 times as long as propodus; dactylus with dorsal and ventral distal spiniform processes near unguis insertion; unguis 1.5 times as long as dactylus, ventrally serrulate.

Pereopod 2 (Fig. 5B) basis 2.6 times as long as broad, naked. Ischium with ventral seta. Merus 0.4 times as long as basis, 1.2 times as long as broad, with ventrodistal spine, as long as carpus. Carpus about as long as merus, 1.2 times as long as broad, with one ventrodistal spine about as long as merus, one dorsodistal seta, and one mediodistal seta. Propodus 1.8 times as long as carpus, 3.8 times as long as broad, with dorsodistal spiniform apophysis, ventrally with microtrichia and one ventrodistal spine. Dactylus and unguis together 0.7 times as long as propodus, 1.3 times as long as broad.

Pereopod 3 (Fig. 5C) basis 1.9 times as long as broad, naked. Ischium with ventral seta. Merus 0.5 times as long as basis, 1.7 times as long as broad, with one subdistal short spine and one ventrodistal spine about as long as carpus. Carpus 0.9 times as long as merus, 1.4 times as long as broad, with one dorsodistal seta, one ventrodistal spine longer than carpus, one short ventrodistal spine, and one short mediodistal spine. Propodus 1.6 times as long as carpus, 2.8 times as long as broad, with dorsodistal spiniform process, one ventrodistal spine, distal and ventral margin with microtrichia. Dactylus and unguis together 0.7 times as long as propodus, dactylus with ventral setules, unguis 1.9 times as long as dactylus.

Pereopods 4–6 (Fig. 5D) alike. Basis 2.5 times as long as broad, with one ventral penicillate seta. Ischium with one ventral seta. Merus 1.5 times as long as broad, with one ventral seta and one ventral spine 0.5 times as long as carpus. Carpus 1.2 times as long as merus, 1.6 times as long as broad, distally with pair of ventral spines, one 0.7 times as long as propodus, the other shorter, and pair of dorsal spines, the same. Propodus about as long as carpus, 2.3 times as long as broad, with one dorsodistal spine (two on pereopod 6), one ventrodistal spine, and one mediodistal seta. Dactylus and unguis together about as long as propodus, dactylus with setules, unguis 0.3 times as long as dactylus.

Pleopods (Fig. 5E) alike, basis naked. Rami with distal plumose setae.

Uropod (Fig. 5F) biramous, protopod with dorsodistal spiniform process, naked. Endopod bisegmented, proximal segment 4.8 times as long as broad, with one subdistal penicillate seta, second segment as long as first, with one subdistal and three distal long setae. Exopod bisegmented, 0.6 times as long as endopod first segment, first segment 2.7 times as long as broad, naked, second segment as long as first, with one long and one short distal setae.

Remarks. The only observed difference between the material from the GoC and HCR, and the type specimens is the dorsal and ventral distal spiniform processes on dactylus of pereopod 1, which are present although less evident in the Ingolf specimens. **Distribution and Ecology**. This represents the first published records of the *T. uncinata* since its original description. The original material came from Davis Strait and the Iceland Plateau, at

2702 and 1090 m respectively. The specimens reported herein were recovered from mud breccia and overlaying hemipelagic sediments collected at HCR, at 4492–4551 m depth. Hence, the geographic distribution range of *T. uncinata* has been expanded to the south.

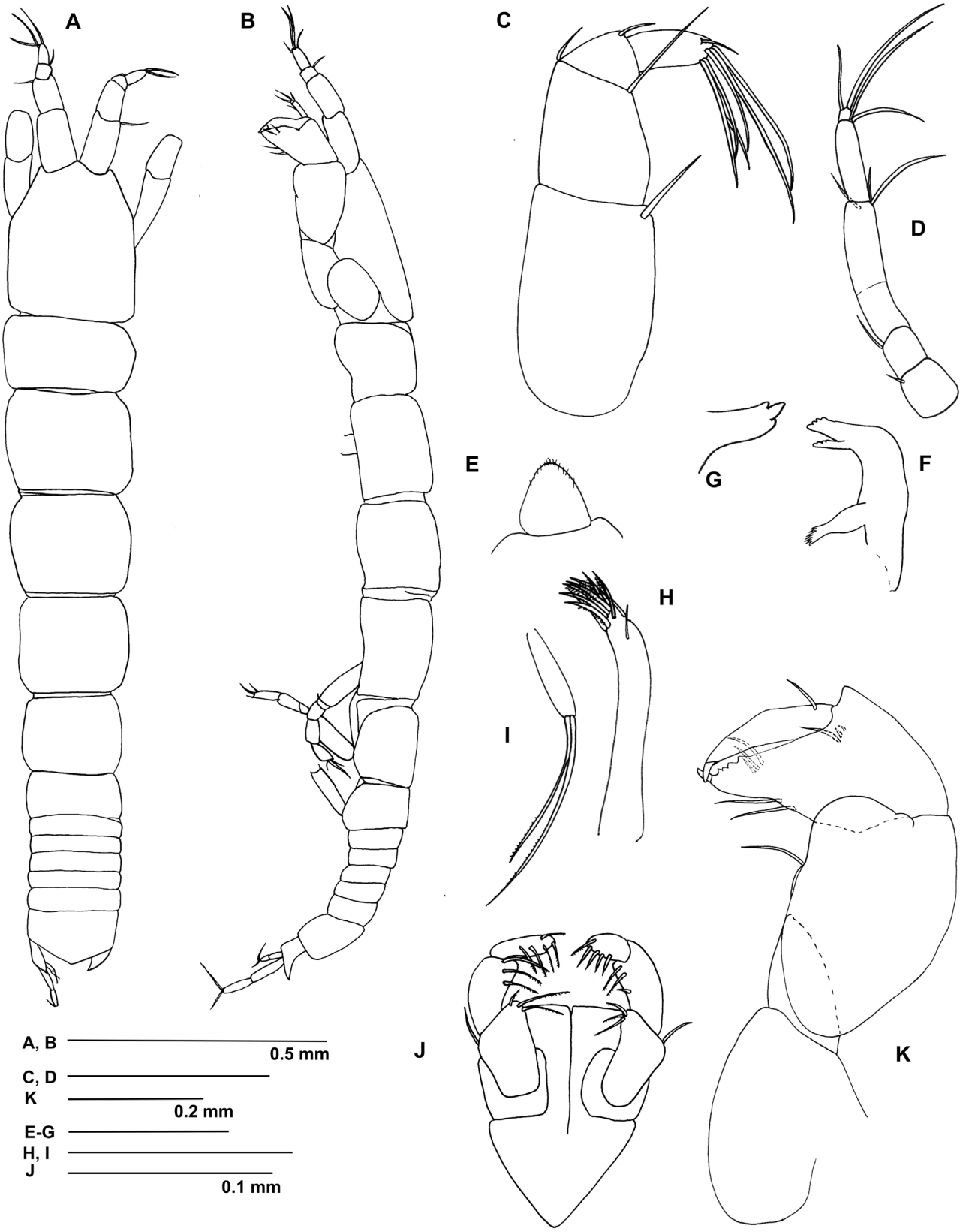

FIGURE 4. *Tumidochelia uncinata.* Female specimen DBUA0002217.02: A, habitus (dorsal view). B, habitus (lateral view; pleopods omitted for clarity); C, antennule; D, antenna; E, labrum; F, left mandible; G, right mandible; H, maxillule endite; I, maxillule palp; J, maxilliped; K, cheliped outer view.

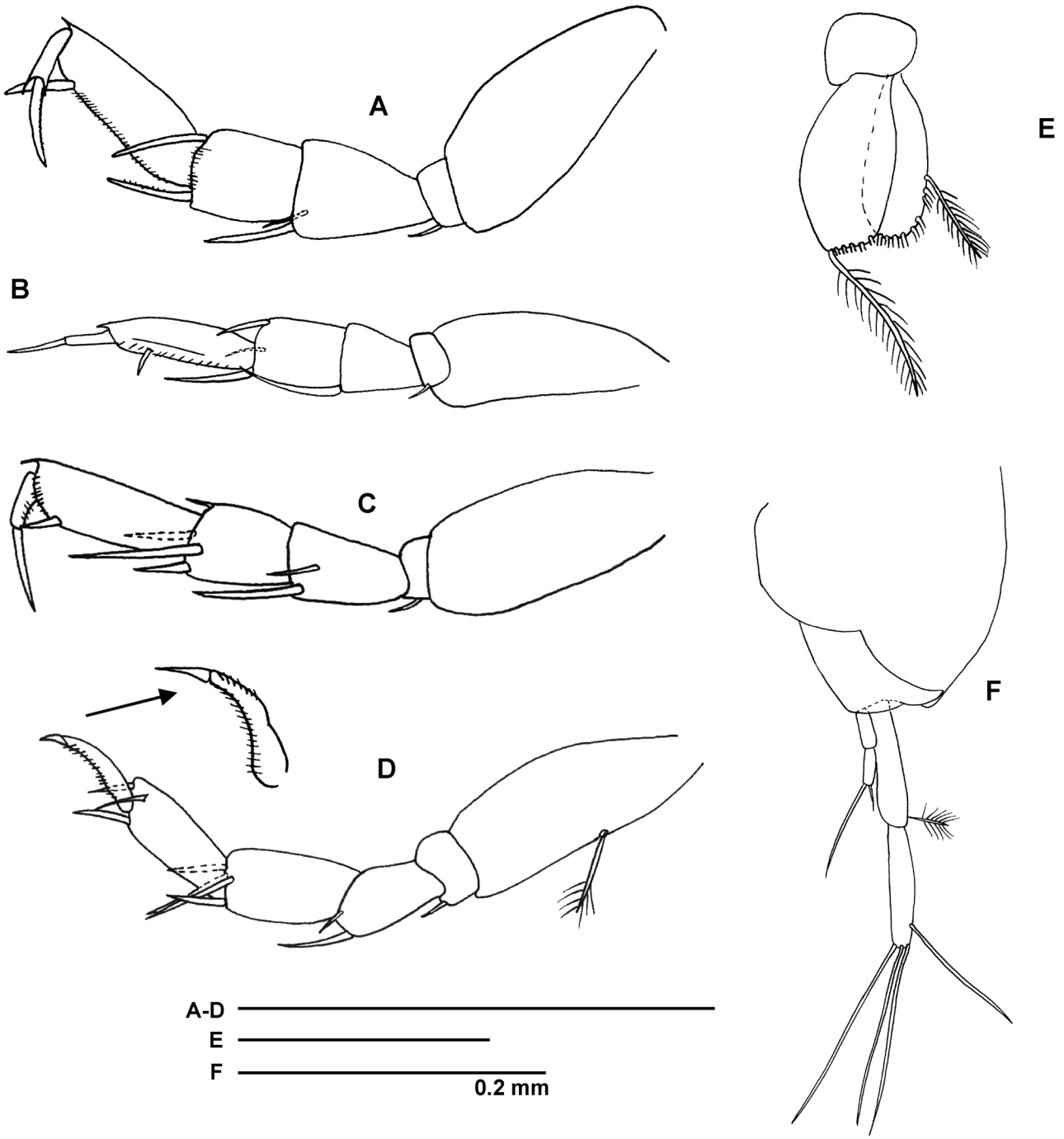

FIGURE 5. *Tumidochelia uncinata.* Neuter Specimen DBUA0002217.01: A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 5; E, pleopod; F, uropod.

Family Colletteidae Larsen & Wilson, 2002

Genus *Collettea* Lang, 1973

***Collettea gaditana* sp. nov.**
(Figs 6–7)

Material examined. Holotype—♀(MNCN 20.04/11446), cruise TTR15, station TTR15_AT575, USNEL boxcore,

26.07.2005, GoC, Mercator MV, 35º17.903'N, 06º38.715'W, 355 m depth, crater of MV, mud breccia; near seep, coll. MRC.

Further paratypes: **Gulf of Cadiz—Mud volcanoes. Mercator MV:** station MSM01-3_237.2, multicore, 06.05.2006, 35º17.914'N, 06º38.687'W, 353 m, crater of MV; mud breccia, near seep, one ♀ (DBUA00002218.01), coll. MRC; station 64PE253_49, NIOZ boxcore, 14.10.2006, 35°17.90'N, 6°38.64'W, 360 m, crater of MV, clayey-silty sand with carbonate debris, H_2S smell, one ♀ (DBUA00002219.01), coll. Clara F. Rodrigues (CFR); **Gemini MV:** station 64PE253_13, NIOZ boxcore, 08.10.2006, 35°16.65'N, 6°46.11'W, 516 m, flank of MV; silty clay, one specimen (DBUAXXXX). Coll. CFR

Gulf of Cadiz—Carbonate and coral mounds. **Pen Duick Escarpment:** station 64PE253_39, NIOZ boxcore, 13.10.2006, 35°18.90'N, 6°47.90'W, 560 m, sandy silty clay, one ♀ (DBUA00002219.03 **Mound B:** station 64PE268_13A, NIOZ boxcore, 03.05.2007, 35°17.997'N, 6°44.488'W, 475 m, sandy silty clay with coral fragments, one neuter (DBUA00002220.01). All coll. CFR.

Additional comparative material examined. - Collettea cylindrata (Sars, 1882): six specimens (syntypes), NHMUO F10159; one specimen, NHMUO F10159.

Etymology. "Gaditana" is the demonym (feminine) of the inhabitants of Cádiz, the city which the Gulf of Cadiz is named after.

Diagnosis. Body 8.6 times as long as broad. Pereon distinctively longer than pleon. Pleon distinctively longer than pleotelson. Antennule with distinct cap-like terminal segment. Antenna article 4 with fusion line. Maxilliped endite with paired tubercles and no seta. Uropods short, not reaching pleotelson distal border.

Description of female DBUA00002218.01. *Body* (Fig. 6A, B) slender, 8.6 times longer than broad, length 2.3 mm. *Cephalothorax* 0.2 times as long as body, 1.5 times as long as broad, as long as pereonites 1–2 and half of 3 together. *Pereonite 1* 0.4 times as long as broad. *Pereonite 2* 1.6 times as long as pereonite 1, 0.7 times as long as broad. *Pereonite 3* about as long as pereonite 2. *Pereonites 4–5* about as long as broad. *Pereonite 6* 0.8 times as long as pereonites 4 and 5. *Pleon* as broad as pereon, 0.2 times as long as body, about as long as pereonites 4–6 together; all pleonites alike. *Pleotelson* 1.5 times as long as broad, as long as pleonites 3–5 and half of 2 together.

Antennule (Fig. 6C) article 1 3.2 times as long as broad, with one outer subdistal seta. Article 2 1.2 times as long as broad, with one inner distal simple seta and tuft of three outer distal penicillate setae. Article 3 as long as broad, with one outer subdistal simple seta and one inner distal short seta. Article 4 3.0 times as long as broad, naked. Article 5 cap-like, with three simple setae and one aesthetasc. *Antenna* (Fig. 6D) article 1 1.2 times as long as broad, with one dorsodistal seta. Article 2 0.7 times as long as broad, with one dorsodistal seta. Article 4 with faint division line, five times as long as broad, naked. Article 5 2.5 times as long as broad, naked. Article 6 with five distal setae.

Mouthparts. Labrum semicircular (not figured). *Left mandible* (Fig. 6E) pars incisiva process with two larger and three smaller cusps, lacinia mobilis with five cusps; pars molaris armed with teeth. *Right mandible* (Fig. 6F) as left but without lacinia mobilis. *Labium* (Fig. 6G) consisting of one pair of naked lobes. *Maxillule* (Fig. 6H) endite with eight distal spines, three of them distally bilobed; palp with two setae (not figured). *Maxilla* not recovered.

Maxilliped (Fig. 6I) endite with two tubercles. Palp article 1 naked, article 2 and 3 with three inner setae, article 4 with four distal and one subdistal setae.

Cheliped (Fig. 7A) attached via elongate sclerite. Basis 1.8 times as long as broad. Merus with ventral seta. Carpus 1.7 times as long as broad, with one ventral seta. Propodus 2.0 times as long as broad, with inner row of three spines, the ventral-most the longest; chela fixed finger with two ventral setae and three setae near cutting edge; cutting edge distal half crenulated with one subdistal denticle. Dactylus as long as fixed finger, with one inner medial seta.

Pereopod 1 (Fig. 7B) coxa with one seta. Basis slightly curved, four times as long as broad. Ischium with ventral seta. Merus 0.3 times as long as basis, with one ventrodistal seta. Carpus 1.7 times as long as merus, 2.8 times as long as broad, with one dorsodistal seta reaching half length of propodus and one ventrodistal, shorter seta. Propodus about as long as carpus, with subdistal spine. Dactylus and unguis together 1.1 times as long as propodus, unguis 1.6 times as long as dactylus.

Pereopods 2–3 (Fig. 7C, D) coxa with seta. Basis straight, 5.0 times as long as broad. Ischium with ventral seta. Merus 0.3 times as long as basis, with one ventrodistal seta. Carpus 1.6 times as long as merus, with two short and one long setae. Propodus 1.3 times as long as carpus, with ventrodistal spine. Dactylus and unguis together 1.1 times as long as propodus, unguis 1.6 times as long as dactylus.

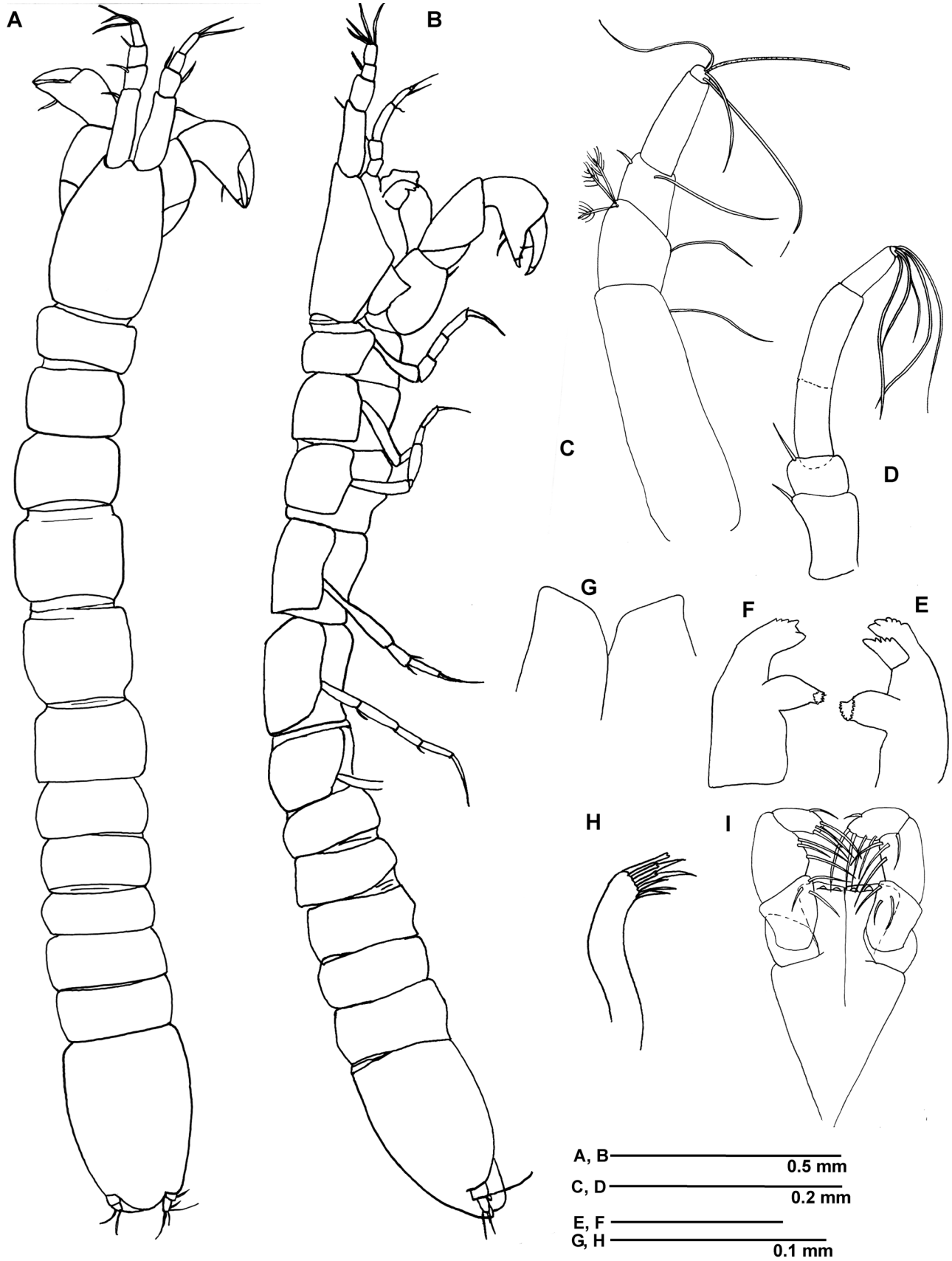

FIGURE 6. *Collettea gaditana* **sp. nov.** Female holotype MNCN 20.04/11446: A, habitus (dorsal view). B, habitus (lateral view). Female specimen DBUA00002218.01: C, Antennule; D, antenna; E, left mandible; F, right mandible; G, labium; H, maxillule; I, maxilliped.

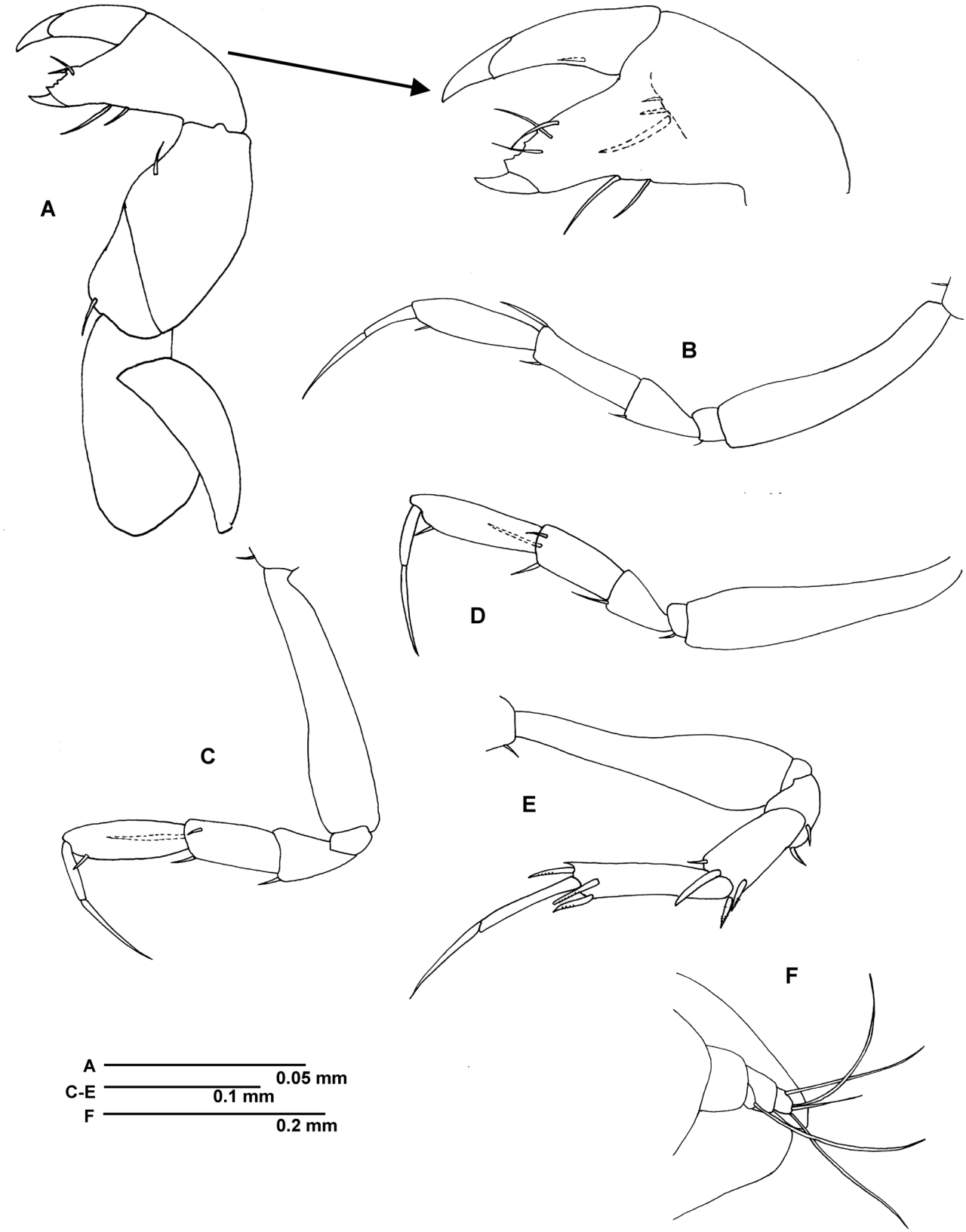

FIGURE 7. *Collettea gaditana* **sp. nov.** Female specimen DBUA00002218.01: A, cheliped; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, uropod.

Pereopods 4–6 (Fig. 7E) coxa with seta. Basis 3.7 times as long as broad, visibly broader distally. Ischium naked. Merus with pair of ventrodistal spines. Carpus 1.7 times as long as broad, with pair of ventrodistal serrulate spines, one simple dorsodistal spine and one simple dorsodistal seta. Propodus 4.8 times as long as broad, with dorsodistal spiniform apophysis, one dorsodistal serrulate spine and pair of ventrodistal serrulate spines. Dactylus and unguis together 1.3 times as long as propodus, unguis 0.9 times as long as dactylus.

Uropod (Fig. 7F) protopod 0.7 times as long as broad, naked. Endopod first segment about as long as basis, naked; second segment 0.6 times as long as first, with one subdistal and three long distal setae. Exopod with one long simple seta.

Remarks. Two species are described from localities near the GoC: *Collettea rotundicauda* Kudinova-Pasternak, 1986, from waters off Portugal, can be readily distinguished from *C. gaditana* **sp. nov.** in having a pleon distinctly shorter than pleotelson, uropods long, inner rami about twice as long as basis, and pereopods with setules on propodus and dactylus; *C. vermiformis* (Lang, 1971) from the Alboran Sea, has a pleon longer than pereon, antenna without dorsal setae on articles 2 and 3, pereopods 1 to 3 dactylus with proximal seta, carpus without dorsodistal seta, pereopods 4 to 6 with four serrulate spines, and uropods proportionally longer, with protopod distinctively longer than wide.

Collettea cylindrata (Sars, 1882) recorded along the coast of Norway and Davis Strait (Hansen 1913; Lang 1971; Larsen 2000; Sars 1882, 1896) is a species with high intraspecific variation, and some of the morphologies described by the various authors also show similarities with *C. gaditana*. For instance, Sars (1882, 1896) described two different morphologies of the habitus of *C. cylindrata,* one corresponding to the females and the other corresponding to immature males, and Hansen (1913) and Lang (1971) provided further descriptions and illustrations of additional intraspecific variation on antennule and chela. The habitus of the female specimens illustrated by Sars (1896, pl. XVI Fig. 1) and redescribed by Lang (1971) have the same proportions of carapace, pereonites, pleonites and pleotelson as C*. gaditana*. Likewise, characters of the chela such as propodus dimensions and number of setae in the setal row lie within the variability described by Lang (1971, Fig. 1). Nevertheless, *C. cylindrata* differs from *C. gaditana* in having a pair of setae on the carapace, the maxilliped endite with a seta and no cusps, pereopods 1 to 3 dactylus with a proximal seta and the carpus without dorsodistal seta, and pereopods 4 to 6 with four serrulate spines instead of three.

Distribution and ecology. This species was found in mud breccia near active seeps but mostly in very fine sediments (clay) with carbonate and fossil coral debris collected from mounds and inactive sites of mud volcanoes (Mercator and Gemini) in the Moroccan margin between 241–575 m depth.

Identification key to Eastern Atlantic species of *Collettea* (based on Drumm & Bird 2016)

1.	Cheliped fixed finger with one ventral seta	***C. minima* (Hansen)**
-	Cheliped fixed finger with two ventral setae	2
2(1).	Uropod endopod one-segmented	***C. pegmata* Bamber**
-	Uropod endopod two-segmented	3
3(2).	Pereonite 1 about as long as broad; pleotelson about as long as pleonites combined length	***C. rotundicauda***
-	Pereonite 1 shorter than broad; pleotelson distinctively shorter or longer than pleonites combined length	4
4(3).	Pleonites 1–4 about as long as broad. Uropods long (> 0.3 times length of pleotelson)	***C. vermiformis***
-	Pleonites 1-4 shorter than broad. Uropods short (< 0.3 times length of pleotelson)	5
5(4).	Pereopods 4–6 carpus with four serrulate spines	***C. cylindrata***
-	Pereopods 4–6 carpus with three serrulate spines	***C. gaditana* sp. nov.**

Genus *Cetiopyge* Larsen & Heard, 2002

Diagnosis (modified after Larsen & Heard 2002). Body laterally compressed. Antennule of four or five articles, fifth article minute. Antenna of six articles. Mandible pars molaris broad. Maxillule with some bifurcate terminal setae. Maxilliped basis not fused distally, endites not fused. Cheliped attached via sclerite. Pereopods with coxa, propodus never longer than dactylus and terminal setae combined. Distal pleon and pleotelson laterally compressed. Pleopods absent in female. Uropods small, exopod minute, endopod of two segments, fused or not.

Remarks. This is the first record of this monotypic genus since it was described from the deep-sea waters of

the Gulf of Mexico (Larsen & Heard 2002). This record shows that *Cetiopyge* has an amphiAtlantic distribution. The diagnosis is herein modified to accommodate the newly described species.

***Cetiopyge lemei* sp. nov.**
(Figs 8–10)

Material examined. Holotype—♀ (MNCN 20.04/11447), cruise MSM01-03, station MSM01-3_344, collected from the experimental chamber of a FLUFO lander, 16.05.2006, GoC, Capitan Arutyunov MV, 35º39.697'N, 07º20.038'W, 1320 m depth, crater of MV; mud breccia.

Paratypes—seven ♀♀ (DBUA0002221.02), same data as holotype. All coll. MRC

Further specimens—**Gulf of Cadiz—Mud volcanoes. Captain Arutyunov MV:** station MSM01-03_225, collected from the experimental chamber of a BIGO lander, 04.05.2006, 35º39.682'N, 07º19.882'W, 1320 m, crater of MV, mud breccia, two neuters (DBUA0002222.01), coll. MRC. **Horseshoe Continental Rise—Mud volcanoes. M. Ivanov MV:** station M86-5_329, USNEL boxcore, 01.03.2012, 35º44.338'N, 10º12.056'W, 4492 m, crater of MV; mud breccia covered by hemipelagic sediments, one neuter (DBUAXXXX); **Abzu MV:** station M86-5_369, USNEL boxcore, 08.03.2012, 35º45.045'N, 10º19.018'W, 4550 m, crater of MV; mud breccia covered by hemipelagic sediments, one neuter (DBUA0002222.02). All coll. MRC.

Etymology. Named after "LEME", acronym for the "Laboratorio de Ecologia Marinha e Estuarina" (Laboratory of Marine and Estuarine Ecology) of the University of Aveiro.

Diagnosis. Cephalothorax as long as three first pereonites combined. Mandible pars incisiva with three cusps. Maxillule endite with nine spines. Maxilliped endite with two cusps. Maxilliped palp article 2 with one outer and two simple inner setae, article 3 with two simple inner setae, article 4 with three distal and one subdistal setae. Chela twice as long as broad, fixed finger with proximal invagination, dactylus shorter than fixed finger, naked, with medioventral ventral tooth. Pereopods 1–3 propodus with one subdistal serrulate spine.

Description of female DBUA0002221.01. Body (Fig. 8A, B) length 1.6 mm, 4.4 times as long as broad. Cephalothorax about as long as broad, as long as pereonites 1–3; eyelobes present without visual elements. Pereonites all broader than long, pereonites 4–5 longest. Pleon and pleotelson swollen. All pleonites subequal, without pleopods. Pleotelson semicircular, longer than four pleonites.

Antennule (Fig. 9A) article 1 2.1 times as long as broad, with two inner tufts of penicillate setae. Article 2 0.5 times as long as article 1, with inner simple seta. Article 3 broader than long, 0.2 times as long as article 2, with three setae. Article 4 3.5 times as long as previous, with tuft of distal setae and one aesthetasc.

Antenna (Fig. 9B) article 1 1.3 times as long as broad, naked. Articles 2 and 3 with one dorsal seta. Article 4 4.0 times as long as broad, with medial and subdistal penicillate setae. Article 5 0.3 times as long as article 4, with distal seta. Article 6 small, as long as broad, with tuft of setae.

Mouthparts. *Labrum* semicircular (not figured). *Left mandible* (Fig. 9C) pars incisiva with three lobes, lacinia mobilis as long as pars incisiva, rectangular; pars molaris about as long as pars incisiva, armed with denticles and setules. *Right mandible* (Fig. 9D) as left, but without lacinia mobilis. *Maxillule* endite (Fig. 9E) with nine distal spines, two of them bifurcate; palp (Fig. 9F) with two distal setae. *Maxilla* not recovered.

Maxilliped (Fig. 9G) basis fused; palp article 1 naked, article 2 with one outer and three inner setae, article 3 with two inner setae, article 4 with one subdistal and three distal setae.

Cheliped (Fig. 10A) basis attached via sclerite, naked. Merus as long as basis, naked. Carpus 1.2 times as long as broad, with one ventral and one dorsodistal setae. Propodus palm with four setae near dactylus insertion; fixed finger with two ventral and three inner setae, cutting edge with subdistal denticle. Dactylus shorter than fixed finger, naked, with ventral tooth.

Pereopod 1 (Fig. 10B) coxa naked. Basis curved, 7.9 times as long as broad, naked. Ischium with ventral seta. Merus 0.3 times as long as basis, with ventrodistal spine. Carpus about as long as merus, distally with two setules, one short and one long spines. Propodus 1.3 times as long as carpus, with subdistal seta and ventrodistal spine. Dactylus plus unguis 1.4 times as long as propodus, unguis 1.3 times as long as dactylus.

Pereopods 2–3 (Fig. 10C, D) similar to pereopod 1, but basis not curved.

Pereopod 4 (Fig. 10E) coxa naked. Basis 4.6 times as long as broad, naked. Ischium naked. Merus 0.4 times as long as broad, with pair of ventrodistal serrulate spines. Carpus 1.1 times as long as merus, with three ventrodistal

serrulate spines and one dorsodistal seta. Propodus 1.1 times as long as carpus, with two ventrodistal serrulate long spines and one dorsodistal, stout, ventrally serrated spine. Dactylus plus unguis 1.7 times as long as propodus, unguis as long as dactylus.

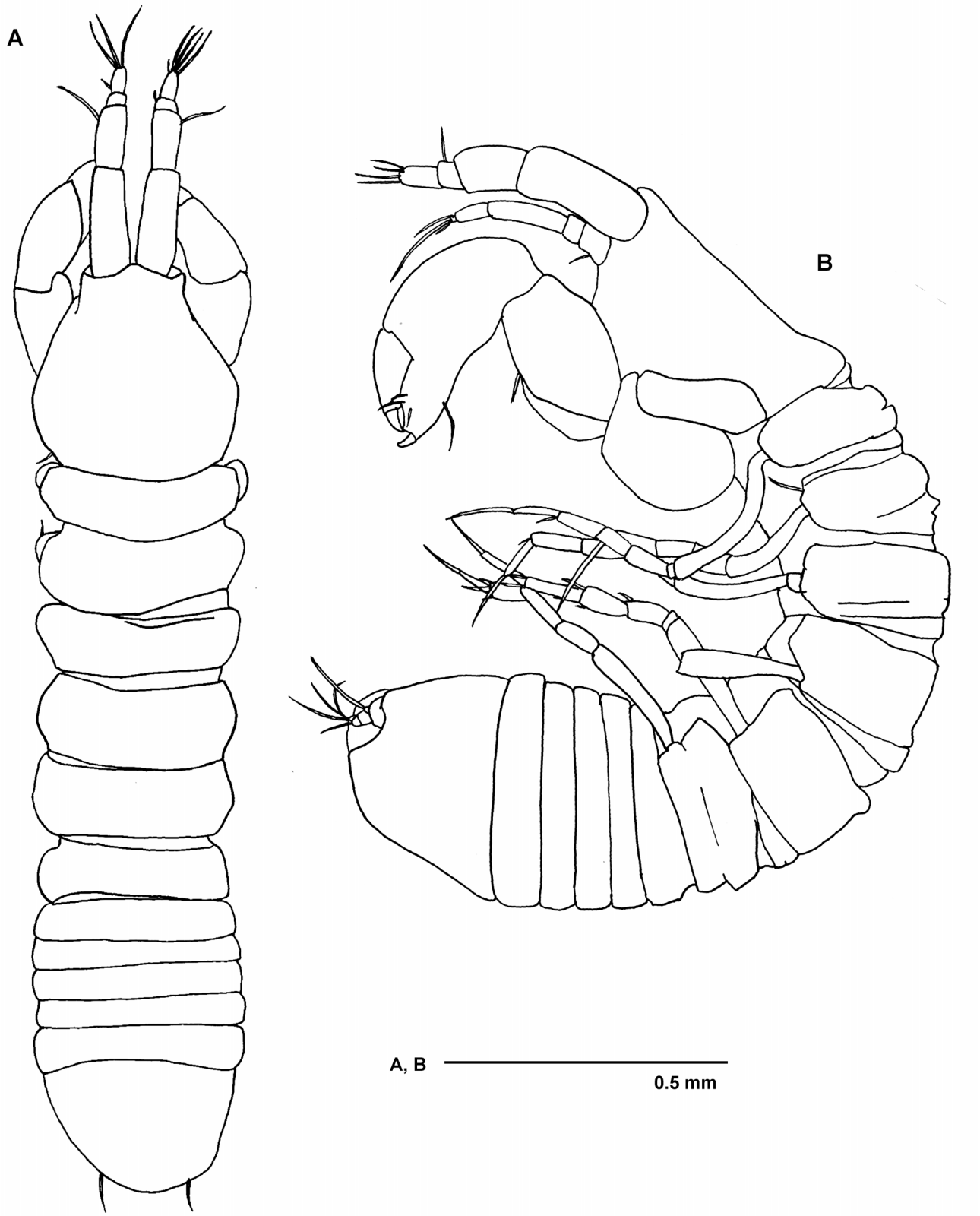

FIGURE 8. *Cetiopyge lemei* **sp. nov.** Female specimen DBUA0002221.01A: A, habitus (dorsal view). Specimen DBUA0002221.01B: B, habitus (lateral view).

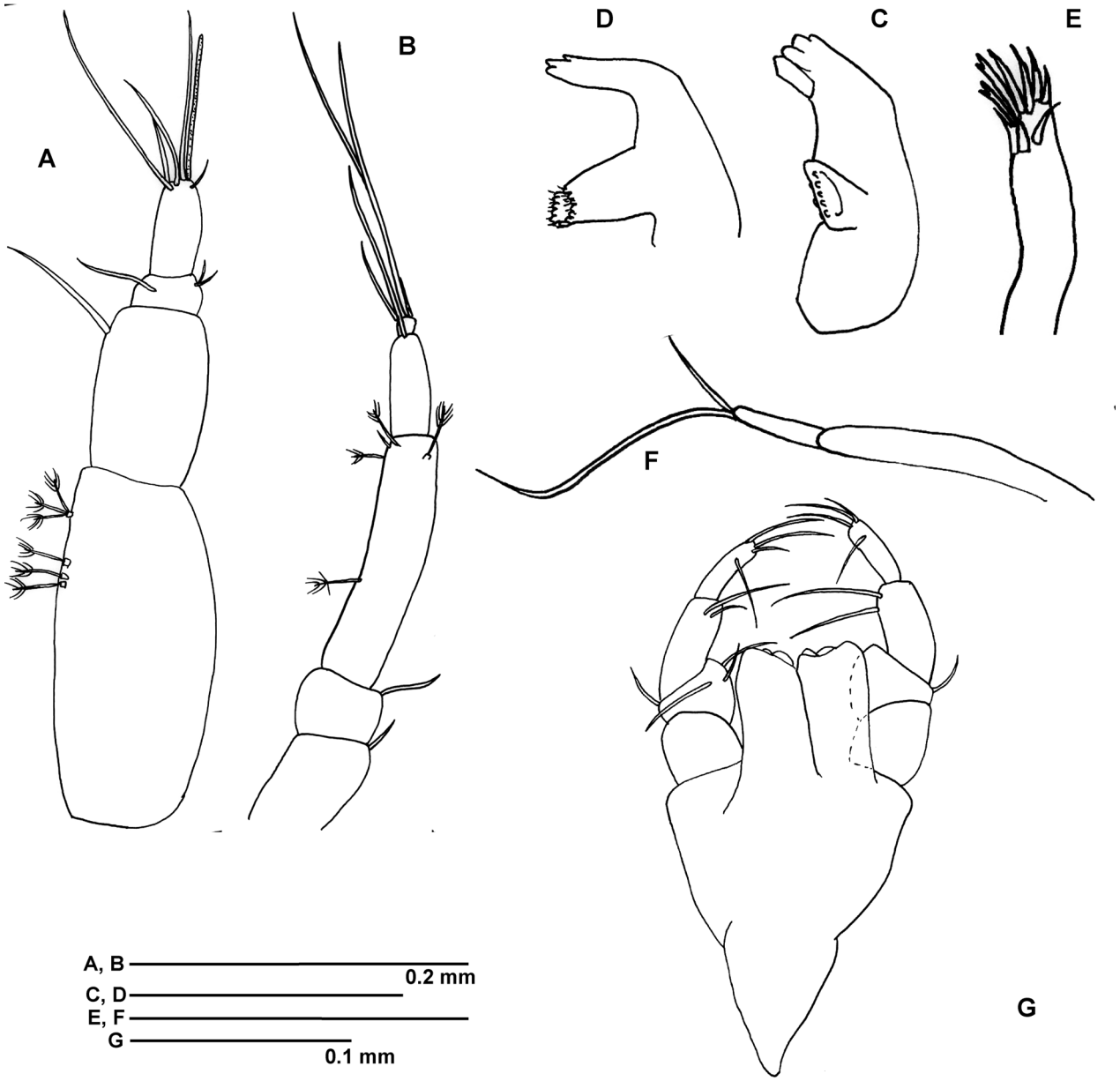

FIGURE 9. *Cetiopyge lemei* **sp. nov.** Female specimen DBUA0002221.01B: A, antennule; B, antenna; G, maxilliped. Specimen DBUAXXXX: C, left mandible; D, right mandible; E, maxillule endite; F, maxillule palp.

Pereopod 5 (Fig. 10F) similar to pereopod 4, but propodus with one dorsodistal long seta instead of stout serrated spine.

Pereopod 6 (Fig. 10G) similar to pereopod 4, dactylus with one distal setule.

Uropods (Fig. 10H) short, not protruding apex of pleotelson. Protopod as long as first endopod segment, naked. Endopod first segment about as long as broad, naked; second segment 0.5 times as long as first, with one penicillate and three simple setae, one of which longer than total length of uropod. Exopod minute, 0.5 times as long as first endopodal segment, with one long simple seta.

Remarks. *Cetiopyge lemei* **sp. nov.** is included within the genus because of the presence of several diagnostic characters, namely the pleon and pleotelson compressed laterally, the presence of bifurcate spines on the maxillule, absence of pleopods on the female, and short uropods with minute exopodite and endopodite second article.

The species described herein is different from the type species, *Cetiopyge mira,* in the following features: cephalothorax as long as three first pereonites combined instead of two; mandible pars incisiva with three lobes; maxillule endite with nine spines instead of eight; maxilliped endite with two cusps, palp article 2 with two simple setae instead of three, article 4 with three distal setae instead of four; chela twice as long as broad and longer than

carpus, fixed finger with proximal invagination, dactylus shorter than fixed finger, naked, with medioventral tooth; all pereopods meri and carpi distinctively more slender; pereopods 1–3 propodus without serrulate dorsal spine, but with one subdistal seta.

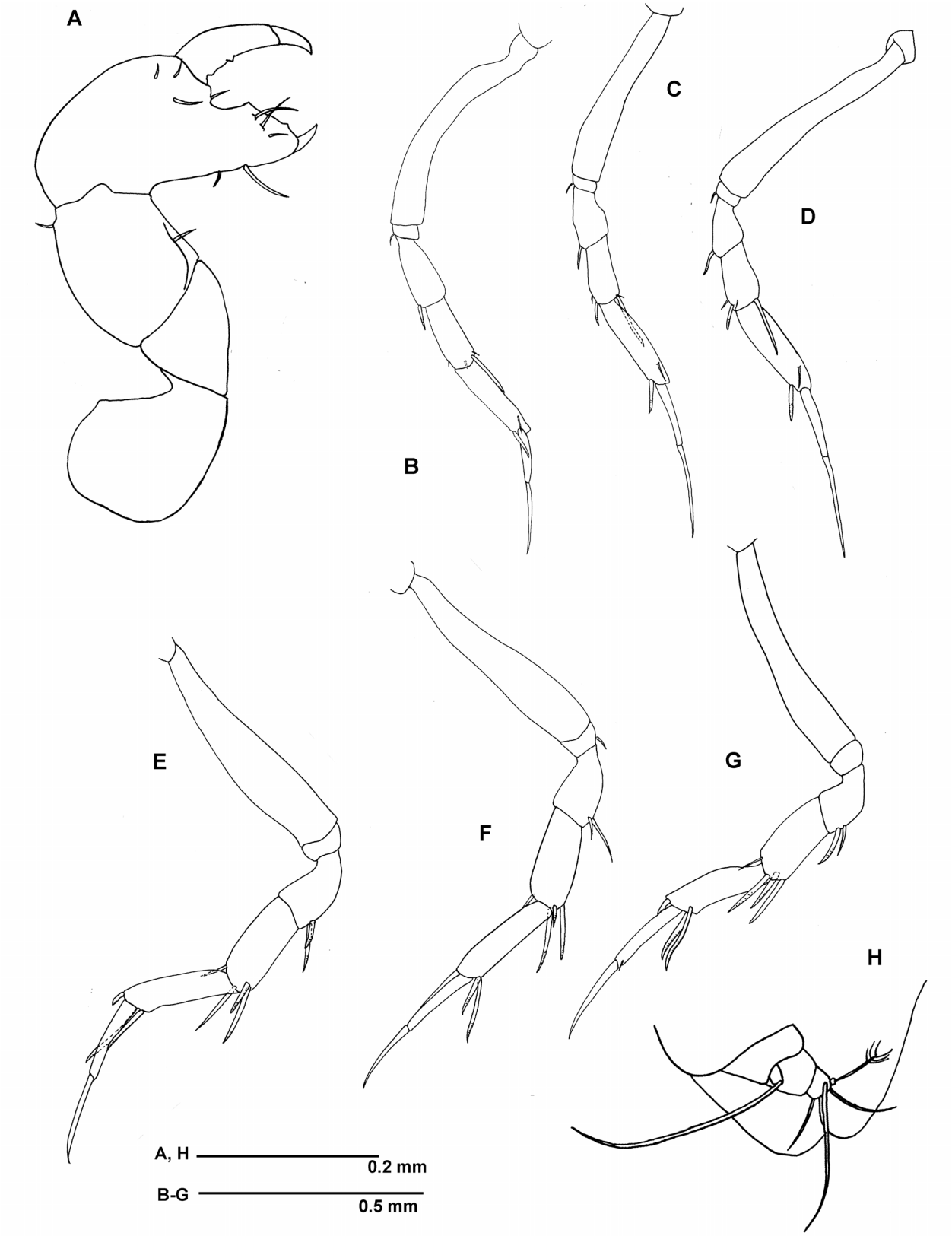

FIGURE 10. *Cetiopyge lemei* **sp. nov.** Female specimen DBUA0002221.01B: A, cheliped; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pereopod 6; H, uropod.

Distribution and ecology. This species was found in mud breccia and overlaying hemipelagic sediments collected mostly from active sites of mud volcanoes sitting on the deep-reaching SWIM fault (Capitain Arutyunov, Abzu and Ivanov MVs) at depths between 1320 and 4550 m.

Family Nototanaidae (Sieg, 1973 M.S.) (Sieg, 1976)

Genus *Gamboa* Bamber, 2012

Diagnosis (modified after Bamber 2012). Body glabrous, about ten times as long as wide. Eyelobes fused to carapace, with visual elements. Labrum setulose. Right mandible pars incisiva with crenulate distal margin and bilobed inner-distal corner; pars molaris stout, armed with teeth. Maxillule endite bent almost at a right-angle; maxilliped endites with setae but no distal tubercles. Cheliped with one single ventral seta on merus, carpus not produced. Coxae of all pereopods with one seta, without apophysis. Pereopods 4–6 without prickly tubercles, with distal spines on merus, carpus and propodus. Pleopods absent in female. Exopod of uropod shorter than endopod.
Remarks. *Gamboa*, described from Cape Verde Islands, Macaronesia, is the only genus of the family Nototanaidae with females lacking pleopods, a character which has been attributed to an interstitial mode of life (Bamber 2012). Other character reductions, such as the presence of three spines on pereopods 4–6 carpus (four in other nototanaids), and the scarcity of setae on pereopods 1–3, have been seen as apomorphic characters related to the small size (Bird 2012), as they are only present on the smallest representatives within the Nototanaidae (i.e., *Stachyops* Bird, 2012 and *Gamboa*).

This is the first record of this monotypic genus since its description, and the diagnosis is herein modified to accommodate the newly described species (see remarks on the species below).

Gamboa henrieti sp. nov.

(Figs 11–13)

Material examined. Holotype—♀ with marsupium (MNCN 20.04/11448), Cruise 64PE268, station 64PE268_24, NIOZ boxcore, 06.05.2007, GoC, carbonate and coral mounds, Mound B, 35°17.732'N, 06°43.886'W, 495 m, silty clay with carbonate debris.

Paratypes—two neuters (DBUA0002223.01), same data as holotype. All coll. CFR.

Further material—**Gulf of Cadiz—Carbonate and coral mounds**. **Mound B:** station 64PE268_13B, NIOZ boxcore, 03.05.2007, 35°18.010' N, 06°44.493' W, 493 m, one ♀ with marsupium, dissected; two neuters (DBUA0002223.02), coll. CFR.

Etymology. In honour of Jean-Pierre Henriet (1945-2017), distinguished Belgian marine geologist and great enthusiast of cold water coral and carbonate mound research in the Gulf of Cadiz.

Diagnosis. Body 7.5 times as long as broad. Cephalothorax as long as broad, rostrum rounded, eyelobes present, with vestigial ommatidia. Pereonites 1 and 6 broader than long, pereonites 2–5 about as long as broad. Antennule longer than cephalothorax. Maxilliped endites with three setae. Cheliped carpus and propodus with two ventral setae each. Female chela fixed finger longer than palm. Ischia of all pereopods with setae, unguis not bifurcate.

Description of female with marsupium DBUA0002223.02. *Body* (Fig. 11A, B) 7.5 times as long as broad, length 1.2 mm. *Cephalothorax* as long as broad, rostrum rounded, eyelobes present, with vestigial ommatidia. *Pereonite 1* 2.3 times as broad as long; pereonites 2–5 about as long as broad; pereonite 6 0.8 times as long as broad. *Pleon* narrower than pereon, pleonites alike, demarcated by a faint line. *Pleotelson* as long as four pleonites.

Antennule (Fig. 11C) longer than cephalothorax. Article 1 3.3 times as long as broad, inner margin with one simple and one penicillate medial setae, and one simple and one penicillate distal setae. Outer margin with one distal seta. Article 2 0.2 times as long as article 1, 1.3 times as long as broad, with one inner distal seta. Article 3 2.1 times as long as article 2, 5.7 times as long as broad, with four distal setae and one aesthetasc.

Antenna (Fig. 11D) article 1 as long as broad, naked. Article 2 2.4 times as long as broad, with one dorsodistal seta. Article 3 0.7 times as long as article 2, 1.1 times as long as broad, with one dorsodistal seta. Article 4 3.5 times

as long as article 3, 5.2 times as long as broad, with five distal setae. Article 5 0.3 times as long as article 4, 2.6 times as long as broad, with two distal setae. Article 6 minute, with four distal setae.

Mouthparts. Labrum (Fig. 12A) rhomboidal, clypeus distinct, with setae. *Left mandible* (Fig. 12B) pars incisiva with four cusps, lacinia mobilis crenulated; pars molaris armed with teeth. *Right mandible* (Fig. 12C) pars incisiva crenulated, with two terminal cusps, without lacinia mobilis, pars molaris as in left mandible. *Labium* not recovered. *Maxillule* (Fig. 12D) endite bent almost at a right-angle, with seven terminal spines. *Maxilla* (Fig. 12E) rectangular.

Maxilliped endite (Fig. 12G) with three setae; palp (Fig. 12F) article 1 with one inner seta; article 2 with one outer seta and three inner serrulate setae; article 3 with three inner pinnate setae; article 4 with three distal and one subdistal pinnate setae.

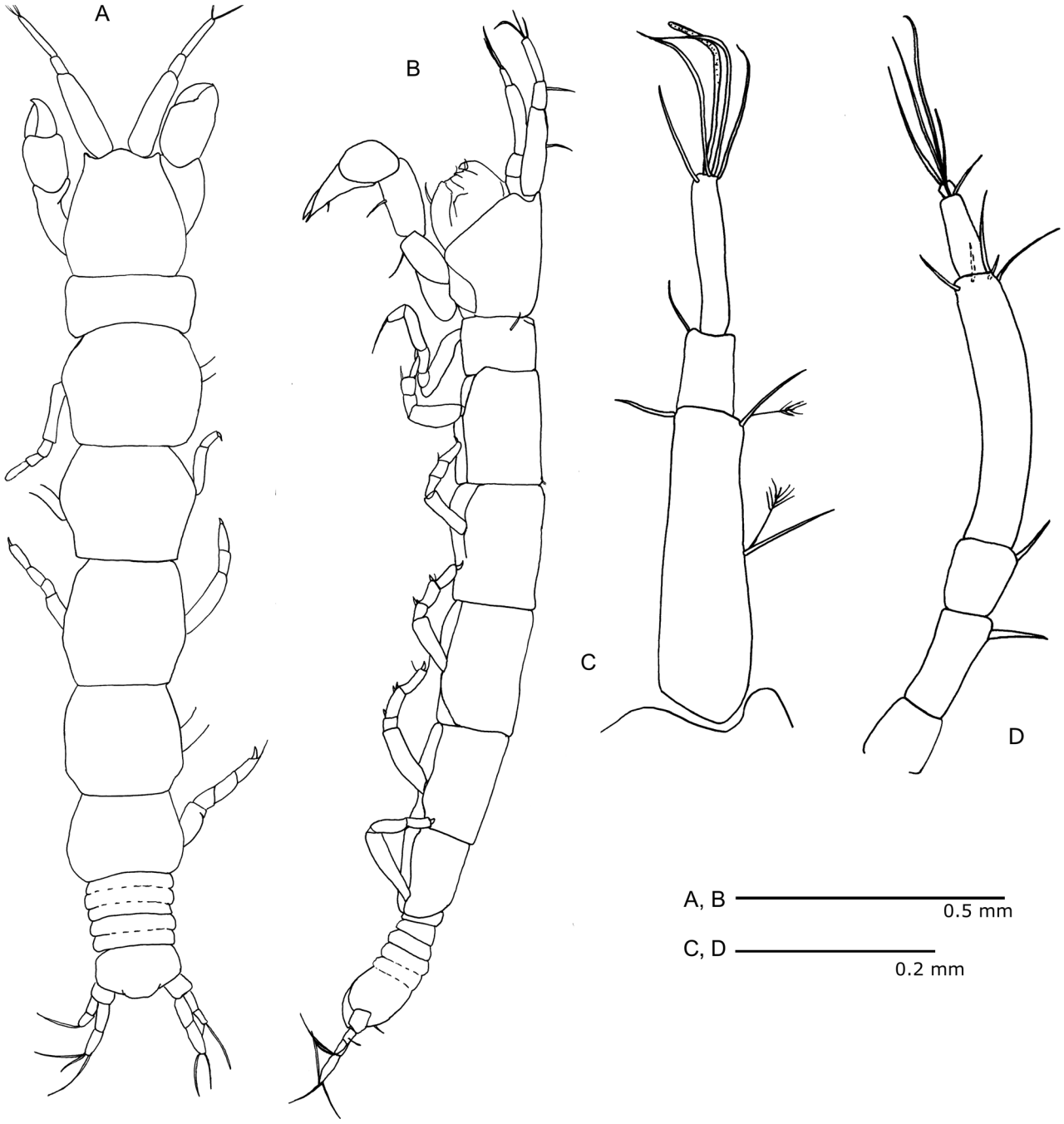

FIGURE 11. *Gamboa henrieti* **sp. nov.** Female specimen DBUA0002223.02A: A, habitus (dorsal view); B, habitus (lateral view); C, antennule; D, antenna.

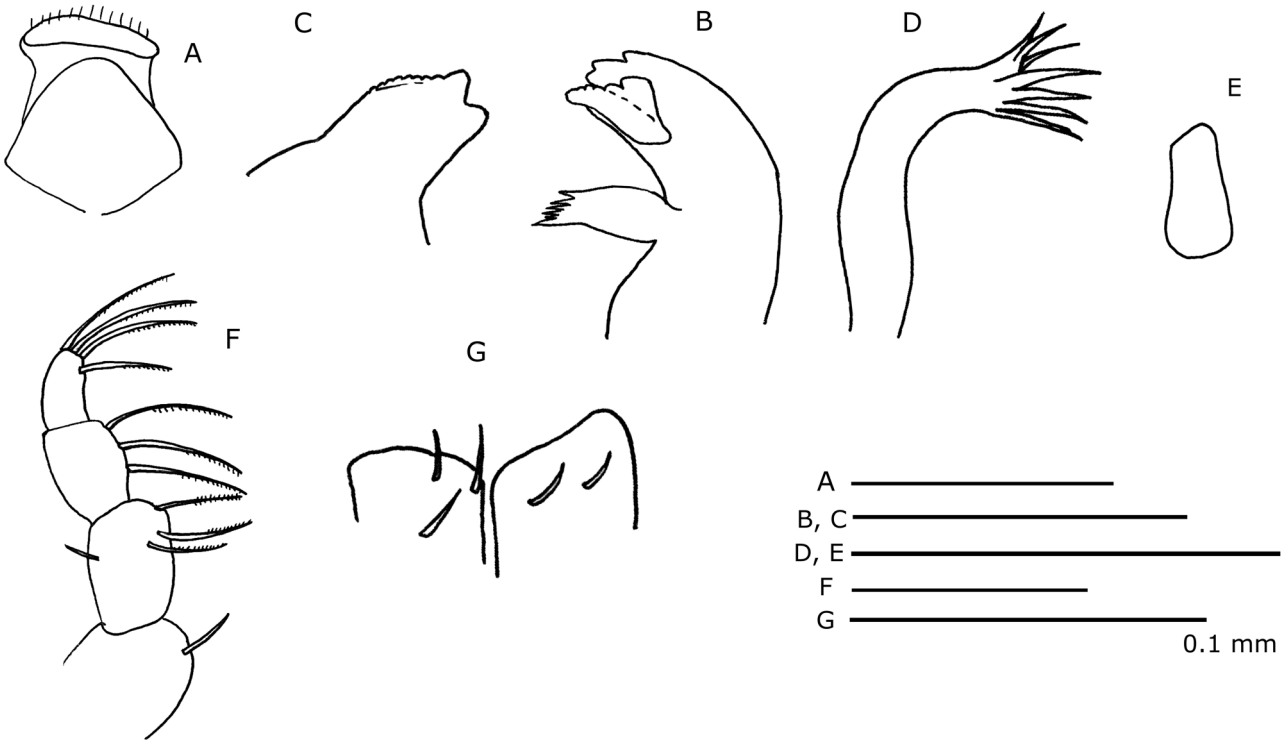

FIGURE 12. *Gamboa henrieti* **sp. nov.** Female specimen DBUA0002223.02B: A, labrum; B, left mandible; C, right mandible; D, maxillule; E, maxilla; F, maxilliped palp; G, maxilliped endite.

Cheliped (Fig. 13A, C) attached via elongated sclerite. Basis 1.7 times as long as broad, naked. Merus with one seta. Carpus 2.2 times as long as broad, with two ventral setae. Propodus twice as long as broad, 1.2 times as long as carpus, with two ventral setae, three setae near cutting edge, and inner row of three setae near insertion with dactylus. Dactylus with one inner proximal seta; unguis with one outer seta.

Pereopod 1 (Fig. 13D) coxa with seta. Basis slightly curved, 4.4 times as long as broad, naked. Ischium with one ventral seta. Merus 0.3 times as long as broad, naked. Carpus as long as merus, with one ventrodistal seta. Propodus 2.2 times as long as carpus, with one subdistal ventral seta. Dactylus and unguis fused, together about as long as propodus.

Pereopods 2–3 (Fig. 13E) coxa with one seta. Basis 4.2 times as long as broad, with one mediodorsal seta. Ischium with two ventral setae. Merus 0.3 times as long as basis, 1.1 times as long as broad, with two ventrodistal spines. Carpus 1.2 times as long as merus, 1.5 times as long as broad, with one dorsodistal and two unequal ventrodistal spines. Propodus 1.5 times as long as carpus, 2.5 times as long as broad, with ventral subdistal spine. Dactylus and unguis fused to claw.

Pereopods 4–5 (Fig. 13F) basis 3.1 times as long as broad, with one medioventral penicillate seta. Ischium with two ventral setae. Merus 1.2 times as long as broad, with two ventrodistal spines. Carpus 1.9 times as long as broad, with three ventrodistal spines and one dorsodistal seta. Propodus 1.3 times as long as carpus, 3.0 times as long as broad, ventrodistal margin with two spines and one seta, dorsodistal corner with one seta.

Pereopod 6 (Fig. 13G) basis 2.7 times as long as broad, naked. Ischium with two ventral setae. Merus 0.3 times as long as basis, 1.1 times as long as broad, with two ventrodistal spines. Carpus 1.1 times as long as merus, 1.2 times as long as broad, with three ventrodistal spines and one dorsodistal seta. Propodus 1.3 times as long as carpus, 2.7 times as long as broad, with two ventrodistal spines and one dorsodistal setae.

Pleopods absent.

Uropod (Fig. 13H) protopod about as long as broad, naked. Exopod first segment 2.5 times as long as broad, with one distal seta; second segment 1.3 times as long as first, with two distal setae. Endopod 1.6 times as long as exopod; first segment 3.2 times as long as broad; second segment as long as first, with five distal setae.

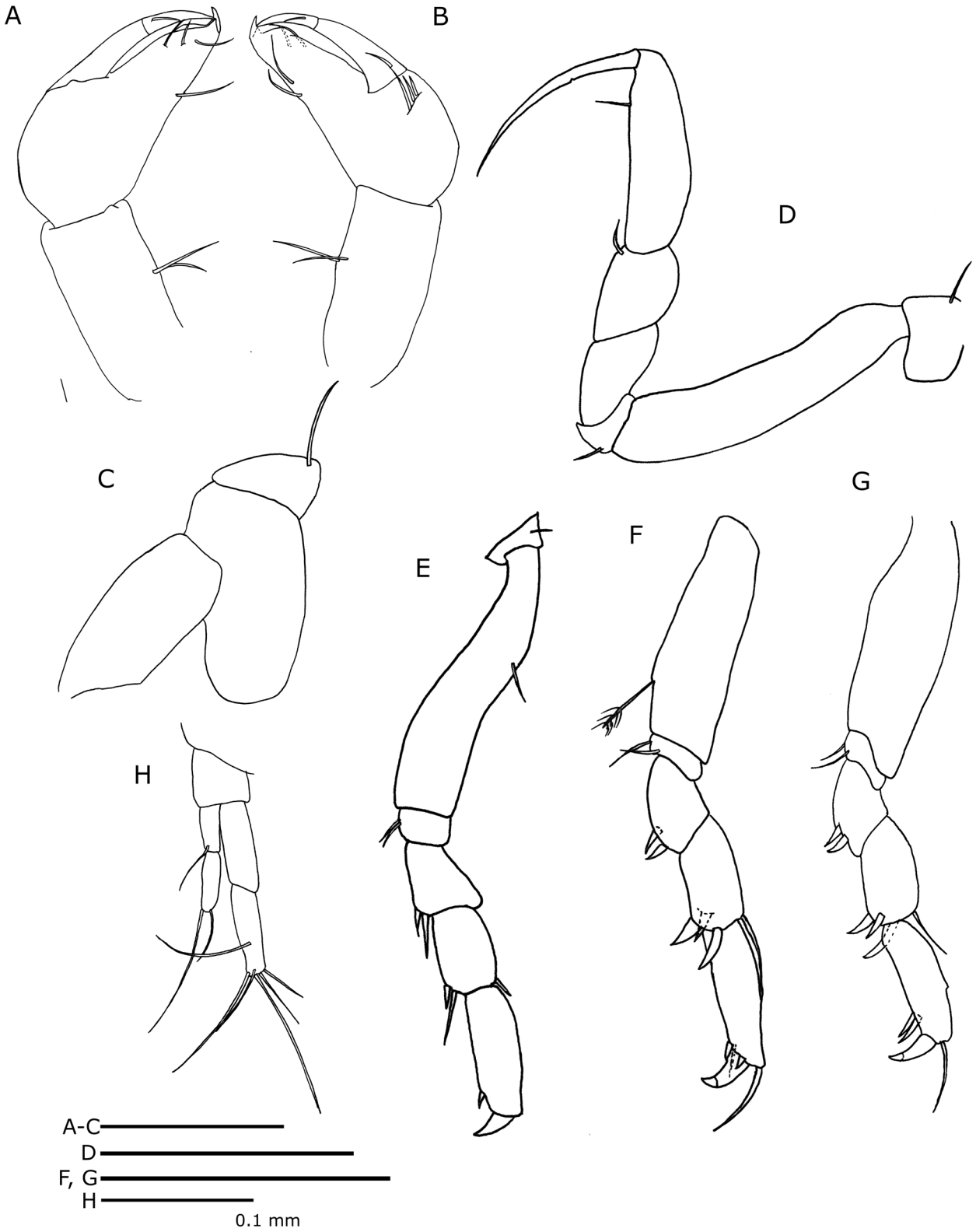

FIGURE 13. *Gamboa henrieti* **sp. nov.** Female specimen DBUA0002223.02B: A, cheliped carpus and chela, outer view; B, cheliped carpus and chela, inner view; C, cheliped basis, merus and sclerite; D, pereopod 1; E, pereopod 2; E, pereopod 3; F, pereopod 4; G, pereopod 6; H, uropod.

Remarks. This species differs from the diagnosis of *Gamboa* given by Bamber (2012) because of the presence of a first pereonite shorter than pereonites 2 and 3, the antennule longer than cephalothorax, the cheliped with two setae on carpus and propodus (instead of one), the fixed finger of chela not shorter than palm, the bases and ischia of pereonites not naked, and the unguis of pereonites 4–6 not bifurcated. Nevertheless, the absence of pleonites is a character unique of *Gamboa* amongst the Nototanaidae, as it is the combination of the following characters: eye lobes fused to the carapace, maxilliped basis without setae, endites with setae but no distal tubercles, coxae with setae and without apophyses, pereopods 4–6 merus, carpus and propodus with spines and without prickly tubercles, and uropods with endopod longer than exopod. Consequently, the species described here is included in *Gamboa* and the diagnosis emended above in order to accommodate both *Gamboa darwini* Bamber, 2012 and *Gamboa henrieti* **sp. nov.**

In addition to the characters mentioned above that were initially included in the generic diagnosis, the type species *Gamboa darwini* differs from *Gamboa henrieti* in having a cephalothorax longer than broad, maxilliped endite with two setae, pereopod 1 propodus with two dorsal setae, pereopods 2 and 3 merus and carpus with one ventral seta only and propodus with one dorsal seta.

Distribution and ecology. This species was found exclusively in fine sediments with coarse materials from a fossil cold-water coral and carbonate mound (Mound B) at the El Arraiche field (Moroccan margin).

Identification key to the genera of Nototanaidae

1(0). Pleonites with epimeral setae . . . 2
- Pleonites without epimeral setae . . . 5
2(1). Pereopods 4–5 propodus dorsodistal spine long (longer than dactylus and unguis together). Male cheliped dactylus not twisted . . . 3
- Pereopods 4–5 propodus dorsodistal spine short (shorter than dactylus and unguis together). Male cheliped dactylus twisted . . . 4
3(2). Maxilliped basis seta short; endite tubercles absent. Pereopods 4–6 dactylus falciform . . . ***Paranesotanais*** **Larsen & Shimomura**
- Maxilliped basis seta long; endite tubercles present. Pereopods 4–6 dactylus claw-shaped . . . ***Nesotanais*** **Shiino**
4(2). Eyelobes fused with cephalothorax. Pereopods 4–6 carpus with four spines. Pereopod 6 propodus with four or more distal spines. . . . ***Nototanoides*** **Sieg & Heard**
- Eyelobes not fused with cephalothorax. Pereopods 4–6 carpus with three spines. Pereopod 6 propodus with three distal spines . . . ***Stachyops***
5(1). Pereopods 2–3 dactylus simple. Maxilliped endite without tubercles. Pereopods 4–6 dactylus falciform . . . 6
- Pereopods 2–3 dactylus with accessory spiniform apophysis. Maxilliped endite with tubercles. Pereopods 4–6 dactylus claw-shaped . . . ***Nototanais*** **Richardson**
6(5). Maxilliped basis with setae. Pereopods 4–6 carpus with four spines. Pereopod 6 propodus with four distal spines or more . . . ***Birdotanais*** **Kakui & Angsupanich**
- Maxilliped basis without setae. Pereopods 4–6 carpus with three spines. Pereopod 6 propodus with two distal spines . . . ***Gamboa***

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