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Apseudomorph tanaidaceans (Crustacea: Peracarida) from mud-volcanoes in the Gulf of Cadiz (North-east Atlantic)

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Abstract

Faunal collections from mud-volcano sites in the Gulf of Cadiz, at depths between 355 and 3061 m, have revealed a high diversity (and in some cases high density) of tanaidaceans. A previous paper has described some of the tanaidomorph species found. Records of apseudomorph species from deep-sea chemosynthetic habitats are almost non-existent. The present study reports on seven apseudomorph species from five different genera from this material; two of the species, one in each of the genera *Sphyrapus* and *Pseudosphyrapus* are new to science, although there was insufficient material available to describe fully the *Pseudosphyrapus* species. Two of the other species are reported herein for only the second time. A neotype is erected for *Apseudes setiferus* Băcescu, and a lectotype for *Sphyrapus malleolus* Norman & Stebbing; these two, plus *Atlantapseudes nigrifrons* Băcescu and *Fageapseudes retusifrons* Richardson are redescribed. The habitus of *Apseudes grossimanus* is figured. None of the taxa appear to show any morphological features specifically adapted to the peculiar habitat around mud-volcanoes. The genus *Collossella* is relegated to the synonymy of *Fageapseudes*. The non-chemosynthetic-habitat-associated species *Apseudes coriolis* is moved to *Taraxapseudes*.

Key words: mud volcanoes, Gulf of Cadiz, deep-sea, *Apseudes*, *Atlantapseudes*, *Fageapseudes*, *Pseudosphyrapus*, *Sphyrapus*

Introduction

There are a number of chemically-reducing environments on the seabed, associated with, for example, hydrothermal vents, methane seeps and mud volcanoes. Particularly in the deep sea, these habitats generally support communities based on chemosynthetic energy-input, which include unusual, specialized and often endemic benthic invertebrate taxa (e.g. Gage & Tyler 1991).

Studies of Tanaidacea from these habitats have only occurred in the last two decades, and were reviewed by Błażewicz-Paszkowycz *et al*. (2011). These authors described a number of species of tanaidomorph tanaidacean from mud volcanoes in the Gulf of Cadiz, collected at depths between 355 and 3061 m during the TTR Cruises in 2001 to 2005 on board the R/V *Prof. Logachev.* The material had revealed a high diversity (and in some cases high density) of tanaidaceans. The present paper describes some of the apseudomorphan tanaidacean species from those cruises.

Records of apseudomorph species from deep-sea chemosynthetic habitats are almost non-existent. The present study reports on seven apseudomorph species from five different genera from this material; two of the species, one in each of the genera *Sphyrapus* and *Pseudosphyrapus* are new to science, although there is insufficient material available to describe fully the *Pseudosphyrapus* species. Two of the other species are reported herein for only the second time. New type-material (neotype and lectotype) of two of the previously-described species are erected. Redescriptions of these taxa are presented.

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The Gulf of Cadiz (GoC) lies to the northwest of the Straits of Gibraltar, at the conjunction of the Mediterranean inflow/outflow, warmer waters which are rich in organic nutrients, and the more oligotrophic, colder cross-Atlantic zonal jet from the west. This combination of water circulation (for potential dispersal), trophic input and chemically-reduced habitat will determine the benthic communities of this region. Recent exploration of the seabed in this region has discovered an extensive area of mud volcanoes and submarine vents, a result of the pressure generated by the collision between the African and the European plates leading to tectonic structures including thrust faults, extensional faults, strike-slip faults and diapirs. Studies have found it to be an area of rich biodiversity (e.g. Pinheiro *et al.* 2003; Dworschak & Cunha 2007; Moura *et al.* 2008; Vanreusel *et al.* 2009; Hilário *et al*. 2010; Błażewicz-Paszkowycz *et al*. 2011). The specific benthic habitats around the mud volcanoes in the Gulf of Cadiz were discussed by Błażewicz-Paszkowycz *et al*. (2011) and Rodrigues *et al.* (2011).

Methods

The sampling methods are described in Błażewicz-Paszkowycz *et al*. (2011).

Morphological terminology is as in Błażewicz-Paszkowycz and Bamber (2007). Measurements are made axially, dorsally on the body and antennae, laterally on other appendages. Body length is measured from the tip of the rostrum to posterior of the pleotelson. Type and voucher material has been lodged at the Natural History Museum, London (BMNH).

Systematics

Order Tanaidacea Dana, 1849

Suborder Apseudomorpha Sieg, 1980

Superfamily Apseudoidea Leach, 1814

Family Apseudidae Leach, 1814

Subfamily Apseudinae Leach, 1814

Genus *Apseudes* Leach, 1814

***Apseudes setiferus* Băcescu, 1981**
(Figs 1–4)

Apseudes setiferus Băcescu, 1981: 51–55, fig. 8.

Material examined. 1♀ with oostegites, **neotype** (BMNH.2010.432), 1♂ (BMNH.2010.43), 1♀ with oostegites, 1♂, 2 juveniles (BMNH.2010.434–437), 1♀ with oostegites, dissected, Cruise TTR11, Station AT339, NW of Ibérico, Formosa Ridge, 36°07.765'N, 07°46.461'W, 1086 m depth, carbonate chimneys, geology dredge, 26.08.2001. 1 juvenile (BMNH.2010.438), Cruise TTR15, Station AT575, Mercator mud volcano, 35°17.903'N 06°38.715'W, 355 m depth, mud breccia, boxcore, 26.07.2005. All coll. MRC.

Other GoC records. 3 specimens, Cruise TTR11, Station AT338, Lolita, Formosa Ridge, 36°08.585'N, 08°00.175'W, 1340 m depth, surrounding hemipelagic mud, gravity core, 25.08.2001; 2 specimens, Cruise TTR12, Station AT407, Pen Duick Escarpment, 35°17.695'N, 06°47.082'W, 560 m depth, dead scleractinean framework, TV-grab, 15.07.2002; 1 specimen, Station AT416, TTR mud volcano, 35°21.87'N 06°52.00'W, 695 m depth, mud and corals, TV-grab, 17.07.2002; 3 specimens, Cruise TTR14, Station AT528, Kidd mud volcano, 35°25.304'N 06°43.972'W, 489 m depth, mud breccia and H_2S, TV-grab, 03.08.2004; 7 specimens, Station AT541, Meknès mud volcano, 34°59.103'N 07°04.435'W, 703 m depth, mud breccia and H_2S, TV-grab, 05.08.2004; 2 specimens, Cruise TTR14, Station AT550, West of Gibraltar Straits, 35°42.105'N 06°30.196'W – 35°42.257'N 06°30.000'W, 368–392 m depth,

carbonate chimneys, geology dredge, 07.08.2004; 1 specimen, Cruise TTR14, Station AT551, West of Gibraltar Straits, 35°42.597'N 06°30.505'W – 35°42.769'N 06°30.305'W, 445 – 393 m depth, carbonate chimneys, geology dredge, 07.08.2004; 1 specimen, Cruise TTR14, Station AT565, Pen Duick Escarpment, 35°18.180'N 06°47.656'W, 544 m depth, coral rubble, TV-grab, 09.08.2004; 3 specimens, Cruise TTR15, Station AT586, Meknès mud volcano, 34°59.146'N 07°04.380'W, 701 m depth, mud breccia, TV-grab, 28.07.2005. All coll. MRC.

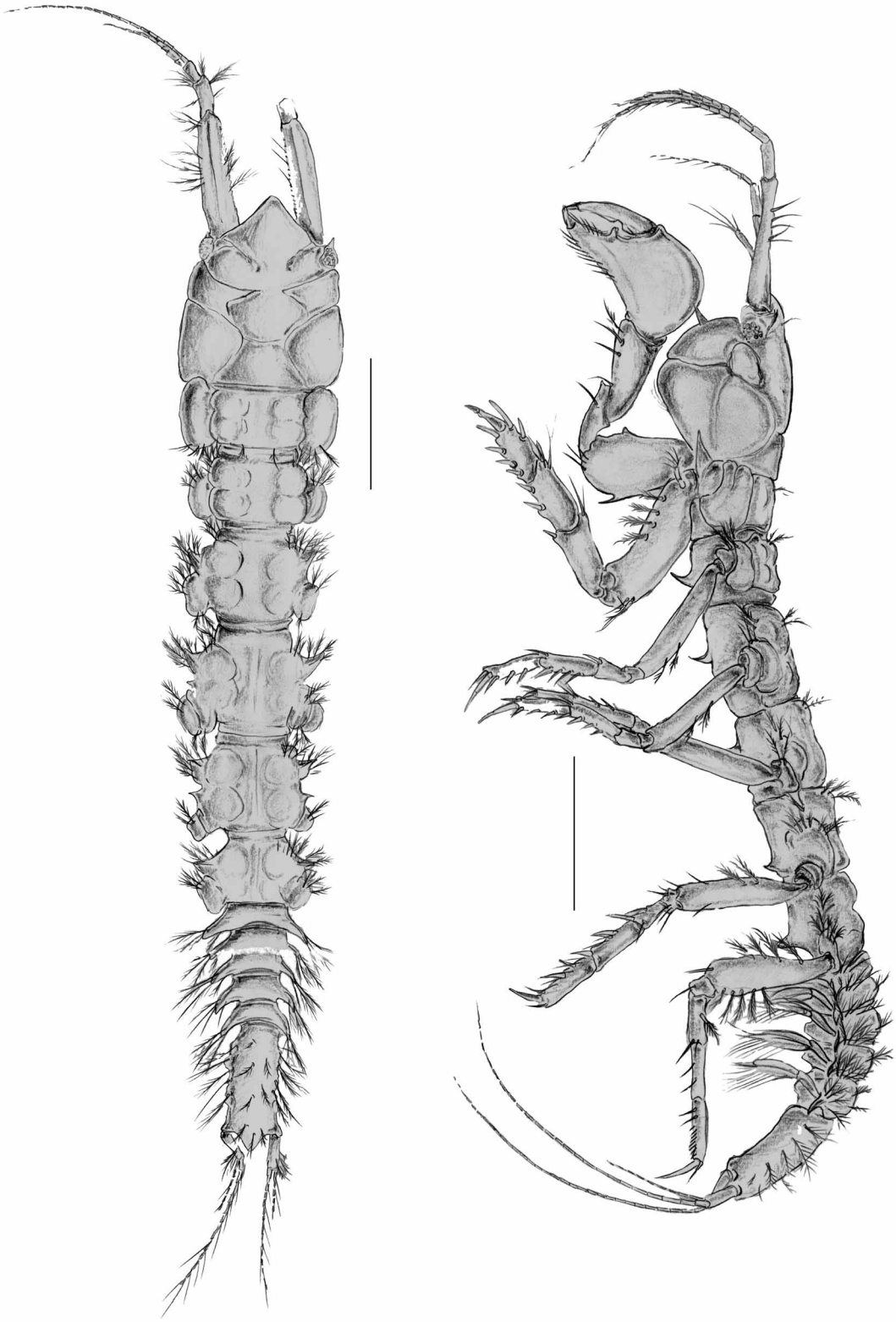

FIGURE 1. *Apseudes setiferus*, A, female, dorsal (tip of rostrum downcurved, so not visible); B, male, lateral. Scale lines = 1 mm.

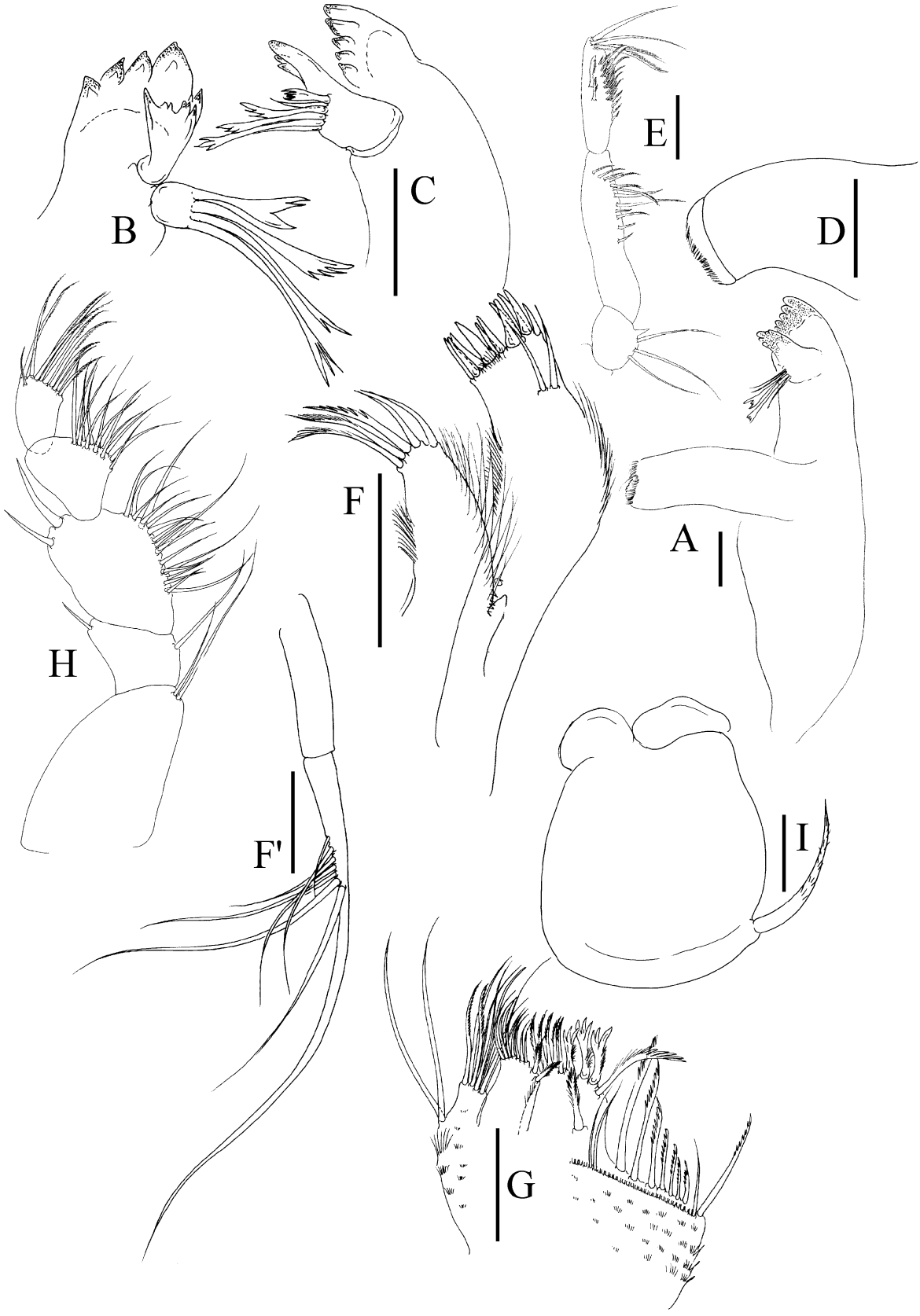

FIGURE 2. *Apseudes setiferus*, A, right mandible; B, distal detail of left mandible; C, distal detail of right mandible; D, mandibular pars molaris; E, mandibular palp; F, maxillule endites and F', maxillule palp; G, maxilla; H, maxilliped; I, epignath. Scale lines = 0.1 mm.

Description of female. *Body* (Fig. 1A), dorsoventrally flattened, elongate, neotype female with oostegites 7.2 mm long, seven times as long as wide, narrower posteriorly. Cephalothorax subrectangular, 1.2 times as long as wide, anterior margin with conspicuous pointed triangular rostrum, point downcurved and commonly not visible dorsally. Eyes absent; eyelobes present with prominent spine-like apophyses directed anteriorly; no lateral spiniform apophyses. Six free pereonites; pereonite 1 shortest, one-third as long as cephalothorax, laterally convex with few posterolateral plumose setae; pereonites 2 to 6 with anterolateral spine-like apophyses bearing tufts of plumose setae extending onto dorsal surface, and expanded posterolaterally at attachment of coxae again with tufts of plumose setae; pereonites 3 to 5 with midlateral invagination; pereonites 2 and 6 subequal in length, about 1.25 times as long as pereonite 1; pereonites 3 and 5 subequal in length, 1.4 times as long as pereonite 1; pereonite 4 longest, 1.75 times as long as pereonite 1 (all pereonites respectively 2.4, 1.7, 1.5, 1.1, 1.3 and 1.5 times as wide as long); ventral hyposphenia present on pereonites 2 to 6. Pleon three times as long as pereonite 6, of five free subequal pleonites bearing pleopods, plus pleotelson; pleonites about four times as wide as long, laterally expanded by spiniform apophyses bearing four or five plumose setae. Pleotelson long and slender, 0.6 times length of whole pleon, 2.5 times as long as wide, with slight lateral expansions at one-third and two-thirds length, distally extended as a triangular process, with sparse dorsal and lateral plumose setae.

Antennule (Fig. 3A) peduncle 4-articled, proximal article elongate, 4.3 times as long as wide, inner margin denticulate, with numerous penicillate setae and fewer simple setae as figured; second article 0.3 times as long as article 1, with numerous penicillate setae and fewer simple setae as figured; third article 0.56 times as long as second, with two inner simple setae; fourth article half as long as third, with two distal setules. Main flagellum of 22 segments, segments 6, 8, 9, 10, 12, 14, 16, 18 and 20 bearing aesthetascs; accessory flagellum of 10 segments.

Antenna (Fig. 3B). Proximal peduncle article 0.43 times as long as second article, with inner triangular apophysis bearing three setae; article 2 inner margin with groups of mesial and distal denticulations, and bearing elongate squama with nine simple marginal setae; peduncle article 3 as long as wide, one-quarter as long as article 2, with inner-distal pointed apophysis and adjacent long seta; article 4 three times as long as article 3, inner margin with simple mid-length seta and paired distal penicillate setae; article 5 three-quarters as long as article 4, inner margin with simple mid-length seta and two distal setae, distally with paired inner and outer penicillate setae. Flagellum of 15 segments.

Mouth parts. Labrum with stout, sharp epistome (e.g. Fig. 1B). Right mandible (Fig. 2A, C) bearing strong, crenulated pars incisiva, setiferous lobe with four trifurcate and one simple setae and incisive extension similar to a lacinia mobilis, pars molaris (Fig. 2D) elongate with finely denticulate distal margins; mandibular palp (Fig. 2E) of three articles, proximal article as long as wide with three inner setae and inner-distal spine-like apophysis, article 2 three times as long as article 1 with group of 12 finely-denticulate setae in distal half; article 3 twice as long as article 1 with 24 inner finely-denticulate setae in four rows and four longer finely-denticulate distal setae. Left mandible (Fig. 2B) as right, but with coarsely denticulate lacinia mobilis. Maxillule (Fig. 2F) inner endite with outer proximal apophysis, finely setose inner and outer margins and three finely setulate and two simple distal setae; outer endite with eleven distal spines and two subdistal setae, inner and outer margins finely setose; palp (Fig. 2F') of two stout articles, distally with eight setae. Maxilla (Fig. 2G) with microtrichial rows on all margins; outer lobe of movable endite with two simple setae on outer margin, distally with two finely-denticulate and six simple setae; inner lobe of movable endite with seven simple and two bilaterally plumose setae; outer lobe of inner endite distally with five outer plumose setae, three trifurcate spines and one inner pinnate seta, and one proximal plumose stout seta; inner lobe of fixed endite with rostral row of 31 setae guarding eight longer distally-denticulate setae. Maxilliped (Fig. 2H) basis with two simple distal setae exceeding distal margin of proximal palp article; palp article 1 with single seta on outer margin and longer simple seta on inner margin; palp article 2 longer than wide, with rows of 17 setae on inner margin, outer margin with two slender distal spines; palp article 3 with 13 simple setae in two rows along expanded inner margin; palp article 4 with ten distally-setulose distal setae and one simple subdistal seta. Endite (not figured) with simple inner caudodistal seta. Epignath (Fig. 2I) large, cup-shaped, with conspicuous inner lobes and finely-setulose distal seta.

Cheliped (Fig. 4A) basis stout, twice as long as wide, dorsally with fine subdistal seta, ventrally with four fine setae in proximal half, stout midventral spine and three distal setae; exopodite present, 3-articled, second article naked, distal article with six plumose setae. Merus elongate, slightly sinuous, narrowing proximally, ventrally with proximal seta and two distal setae surrounding short spine, dorsally with paired distal setae, outer margin with two mesial setae. Carpus three times as long as wide, with seven simple setae in three groups along ventral margin,

smaller dorsodistal seta. Chela palm 1.3 times as long as wide, fingers shorter than palm, ventral margin with twelve setae; twelve setae along cutting edge of fixed finger; cutting edge (Fig. 4A') distally with seven tooth-like spines, proximally with slight inner apophysis bearing tuft of setae; dactylus with three setae but no apophyses on cutting edge, distal claw pointed.

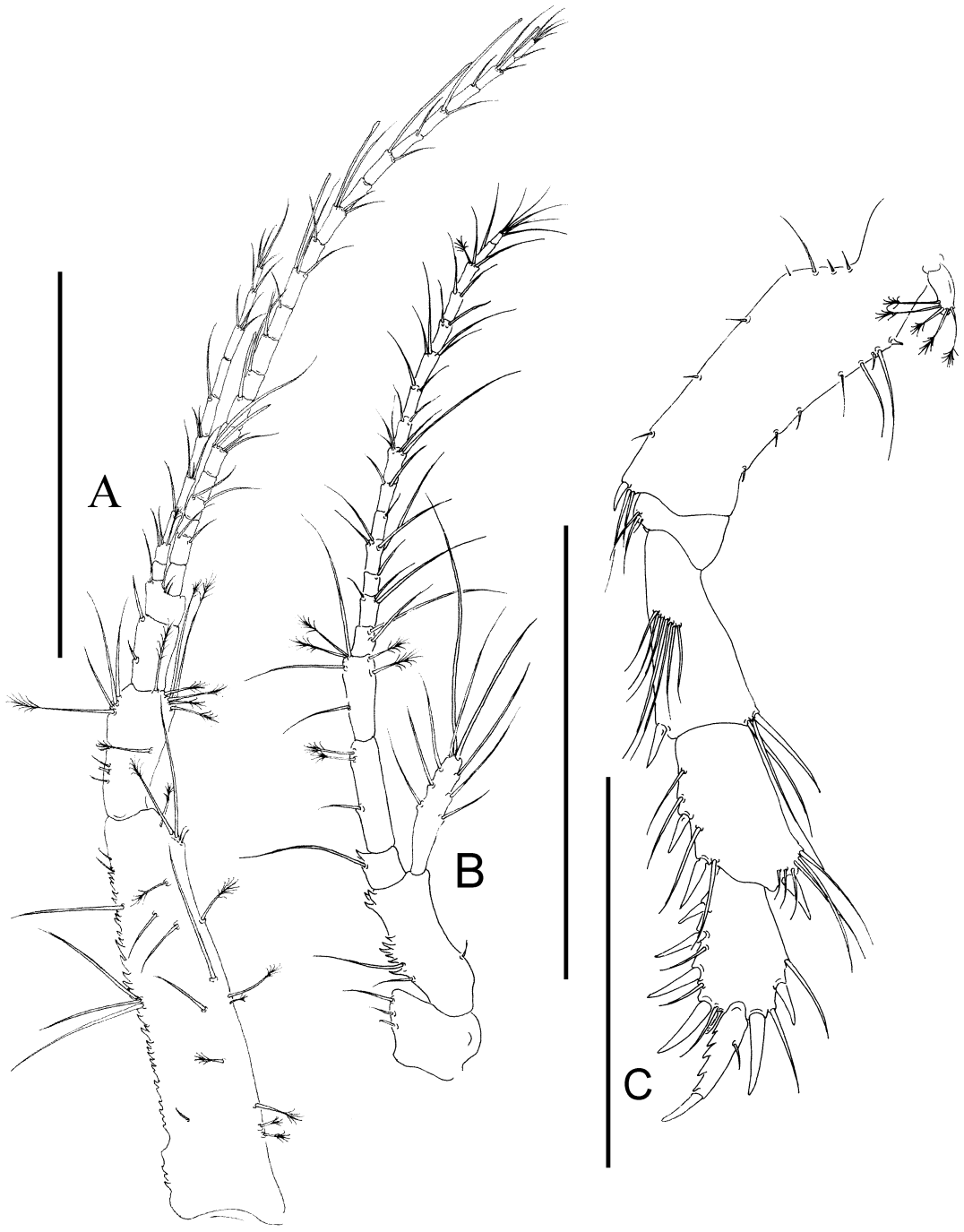

FIGURE 3. *Apseudes setiferus*, A, antennule; B, antenna; C, pereopod 1. Scale lines = 1 mm.

Pereopods: Pereopod 1 (Fig. 3C) coxa with prominent spine-like apophysis (vide Fig. 1B), basis 3.7 times as long as wide, with sparse setae along dorsal and ventral setae, longest proximally, small dorsoproximal spine, ventrodistally with short spine and two setae; exopodite present, 3-articled, article 3 with five distal plumose setae. Ischium with three simple ventrodistal setae. Merus just over half as long as basis, with mesial tuft of seven setae, ventrodistal spine, slender dorsodistal spine and two dorsodistal simple setae. Carpus 0.8 times as long as merus,

with dorsodistal spine in tuft of six setae, ventrally with two spines and four setae. Propodus shorter than merus, with four ventral and two dorsal spines interspersed with setae. Dactylus stout, with three mid-dorsal fine setae and four ventral denticulations; unguis short; both together as long as propodus.

Pereopod 2 (Fig. 4B) more slender than pereopod 1. Basis 5.4 times as long as wide, margins sparsely setose with proximal penicillate setae, three ventrodistal setae. Ischium with two ventrodistal and one dorsodistal setae. Merus 0.8 times as long as carpus, with four ventral setae and ventrodistal spine, three dorsodistal setae. Carpus elongate, with setae along ventral margin and slender ventrodistal spine, tuft of six dorsodistal setae on rounded apophysis. Propodus slightly longer than carpus, with four ventral setae interspersed with three finely-denticulate spines, dorsally with distal finely-denticulate spine and subdistal tuft of five setae. Dactylus slender with two ventral denticulations, unguis slender, 0.4 times as long as dactylus, the two together 0.74 times as long as propodus.

Pereopod 3 (Fig. 4C) similar to pereopod 2, but carpus with mid-ventral rather than ventrodistal spine, propodus with three dorsodistal spines and two short spines on inner face, dactylus with three ventral denticulations.

Pereopod 4 (Fig. 4D) basis 4.9 times as long as wide, with two dorsoproximal penicillate setae, one ventral subdistal penicillate seta and one ventrodistal seta. Ischium with two ventrodistal setae. Merus half as long as carpus, with five ventral setae and shorter mid-ventral and two ventrodistal spines, one dorsodistal seta. Carpus elongate, with four spines along ventral margin in two pairs, five ventrodistal spines, and distal crown of setae. Propodus slightly shorter than carpus, with dorsoproximal penicillate seta, six fine ventral spines, distally with crown of finely setulose and (dorsally) simple setae; dactylus and unguis together 0.4 times as long as propodus.

Pereopod 5 (Fig. 4E) similar to pereopod 3, but propodus with short row of leaf-like spines in distal half.

Pereopod 6 (Fig. 4F) coxa, basis, ischium, merus and carpus with plumose setae as figured; propodus with rows of leaf-like spines along distal half of ventral margin and around distal margin; dactylus and unguis together 0.84 times as long as propodus.

Pleopods (Fig. 4G) all alike. Basis elongate, with three ventral plumose setae. Exopod shorter than endopod; both rami slender, with about 15 marginal plumose setae. Outer proximal seta on exopod separated from remaining setae.

Uropod (Fig. 4H) biramous, both rami filiform, multi-segmented. Basis with six outer and one inner setae distally; exopod less than half as long as endopod, with ten segments; endopod elongate, more than twice as long as pleotelson, with about 33 segments.

Distinctions of male. (Fig. 1B) Generally as female, antennular aesthetascs slightly more numerous, pereonite six with penial tubercle.

Remarks. Băcescu (1981) described this species originally from a single female taken off the Bay of Biscay (47°43.1'N, 08°04.0'W) at 1035–1080 m depth on mud, but that description (and specimen) was somewhat incomplete; the present material has allowed us to describe the species fully, including the male. As the original type-material can no longer be found, we have designated a female from the present material as a neotype.

Slight differences observed between our material and the type description are that Băcescu (1981) shows the sixth pereonite to be twice as long as pereonite 2, while in the present material these two pereonites are subequal in length; the present material also shows more setae on the cheliped, although whether that is a difference in the material or in the attention to detail is unclear.

With the prominent coxa 1 apophysis, row of leaf-like spines on the propodi of pereopods 5 and 6, and denticulate outer margin on the antennular peduncle, *Apseudes setiferus* accords with the restricted diagnosis of *Apseudes* given by Guţu (2006). The present species is morphologically closest to the generotype *A. talpa* (Montagu, 1808) in terms of the proportions of the cephalothorax and pleotelson, conformation of the rostrum, pereonites and pleonites, and the presence of hyposphenia, but has one more ventral propodal spine on pereopod 1, and most notably far more segments in the flagella of the antennule and antenna – *A. talpa* has an antennule with 11 segments in the main flagellum and five in the accessory flagellum, and an antennal flagellum with eight segments, compared with 22, 10 and 15 segments respectively in the new species. *A. talpa* is found in the north-east Atlantic at a depth range of 0 to 33 m on algal-associated and heterogeneous substrata, while *A. setiferus* has now been recorded from depths of 355 to 1340 m, and always from muddy substrata. Unlike *A. talpa*, the present species is not a simultaneous hermaphrodite, specimens with oostegites never having a penial tubercle (and *vice versa*).

The “pseudo-lacinia mobilis” on the right mandible is an unusual feature of *Apseudes setiferus*.

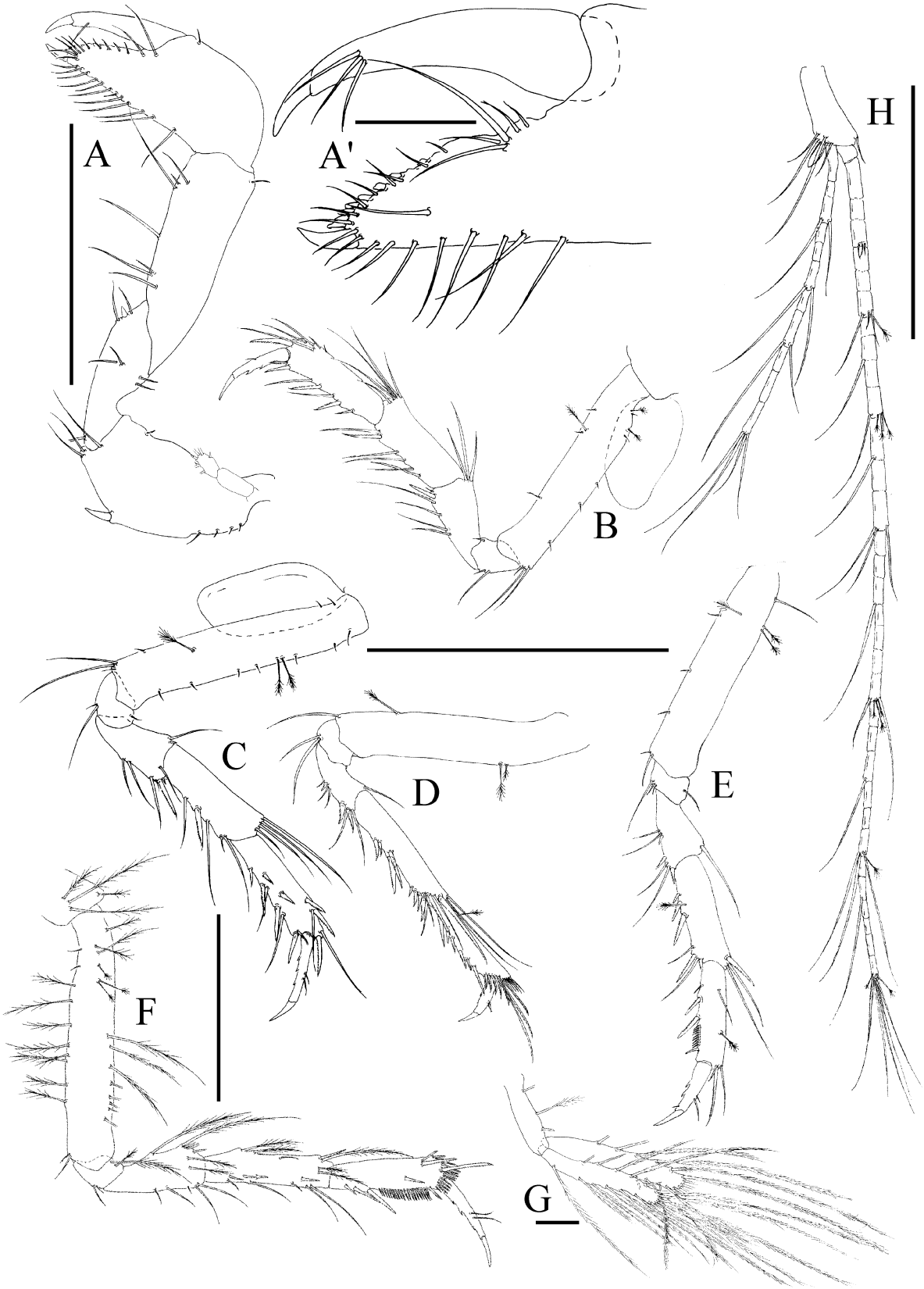

FIGURE 4. *Apseudes setiferus*, female, A, cheliped with A′ detail of chela; B, pereopod 2; C, pereopod 3; D, pereopod 4, E, pereopod 5; F, pereopod 6; G, pleopod; H, uropod. Scale lines = 1 mm for A, B–F, H; 0.1 mm for A', G.

***Apseudes grossimanus* Norman & Stebbing, 1886**
(Fig. 5)

Apseudes grossimanus Norman & Stebbing, 1886: 93–95, pl. 19.

Material examined. 1♂, and fragments of male including chelipeds (BMNH.2010.439),Cruise TTR14, Station AT541, Meknès mud volcano, 34°59.103'N 07°04.435'W, 703 m depth, mud breccia and H_2S, TV-grab, 05.08.2004. Coll. MRC.

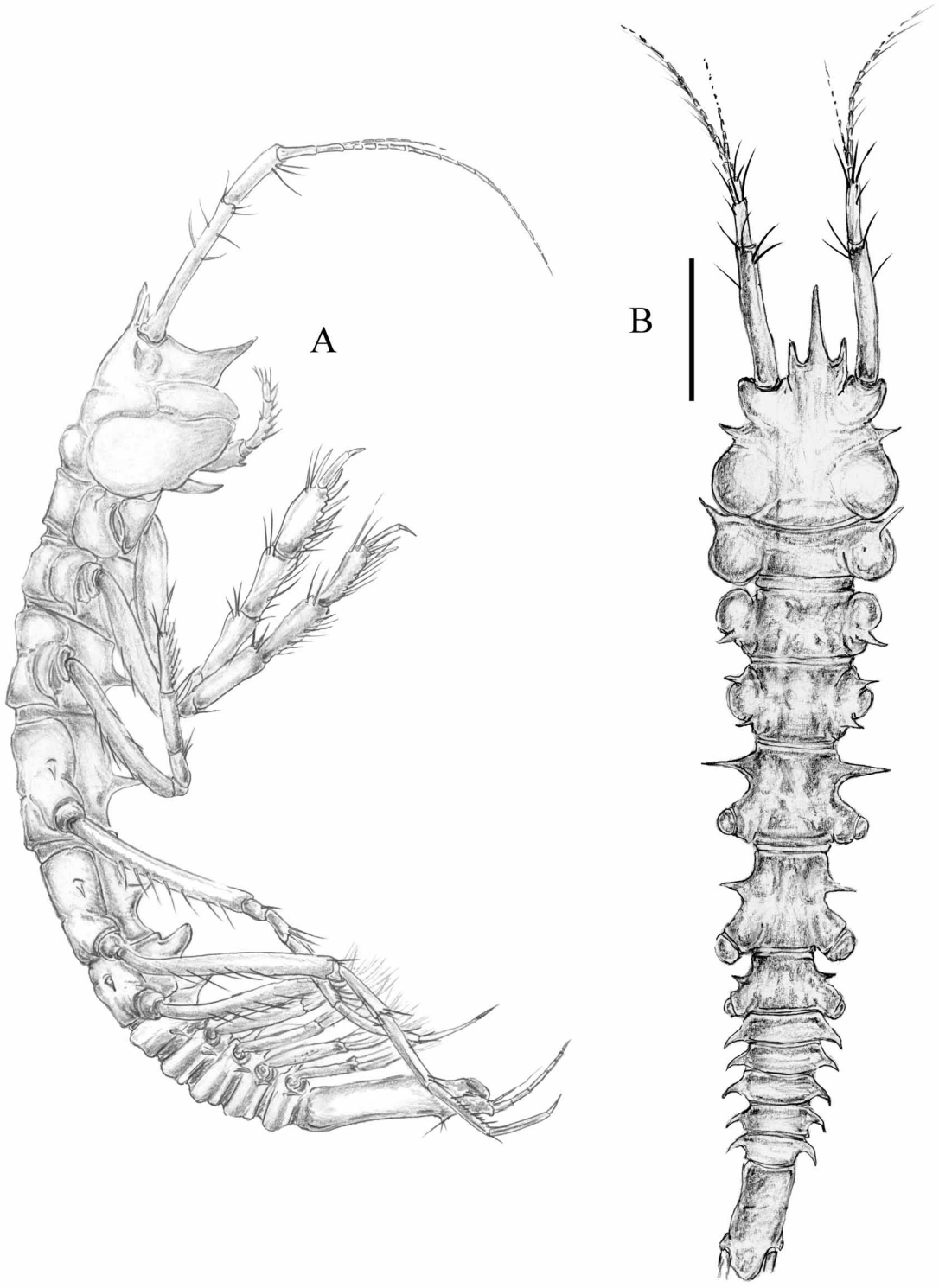

FIGURE 5. *Apseudes grossimanus*, A, lateral (male); B, dorsal (female). Scale line = 1 mm.

Other GoC records. 1 specimen, Cruise TTR12, Station AT416, TTR mud volcano, 35°21.87'N 06°52.00'W, 695 m depth, mud and corals, TV-grab, 17.07.2002; 2 specimens, Cruise TTR14, Station AT524, Yuma mud volcano, 35°24.973'N 07°05.461'W, 960 m depth, marl and mud breccia, TV-grab, 02.08.2004; 3 specimens, Station AT 560, Kidd mud volcano, 35°25.306'N 06°43.976'W, 498 m depth, mud breccia, boxcore, 08.08.2004; 1 specimen, Cruise TTR15, Station AT 581, Meknès mud volcano, 34°59.178'N 07°04.353'W, 700 m depth, mud breccia, TV-grab, 28.07.2005; 2 specimens, Station AT 586, Meknès mud volcano, 34°59.146'N 07°04.380'W, 701 m depth, mud breccia, TV-grab, 28.07.2005; all coll. MRC.

Remarks. This species was figured by both Norman & Stebbing (1886) and Lang (1955, 1968), although neither gave a figure of the habitus from dorsal view (see Fig. 5) (Lang 1955, included a photograph).

Apseudes grossimanus, with its characteristic tridentate rostrum, is the only apseudomorphan species recorded previously from deep-sea chemosynthetic habitats, on the Mid-Atlantic Ridge (Larsen *et al.* 2006); it is otherwise widespread in the north-east Atlantic, to which distribution the present records add nothing new. Records of *A. grossimanus* from off South Africa and in the Mediterranean (see Sieg 1983) must be regarded with some suspicion. Neither this species nor *A. setiferus* (see above) shows any particular morphological adaptation to the conditions found at chemosynthetic habitats.

Genus *Atlantapseudes* Băcescu, 1978(a)

Atlantapseudes nigrichela Băcescu, 1978a

(Figs 6–9)

Atlantapseudes nigrichela Băcescu, 1978a: 317–322: fig. 1.
A. nigrichela. — Santos & Hansknecht, 2007: 38 (key).

Material examined. 1♂ (BMNH.2010.440)**,** 1♀, 3 juveniles, 7 mancae, fragments of another male (BMNH.2010.441–450), Cruise TTR14, Station AT 560, Kidd mud volcano, 35°25.306'N 06°43.976'W, 498 m depth, mud breccia, boxcore, 08.08.2004; 2♀♀, 1♂ subadult (BMNH.2010.451-453), Cruise TTR15, AT 576, Mercator mud volcano, 35°17.657'N 06°39.129'W, 428 m depth, mud, boxcore, 26.07.2005.

Other GoC records. 8 specimens, Cruise TTR12, Station AT395, Aveiro, 35°52.226'N 07°26.282'W, 1094 m depth, marl with clasts, TV-grab, 11.07.2002; 7 specimens, Cruise TTR12, Station AT399, Captain Arutyunov, 35°39.805'N 07°19.997'W, 1339 m depth, crater outer part, mud breccia, TV-grab, 13.07.2002; 1 specimen, Cruise TTR12, Station AT407, Pen Duick Escarpment, 35°17.695'N 06°47.082'W, 560 m depth, dead scleractinean framework, TV-grab, 15.07.2002; 1 specimen and fragments of 1♀, Cruise TTR14, Station AT541, Meknès mud volcano, 34°59.103'N 07°04.435'W, 703 m depth, mud breccia and H_2S, TV-grab, 05.08.2004; 1 specimen, Station AT546, Captain Arutyunov mud volcano, 35°39.692'N 07°20.046'W, 1345 m depth, mud breccia and gas-hydrate, TV-grab, 06.08.2004; 14 specimens, Station AT559, Kidd mud volcano, 35°24.777'N 06°43.782'W, 552 m depth, mud, boxcore, 08.08.2004; 9 specimens, Station AT561, Kidd mud volcano, 35°25.602'N 06°44.099'W, 526 m depth, mud, boxcore, 08.08.2004; 5 specimens, Station AT566, Fiúza mud volcano, 35°15.510'N 06°41.702'W, 414 m depth, mud breccia, TV-grab, 09.08.2004; 1 specimen, Cruise TTR15, Station AT581, Meknès mud volcano, 34°59.178'N 07°04.353'W, 700 m depth, mud breccia, TV-grab, 28.07.2005; 3 specimens, Cruise TTR15, Station AT599, Portimão canyon, 36°06.379'N 07°53.564'W – 36°06.538'N 07°53.942'W, 1418–1275 m depth, carbonate chimneys, Geology dredge, 02.08.2005. All coll. MRC.

Other material examined. 2♀♀ (BMNH.1989.539.2), CENTOB: Calgim CP63, 35°30.6'N 07°42.1'W, 1510 m depth, 4.06.1984, beam trawl (det. G.J. Bird).

Description of male. *Body* (Fig. 6B), dorsoventrally flattened, elongate, 4.7 mm long, 6.5 times as long as wide, narrower posteriorly. Cephalothorax subrectangular, 1.2 times as long as wide, anterior margin with conspicuous pointed rostrum with slight "shoulders" at base. Eyes absent; eyelobes modified to prominent, curved spine-like apophyses directed anterolaterally; lateral spiniform apophyses at anterior margin of branchial chambers. Six free pereonites; pereonite 1 shortest, 0.3 times as long as cephalothorax, with convex lateral margins without apophyses; pereonite 2 1.3 times as long as pereonite 1, lateral margins convex with dorsolateral spine-like apophysis directed anterolaterally; pereonite 3 with laterally-oriented dorsolateral spine-like apophyses, 1.7 times as long as

pereonite 1, expanded anterolaterally over coxal attachments; pereonites 4 and 5 subequal in length, 2.1 times as long as pereonite 1, otherwise similar to pereonite 3; pereonite 6 shorter, 1.5 times as long as pereonite 1, otherwise similar to pereonite 3 (all pereonites respectively 3.3, 2.2, 1.5, 1.2, 1.2 and 1.5 times as wide as long); small ventral hyposphenia present on pereonites 1 to 5, penial tubercle on pereonite 6. Pleon twice as long as pereonite 4, of five free subequal pleonites bearing pleopods; pleonites dorsally convex, about three times as wide as long, laterally expanded by spiniform apophyses, with ventral hyposphenia. Pleotelson long and slender, 0.4 times length of whole pleon, 1.5 times as long as wide.

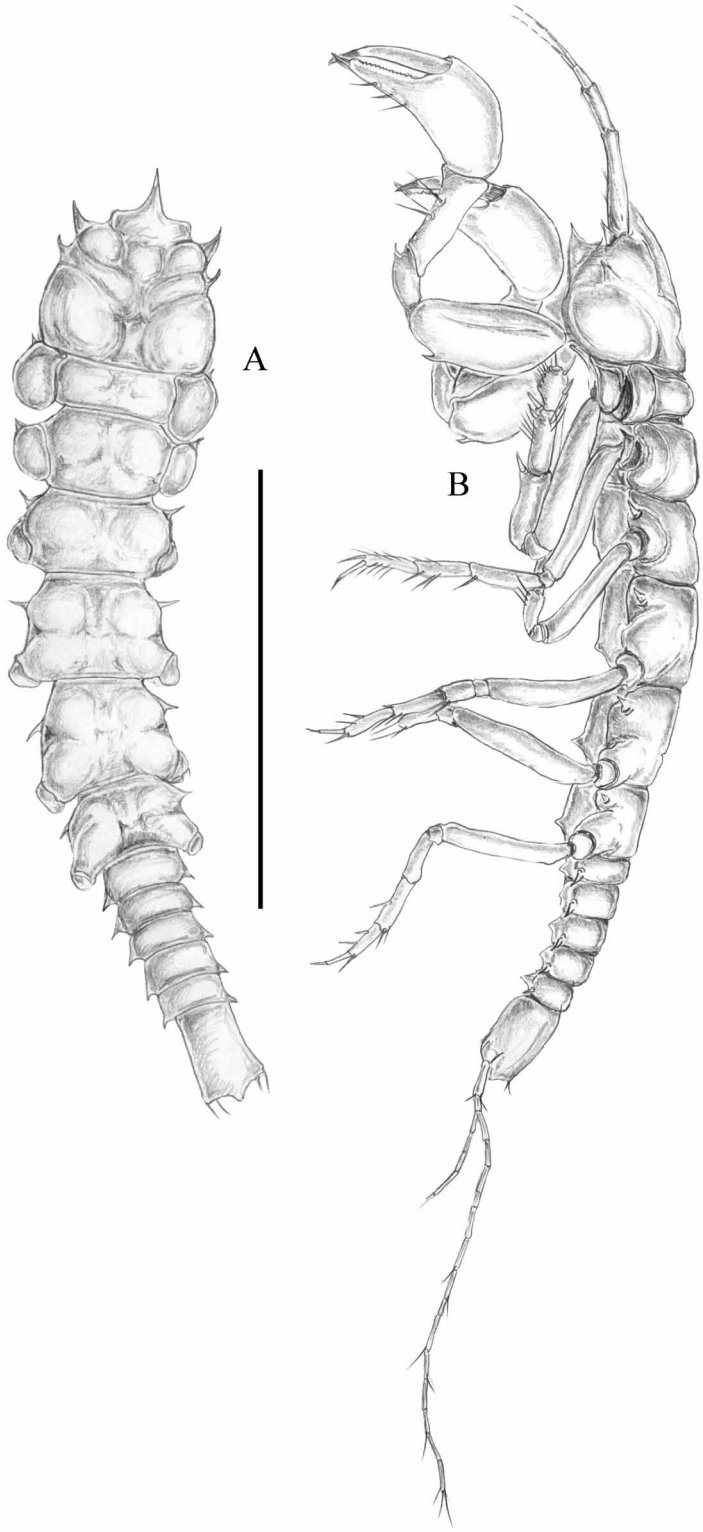

FIGURE 6. *Atlantapseudes nigrichela*, female, A, dorsal; B, lateral. Scale line = 2 mm.

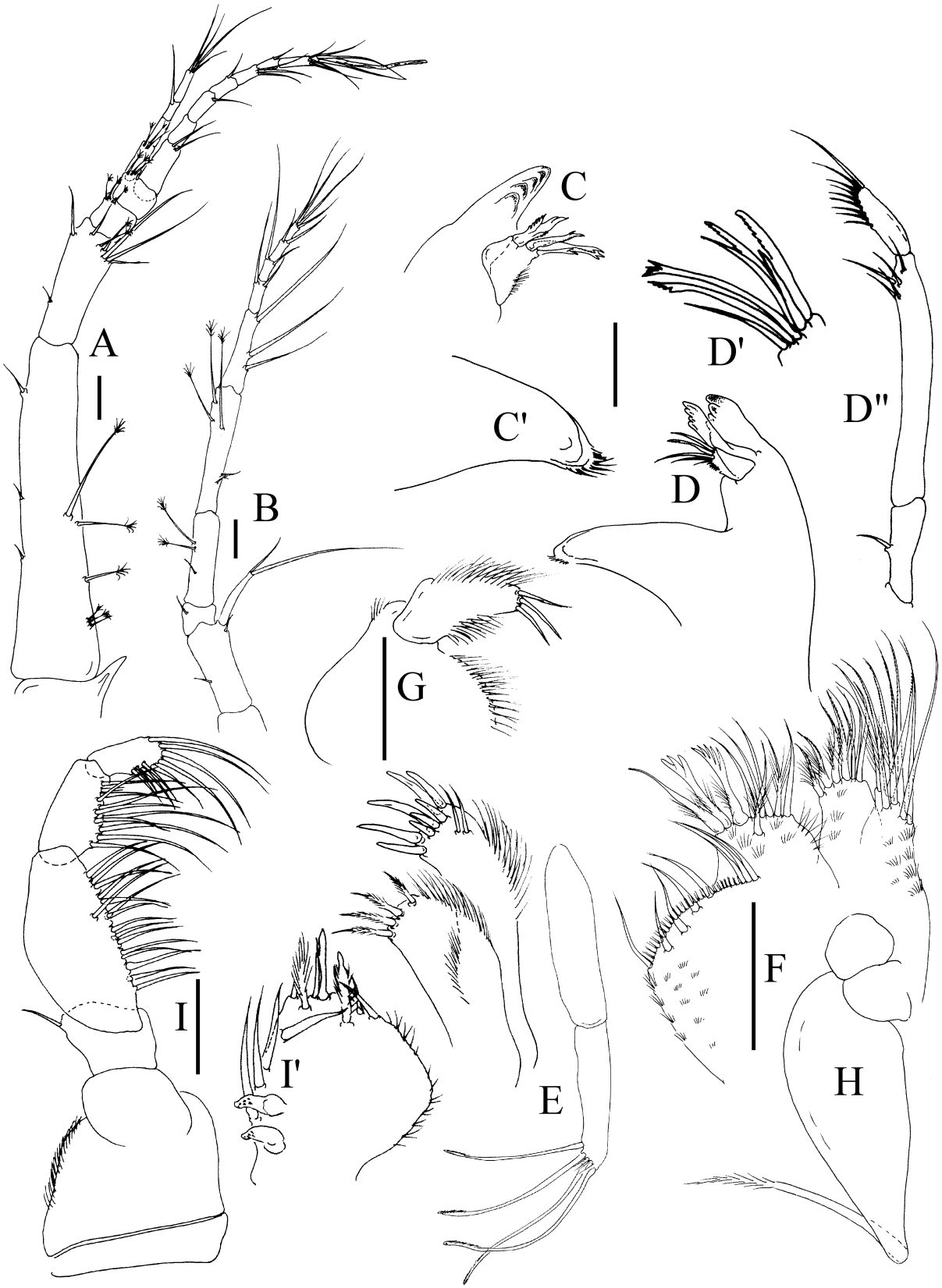

FIGURE 7. *Atlantapseudes nigrichela*, A, antennule; B, antenna; C, right mandible, distal, with C′, pars molaris; D, left mandible with D′, detail of setiferous lobe and D″, palp; E,maxillule; F, maxilla; G, labium; H, epignath; I, maxilliped, with I′, endite. Scale lines = 0.1 mm.

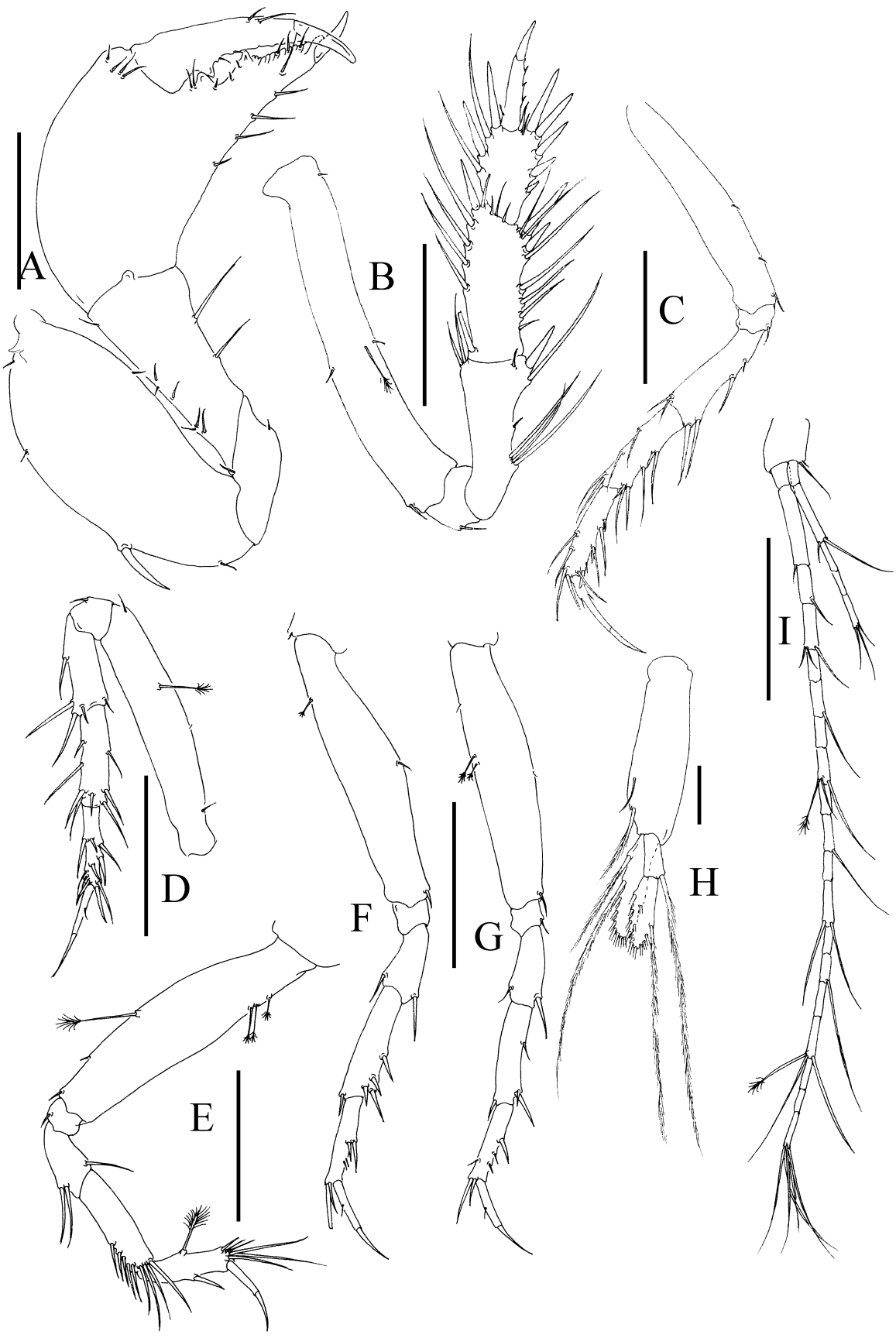

FIGURE 8. *Atlantapseudes nigrichela*, male, A, cheliped; B–G, pereopods 1–6 respectively; H, pleopod; I, uropod. Scale lines = 0.5 mm for A–G, I; 0.1 mm for H.

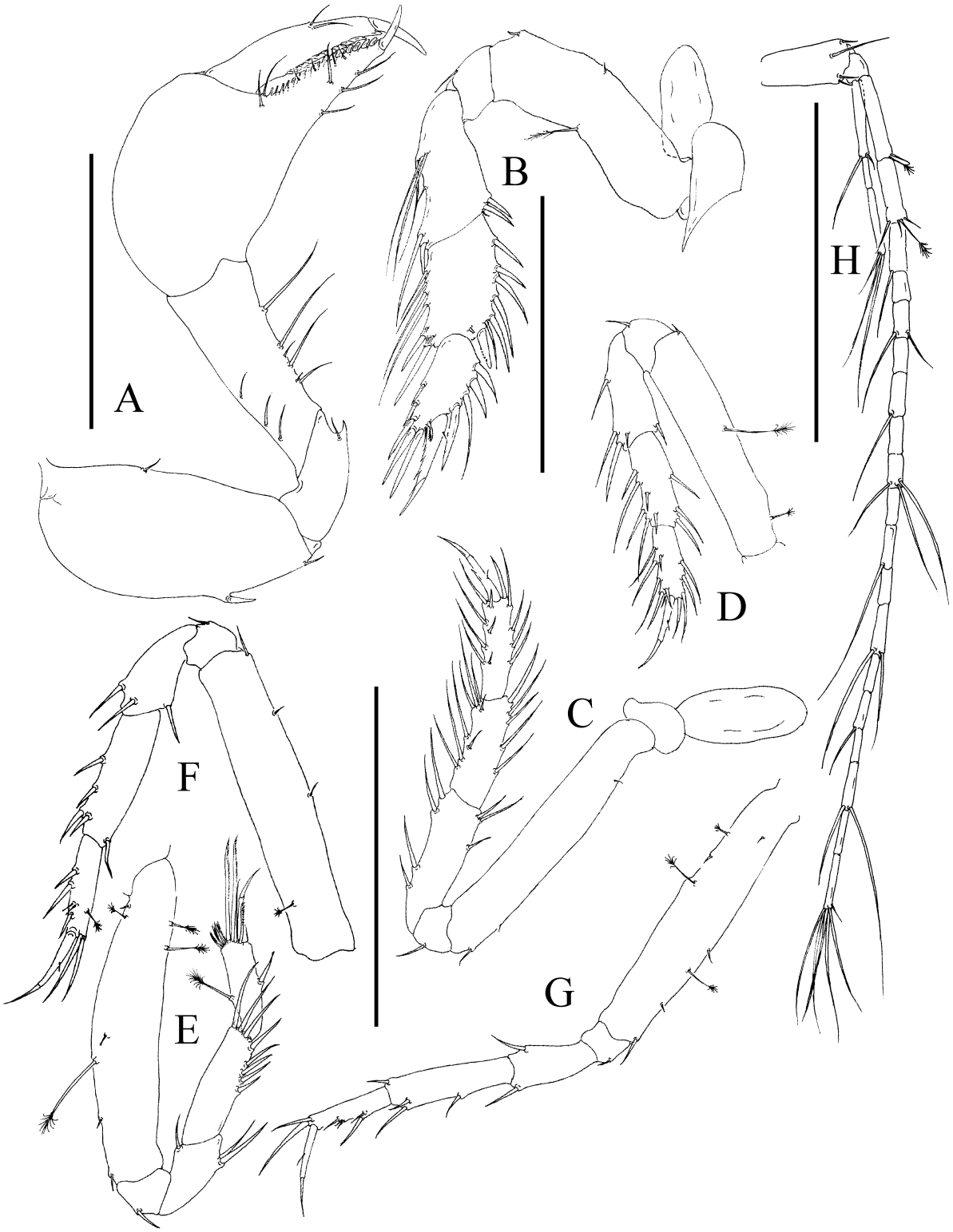

FIGURE 9. *Atlantapseudes nigrichela*, female, A, cheliped; B–G, pereopods 1–6 respectively; H, uropod. Scale lines = 1 mm.

Antennule (Fig. 7A) peduncle 4-articled, proximal article elongate, six times as long as wide, with sparse inner simple and outer penicillate setae; second article one-third as long as article 1, with outer distal tuft of simple and penicillate setae, single mesial and inner distal setae; third article one-quarter as long as second, fourth article as long as third, both with outer penicillate setae. Main flagellum of eight segments, distal segment with aesthetasc; accessory flagellum of four segments.

Antenna (Fig. 7B) proximal peduncle article simple, as long as wide, naked; article 2 three-times as long as wide, bearing elongate squama with two unequal simple distal setae; peduncle article 3 as long as wide, 0.25 times as long as article 2, with one seta; article 4 as long as article 2, with inner penicillate setae; article 5 longest, 1.3 times as long as article 4, with inner distal group of penicillate setae. Flagellum of five segments.

Mouth parts. Labrum rounded, simple, with stout, sharp epistome. Left mandible (Fig. 7D) with strong, crenulated pars incisiva, slender crenulated lacinia mobilis, setiferous lobe (Fig. 7D′) with six stout or trifurcate and one tapering setae, pars molaris tapering, distally setulose (as on right mandible, see Fig, 7C′); mandibular palp (Fig. 7D″) of three articles, proximal article slender with one small medial seta, article 2 nearly three times as long as article 1 with five simple inner distal setae; article 3 as long as article 1 with eight inner simple setae, distal seta almost as long as article. Right mandible (Fig. 7C) as left but without lacinia mobilis, setae on setiferous lobe more robust. Maxillule (Fig. 7E) inner endite with finely setose outer margin and four finely setulate distal setae; outer endite with eight unequal distal spines and two subdistal setae, outer margin finely setose; palp of two relatively-stout articles, distally with four setae each with setulose tip. Maxilla (Fig. 7F) with microtrichia on margins; outer lobe of movable endite with two simple setae on outer margin and six mesially pinnate, distally finely-setulose setae on distal margin; inner lobe of movable endite with four distally finely-setulose and four mesially pinnate setae; outer lobe of inner endite distally with four simple and two mesially pinnate setae, one trifurcate and one multi-furcate spines, and one mesially pinnate subdistal seta; inner lobe of fixed endite with rostral row of 30 setae guarding five longer setae. Labium (Fig. 7G) with setulose distal margin, palp with dense, fine lateral setules and three simple distal setae. Maxilliped (Fig. 7I). Basis outer margin densely setulose, distally naked; palp article 1 with single seta on outer margin; palp article 2 longer than wide, with about 16 setae on inner margin; palp article 3 longer than wide, with 11 setae on inner margin; palp article 4 with nine inner-to-distal setae. Endite (Fig. 7I′) with pinnate inner caudodistal seta and stout, simple or pinnate distal spines. Epignath (Fig. 7H) large, elongate-ovoid, with inner lobes and distally-setulose distal seta.

Cheliped (Fig. 8A) basis just over twice as long as wide, mid-dorsally with one simple seta, ventrally with two simple setae in proximal half, slender midventral spine and simple subdistal seta; exopodite absent, but small pointed outer apophysis present proximally. Merus quadrangular, narrowing proximally, with single dorsodistal seta and small seta on shoulder of ventral margin. Carpus 2.4 times as long as wide, with two simple setae on ventral margin, seven shorter setae along dorsal margin mainly in proximal half. Propodus stout, tuft of four setules dorsodistally, chela fingers as long as palm, ventral margin with four setae; cutting edge of fixed finger with row of fine submarginal setae, distal half with rounded crenulations, two triangular tooth-like apophyses in proximal half, distal claw slender; dactylus with sparse setae and proximal triangular tooth-like apophysis on cutting edge.

Pereopods: Pereopod 1 (Fig. 8B) basis slender, seven times as long as wide, with paired mid-length simple setae and one penicillate seta, fine ventrodistal seta; exopodite absent. Ischium with simple ventrodistal seta. Merus 0.4 times as long as basis, with ventral tuft of three longer setae in proximal half, ventrodistal spine and longer seta, and two dorsodistal simple setae. Carpus slightly shorter than merus, with rows of dorsal and ventral marginal longer setae, distal margin with fine shorter setae, two ventrodistal spines and one dorsodistal spine. Propodus 0.6 times as long as carpus, dorsal margin with two setae and two spines alternating, ventral margin with five spines becoming progressively larger towards distal end; fine seta and small spine adjacent to dactylus insertion. Dactylus with fine dorsal seta and three ventral denticulations; unguis half as long as dactylus, both together just longer than propodus.

Pereopod 2 (Fig. 8C) more slender overall than pereopod 1, basis 5.7 times as long as wide with sparse ventral setae. Merus 1.2 times as long as carpus, with one mid-ventral and two ventrodistal elongate setae. Carpus elongate, with rows of six ventral and four dorsal setae in distal two-thirds. Propodus just shorter than carpus, similarly setose. Dactylus slender with fine dorsal and ventral proximal setae, unguis slender, almost as long as dactylus, the two together longer than propodus.

Pereopod 3 (Fig. 8D) similar to pereopod 2, but basis with penicillate seta; merus proportionately shorter.

Pereopod 4 (Fig. 8E) basis stouter, four times as long as wide, with three dorsoproximal and one mid-ventral penicillate setae. Merus about half as long as carpus, with one dorsodistal and two ventrodistal setae. Carpus with ventrodistal to distal crown of about ten setae. Propodus 0.8 times as long as carpus, with mid-dorsal plumose sensory seta, mid-ventral spine, dorsodistal tuft of three short and three long setae; dactylus plus claw just shorter than propodus and shorter than longest dorsodistal propodal seta.

Pereopod 5 (Fig. 8F) similar to pereopod 4, but basis with single dorsoproximal penicillate seta; merus with one dorsodistal and one ventrodistal setae; carpus with ventrodistal spinules rather than setae; propodus just shorter than carpus, with two ventrodistal setae.

Pereopod 6 (Fig. 8G) similar to pereopod 5, but basis with two mid-dorsal penicillate setae.

Pleopods (Fig. 8H) all alike. Basis elongate, with one simple and one plumose inner distal setae. Exopod of two articles, proximal article with long outer plumose seta; endopod just shorter than exopod without proximal articulation; both rami slender, with about ten plumose setae.

Uropod (Fig. 8I) biramous, both rami filiform. Basis with two outer distal setae; exopod about one-quarter as long as endopod, with five segments; endopod with about 19 segments.

Distinctions of female (Fig. 6A, 9). Generally as male, but pleopods absent. Cheliped merus with spine-like apophysis on "shoulder"; fingers of chela without tooth-like apophyses. Pereopod 1 (Fig. 9B) stouter, basis (for example) 3.4 times as long as wide.

Remarks. Băcescu (1978a) described this species originally from material taken in the north-east Atlantic off the west of Portugal at 740–1250 m depth, but that description was somewhat incomplete; the present material has allowed us to describe the species fully, including the mature male. The present male appears to be more mature than those of Băcescu (1978a), as it does show distinct triangular tooth-like apophyses on the fingers of the chela, while Băcescu (*ibid*) stated that the male did not differ in the form of its chela. The black pigment on chela, from which the specific epithet is derived, persists in all of this material (in alcohol) only on the distal spines on the chela fingers. While Băcescu (*ibid*) states that the carpus of the pereopods is shorter than the merus, it was in fact clearly longer on the posterior pereopods in all the present material. Of other slight differences with the types, Băcescu's description and figure show one less segment in both antennular flagella than found in the present material, one more seta on the outer margin of the second article of the maxilliped palp, and a plumose nature to the ventral carpal setae on the cheliped.

While all of the newly recorded material above is from the same region as the type-collection, the depth range for this species has been extended to from 414 to 1510 m.

The most recent study on *Atlantapseudes* was that of Santos and Hansknecht (2007): they described two new species of the genus, one from off Brazil and one from off Madagascar, and produced a key to the five known species. They sensibly removed *Apseudes diversus* Lang, 1968 to a new genus, *Taraxapseudes*, this species having previously been attributed to *Atlantapseudes* by Guţu (1996). It should be noted that *Apseudes coriolis* Bamber, 2007 (Bamber 2007a) should also be moved to *Taraxapseudes*.

Subfamily Leviapseudinae Sieg, 1983

Genus *Fageapseudes* Băcescu & Guţu, 1971

Collossella Jóźwiak & Błażewicz-Paszkowycz, 2007, new synonymy

Fageapseudes retusifrons (Richardson, 1912)

(Figs 10–12)

Apseudes obtusifrons Norman & Stebbing, 1886, 88–89; pl. 18, fig. 2. [Pre-occuppied, non-*Apseudes obtusifrons* Haswell, 1882].
Apseudes retusifrons Richardson 1912, 584.
Fageapseudes retusifrons Sieg 1983, 99–100 (synonymy).

Material examined. 25 specimens, including three ♂ (hermaphrodites) with brood pouches (BMNH.2010.454-463), Cruise TTR15, Station AT575, Mercator mud volcano, 35°17.903'N 06°38.715'W, 355 m depth, mud breccia, boxcore, 26.07.2005; coll. MRC.

Other GoC records. 8 specimens, Station AT559, Kidd mud volcano, 35°24.777'N 06°43.782'W, 552 m depth, mud , boxcore, 08.08.2004; 11 specimens, Cruise TTR14, Station AT561, Kidd mud volcano, 35°25.602'N 06°44.099'W, 526 m depth, mud, boxcore, 08.08.2004; 8 specimens, Station AT566, Fiúza mud volcano,

35°15.510'N 06°41.702'W, 414 m depth, mud breccia, TV-grab, 09.08.2004; 39 specimens, Cruise TTR15, Station AT576, Mercator mud volcano, 35°17.657'N 06°39.129'W, 428 m depth, mud, boxcore, 26.07.2005. All coll. MRC.

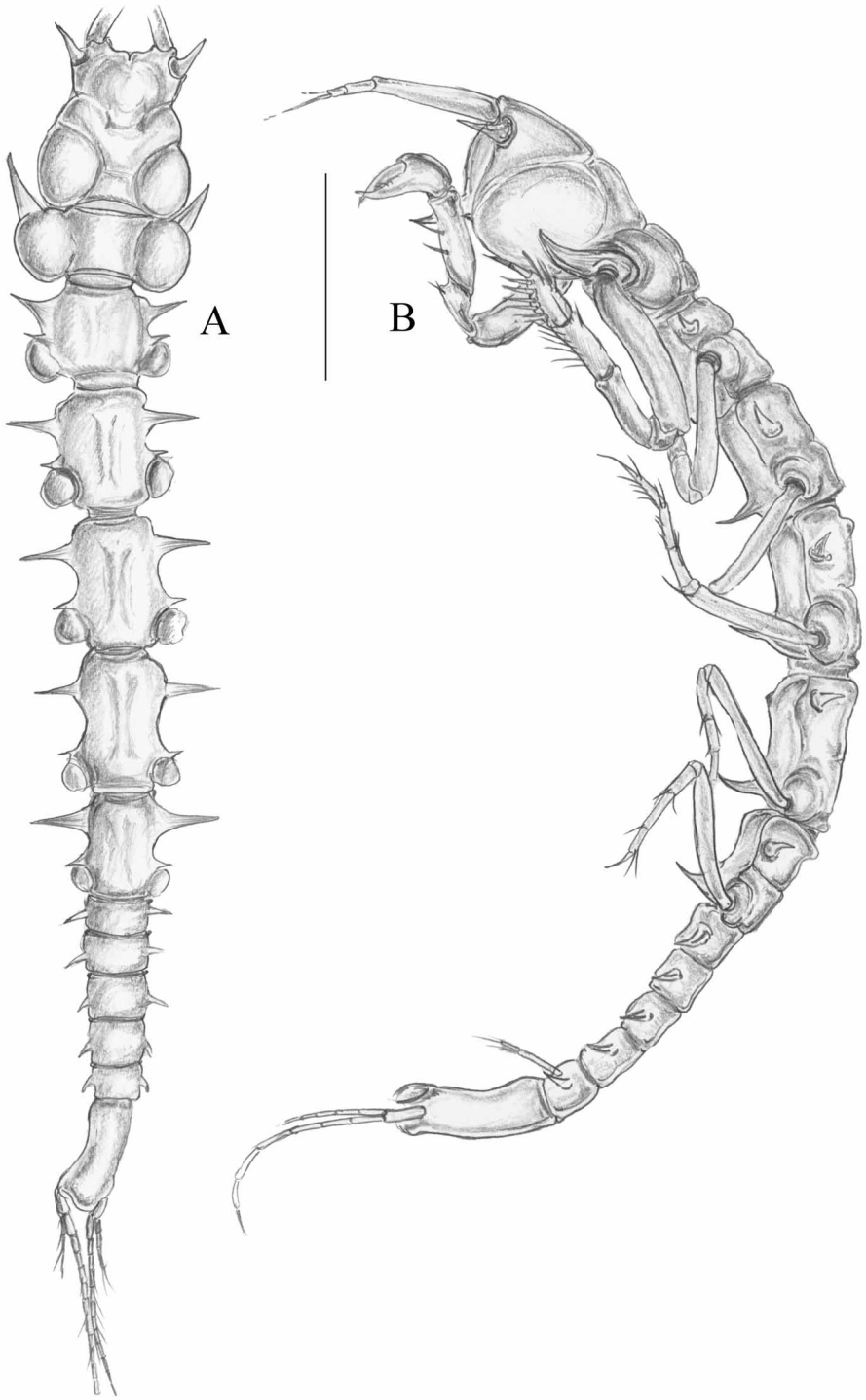

FIGURE 10. *Fageapseudes retusifrons*, A, dorsal; B, lateral. Scale line = 1 mm.

Description. *Body* (Fig. 10A, B) glabrous, dorsoventrally flattened, elongate, 5.7 mm long, eight times as long as wide, narrower posteriorly. Cephalothorax trapezoidal, as long as wide, anterior margin straight and centrally cleft, laterally advanced at attachment of antennules, lateral margin indented anterior to branchial chambers. Eyes absent; eyelobes modified to prominent spine-like apophyses directed anterolaterally. Six free pereonites; pereonite 1 laterally rounded (bulbous), half length of cephalothorax; pereonites 2 to 6 with slender, laterally directed spine-like apophyses

anterolaterally, bulbous posterolateral swellings above attachment of coxae and smaller lateral spine-like apophyses just anterior to coxal swellings; pereonites 2 and 6 subequal in length, 1.25 times as long as pereonite 1, pereonites 3, 4 and 5 subequal in length, 1.7 times as long as pereonite 1 (all pereonites respectively 2.2, 1.4, 1.0, 0.9, 0.9 and 0.9 times as wide as long); ventral hyposphenia present on all pereonites except where penial tubercle developed on pereonite six; some specimens without hyposphenia on pereonites 3 and 4. Pleon twice as long as cephalothorax, of five free subequal rectangular pleonites bearing pleopods (easily detached), plus pleotelson; pleonites 1.5 times as wide as long, laterally expanded by spiniform apophyses. Pleotelson long and slender, widest posteriorly, 0.4 times length of whole pleon, 2.7 times as long as wide.

Antennule (Fig. 11A). Peduncle 4-articled, proximal article elongate, 4.1 times as long as wide, outer margin with tufts of penicillate setae proximally and at midlength, and one subdistal simple seta; second article 0.3 times as long as article 1, with distal pair of penicillate setae, and sparse inner and outer simple marginal setae; third article three-quarters length of second, with inner and outer simple distal setae; fourth article one-third as long as third, with one distal seta. Main flagellum of six segments, segments 3, 4 and 6 bearing single aesthetascs; accessory flagellum of two segments.

Antenna (Fig. 11B) proximal peduncle article without apophyses; article 2 bearing elongate squama with nine simple marginal setae of varying lengths; peduncle article 3 as long as wide, with one seta; articles 4 and 5 equal in length, and 4.5 times as long as article 3, with one and five distal penicillate setae respectively. Flagellum of four segments.

Mouthparts. Labrum (Fig. 11C) rounded, simple, distally setulose; sharp epistome present. Right mandible (Fig. 11E) bearing pointed, crenulated pars incisiva, setiferous lobe with six bifurcate setae, pars molaris strongly recurved, distally pointed and with fine denticulations; mandibular palp of three articles, proximal article twice as long as wide and naked, article 2 slightly curved, 2.7 times as long as article 1 with five simple inner setae in distal quarter; article 3 one-quarter length of article 2 with three shorter and one longer distal simple setae. Left mandible (Fig. 11D) as right but with slender, crenulate lacinia mobilis. Maxillule (Fig. 11F) inner endite with five finely setulate distal setae; outer endite with eleven distal spines and two subdistal setae, outer margin finely denticulate; palp of two stout articles, proximal article with outer denticulations, distal article with five distal setae, each terminating in a rounded, setulose bulb. Maxilla (Fig. 11G) with serrations on outer margin; outer lobe of moveable endite with two mesially plumose setae on outer margin and five simple or mesially plumose distal setae; inner lobe of movable endite with 13 simple setae; outer lobe of inner endite with five trifurcate spines and adjacent row of four stout plumose setae; inner lobe of fixed endite with rostral row of 18 setae guarding two longer and stouter plumose setae. Labium (Fig. 11H) with distally-denticulate outer margin and naked distal margin, palp with dense lateral setules and three simple distal setae. Maxilliped (Fig. 11I) basis with one proximal and one distal short setae; palp article 1 with two stout, plumose distal setae; palp article 2 about twice as long as wide, with eight simple and three plumose setae on inner margin, outer margin with simple distal seta; palp article 3 with two shorter and four longer setae in two rows along inner margin; palp article 4 with six distal setae. Endite (Fig. 11I') with compound (finely denticulate) inner caudodistal seta, slender simple subdistal seta and slender, spatulate, distal spines, and six coupling hooks. Epignath (Fig. 11J) large, cup-shaped, with inner lobes and finely denticulate distal seta.

Cheliped (Fig. 12A) slender. Basis 2.3 times as long as wide, dorsal margin with proximal plumose seta and two fine, simple distal setae, ventrally with two plumose setae in proximal half, stout spine in distal half and subdistal plumose seta; exopodite absent. Merus reflexed, narrowing proximally, with single dorsodistal plumose seta, ventral shoulder with spine-like apophysis with three adjacent simple setae. Carpus 3.4 times as long as wide, with two longer and four shorter simple setae along ventral margin, single fine dorsodistal simple seta. Chela fingers as long as palm, ventral margin with three setae, dorsal margin sparsely setose; cutting edge of fixed finger with row of four setae alongside seven distal "teeth", triangular proximal apophysis with adjacent tuft of three setae, distal claw sharply pointed; dactylus with five fine setae but no apophyses on cutting edge, three subdistal setae.

Pereopods: Pereopod 1 (Fig. 12B) with pronounced spine-like apophysis on coxa. Basis slender, 4.8 times as long as wide, with sparse setae along dorsal and ventral margins and longer ventrodistal seta; exopodite absent. Ischium with two simple ventrodistal setae. Merus less than half as long as basis, with two midventral setae, ventrodistal spine and adjacent seta, and three dorsodistal simple setae. Carpus 0.8 times as long as merus, ventrally with four slender, curved spines, dorsally with four setae in distal half and slender dorsodistal spine. Propodus just shorter than merus, ventral margin with five spines, dorsally with three setae in distal half and slender dorsodistal spine. Dactylus with two dorsal fine setae and two ventral denticulations; unguis one-third as long as dactylus, both together 0.9 times as long as propodus.

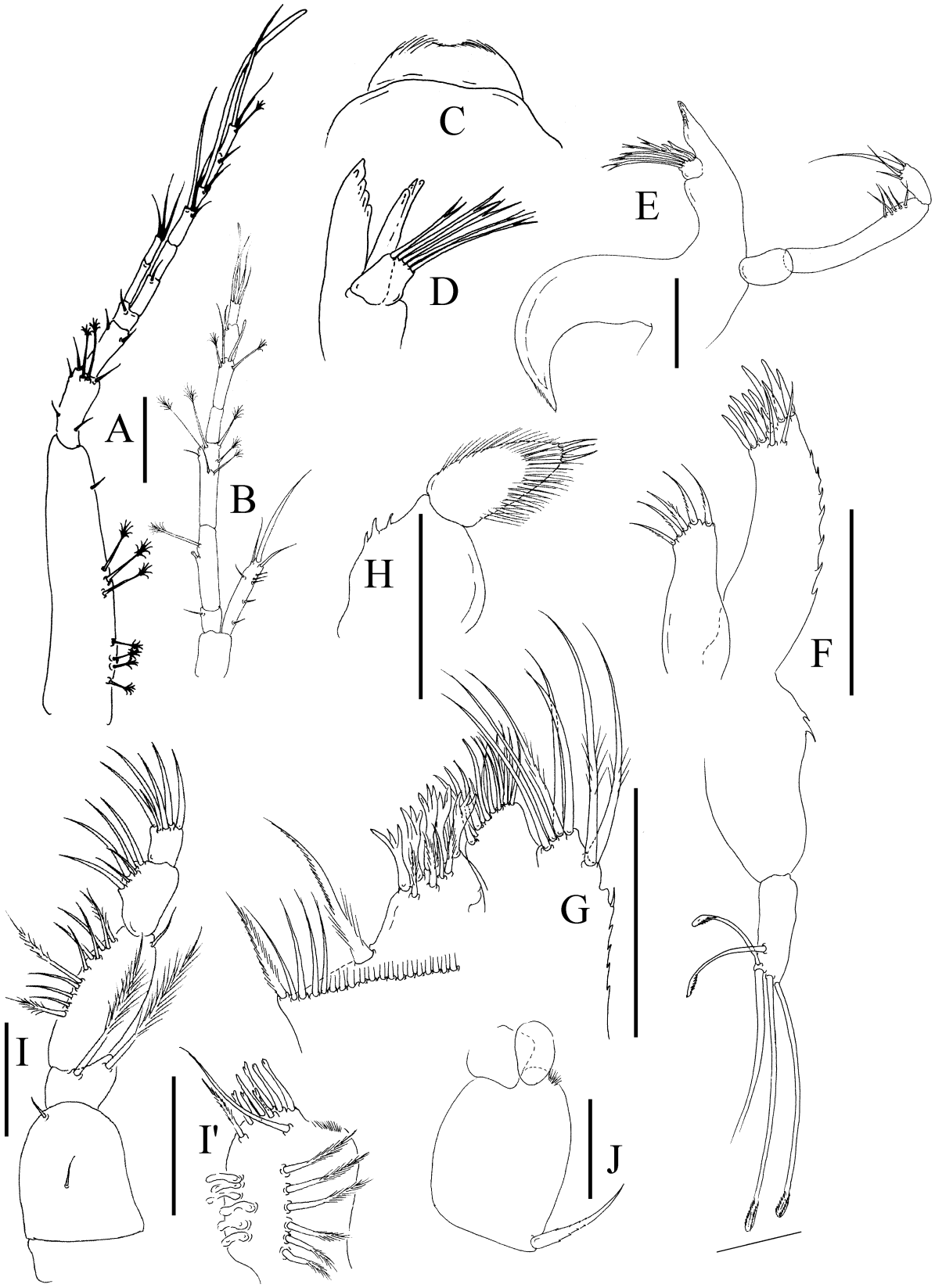

FIGURE 11. *Fageapseudes retusifrons*, A, antennule; B, antenna; C, labrum; D, left mandible, distal; E, right mandible; F, maxillule; G, maxilla; H, labium; I, maxilliped with I', detail of endite; J, epignath. Scale lines = 0.1 mm for A, B, H–J; 0.01 mm for C–G.

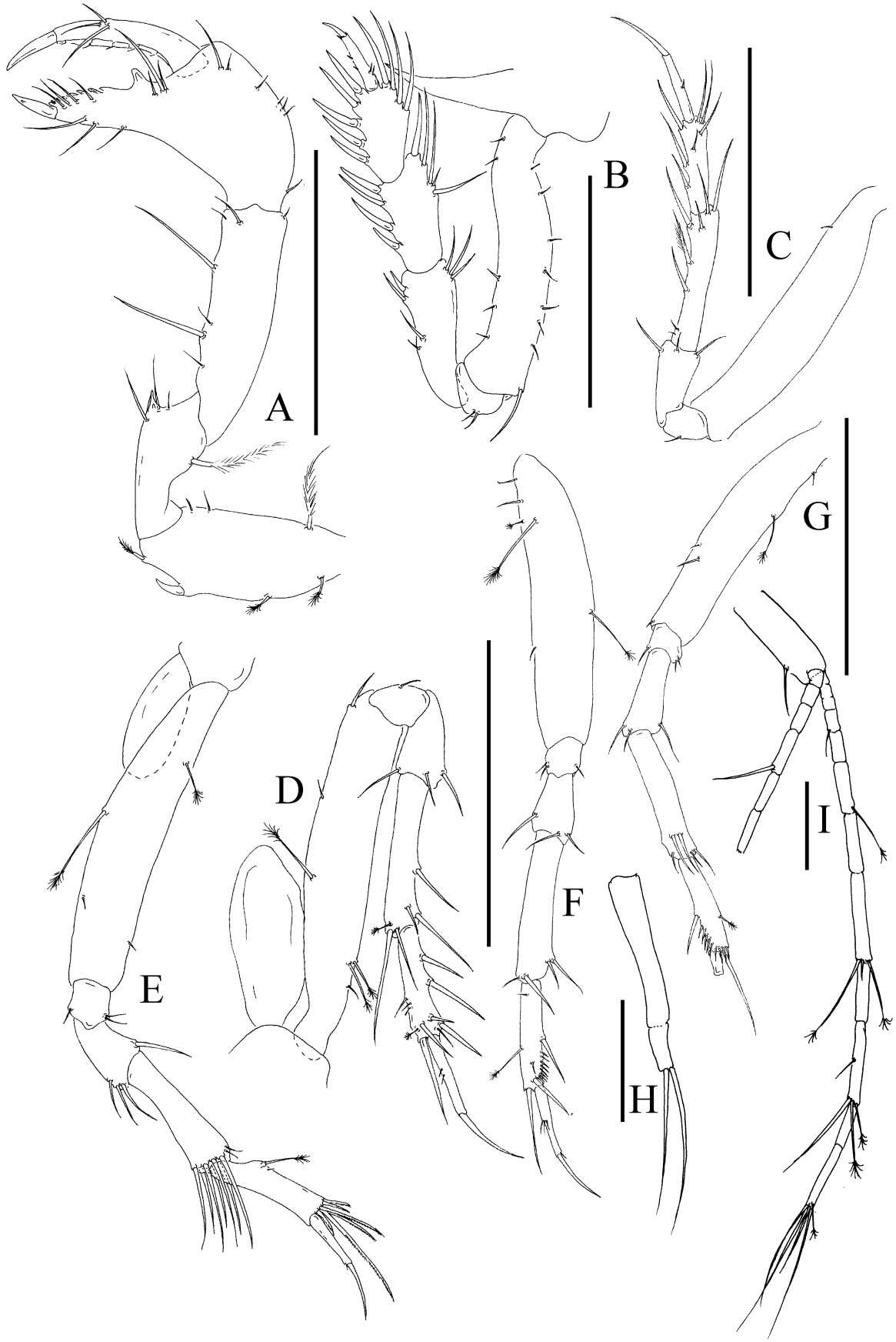

FIGURE 12. *Fageapseudes retusifrons*, A, cheliped; B to G, pereopods 1–6 respectively; H, pleopod; I, uropod. Scale lines = 0.5 mm for A–G, 0.1 mm for H, I.

Pereopod 2 (Fig. 12C) more slender than pereopod 1. Coxa without spiniform apophysis. Basis 5.1 times as long as wide with fine dorsoproximal seta. Ischium with one ventral seta. Merus 0.2 times as long as basis, with three distal setae. Carpus elongate, 2.3 times as long as merus, with two simple and one plumose ventral setae in distal half, paired dorsodistal setae and inner distal seta. Propodus two-thirds as long as carpus, with three ventral strong setae and three dorsodistal fine setae. Dactylus slender with fine mid-dorsal seta, unguis slender, almost as long as dactylus, the two together 1.35 times as long as propodus.

Pereopod 3 (Fig. 12D) similar to pereopod 2, but basis with proximal penicillate setae, carpus without ventral plumose seta, propodus with slender dorsodistal spine longer than dactylus.

Pereopod 4 (Fig. 12E) basis 4.8 times as long as wide, with single dorsoproximal and midventral penicillate setae; ischium with one ventral and two dorsal setae; merus just less than half as long as carpus, with three ventrodistal and one dorsodistal setae; carpus with ventrodistal to distal crown of seven setae more than half as long as propodus; propodus 0.9 times as long as carpus, with mid-dorsal penicillate seta, dorsodistal tuft of four shorter and one longer finely denticulate setae and denticulate spine adjacent to dactylus; dactylus plus claw as long as propodus.

Pereopod 5 (Fig. 12F) proximally similar to pereopod 4, carpus with two ventrodistal and two dorsodistal setae; propodus 0.7 times as long as carpus, with ventrodistal row of nine short leaf-like, bilaterally-setulose spines; dactylus and unguis slender, together longer than propodus.

Pereopod 6 (Fig. 12G) similar to pereopod 5, but ventrodistal leaf-like propodal spines extending around distal margin of article.

Pleopods uniramous (Fig. 12H) or biramous (cf. Băcescu & Guţu 1971, fig. 2). Basis elongate, naked; rami from one-third as long to as long as basis with one to four distal setae.

Uropod (Fig. 12I) biramous, both rami filiform, multi-segmented. Basis with one seta distally; exopod less than half as long as endopod, with six segments; endopod elongate, 1.7 times as long as pleotelson, with about 10 segments.

Oostegites, when present, occur on pereopods 1 to 4.

Remarks. The present material is taken from depths between 355 and 552 m, slightly south-west of the type-locality which is "west of the Straits of Gibraltar" (35°50'N 05°26'W) at 234 m (Norman & Stebbing 1886); other records are from the Mediterranean, off Monaco and Corsica (Băcescu & Guţu 1971; Stephensen 1915) and Libya (Bamber, unpubl.) with an overall recorded range of 220 m to 740 m.

Owing to the rediscovery of this species in the close vicinity of the type-locality, we have redescribed it in detail above. The description agrees with both the incomplete description of Norman and Stebbing (1886, as *Apseudes obtusifrons*) and that of Băcescu & Guţu (1971) based on material from the Mediterranean.

Fageapseudes retusifrons is a sequential protogynous/simultaneous hermaphrodite: the specimens above labelled ♀ have oostegites and a male penial tubercle, and usually (but not always) biramous pleopods. Less mature specimens (including juveniles and some with oostegites or a brood-pouch) are without the tooth-like apophysis on the cheliped fixed-finger, and have fewer, often uniramous pleopods, or no pleopods at all.

Jóźwiak and Błażewicz-Paszkowycz (2007) described a new genus, *Collossella*, for their Antarctic species *C. suprema*, and included *Apseudes bicornis* Kudinova-Pasternak, 1973 in their new genus (this species having been moved previously to *Fageapseudes* by Băcescu 1978b). The two genera were distinguished on the basis of the presence (*Collossella*) or absence (*Fageapseudes*) of an exopodite on the cheliped (absent on pereopod 1 in both), the presence of five pairs of pleopods (*Collossella*) or fewer pairs of reduced pleopods (*Fageapseudes*) in females, the presence of four (*Collossella*) or only one (*Fageapseudes*) pair of oostegites, the presence of two (*Collossella*) or four (*Fageapseudes*) segments in the antennular accessory flagellum (although two are shown for *Fageapseudes* by Băcescu & Guţu 1971), and the presence of spines and setae (*Collossella*) or spines only (*Fageapseudes*) on the ventral margin of the carpus of pereopod 1.

In fact, the present material of *F. retusifrons* shows oostegites present on each of pereopods 1 to 4, two segments in the antennular accessory flagellum, as well as the intraspecific variability in pleopod development.

In addition to the species mentioned above, Bamber (2007b) described *Fageapseudes brachyomos* from the Kurile-Kamchatka Trench. *F. brachyomos* has an exopodite on the cheliped (like *Collossella*), as well as an exopodite on pereopod 1 (like no other species of these genera), five pairs of pleopods (like *Collossella*), four segments in the antennular accessory flagellum (like *Fageapseudes sensu* Jóźwiak & Błażewicz-Paszkowycz, 2007 but not *F. retusifrons*), and both spines and setae on the ventral margins of both carpus (like *Collossella*) and propodus (like no other species of these genera) of pereopod 1, falling quite between the "distinctions" of these two genera.

It is therefore concluded that *Collossella* is a junior synonym of *Fageapseudes*, a genus in which the cheliped and pereopod 1 are with or without exopodites (depending on the species), with two to four segments in the antennular accessory flagellum (depending on the species), four pairs of oostegites, and interspecific variation in the length of the articles and of the setation/spination of pereopod 1.

Family Sphyrapodidae Guțu, 1980

Subfamily Sphyrapodinae Guțu, 1980

Genus *Sphyrapus* Norman, 1882

Remarks. There has been historic confusion over the authority for this genus (e.g. Sieg, 1983: 108–109; Guțu, 1980: 393; Larsen, 2005: 77), but, as Sars (1882: 18) clearly designates it as "*Sphyrapus* Norman M.S." ("M.S." meaning "manuscript", not the initials of Alfred Merle Norman), then under Article 50.1.1 of the International Code of Zoological Nomenclature (ICZN), the authority is Norman, 1882 (or "Norman in Sieg, 1882").

Conversely, while Sars (*ibid*.) listed four named species (including "*Sphyrapus malleolus* Norman M.S." and "*Sphyrapus tudes* Norman M.S.": Sars 1882, p. 20), he did not designate a type-species. As Sars' publications of *S. malleolus* and *S. tudes* did not meet the criteria of Article 12 of the ICZN, each of the names as used in the 1882 publication becomes a *nomen nudum*. Norman & Stebbing (1886) described *S. malleolus* (and *S. tudes*), and designated it validly as the type-species, as it meets the requirements of Articles 67.2.1 and 69.1 of the ICZN, and then conforms with Articles 12 and 50. The type-species of *Sphyrapus* is thus *Sphyrapus malleolus* Norman & Stebbing, 1886; the authority for *Sphyrapus tudes* is also Norman & Stebbing, 1886.

Fortuitously, Guțu (1980; 2001) was correct, when splitting *Pseudosphyrapus* and *Ansphyrapus* (respectively) from *Sphyrapus*, in leaving *S. malleolus* (only) in *Sphyrapus*.

Sphyrapus malleolus Norman & Stebbing, 1886
(Figs 13–16)

Sphyrapus malleolus Norman & Stebbing, 1886: 98–99, pl. 22.

Type material examined. 1♀, syntype (now **lectotype**) (BMNH.1911.11.8.7191), "Porcupine" Station 24, 56°26'N 14°28'W, 199 m depth, 1869 (dredging 2 of Norman & Stebbing 1886); 1♂, 1♀, syntypes (now **paralectotypes**) (BMNH.1911.11.8.7189-7190), "Porcupine" Station 17a, 39°39'N 09°39'W, 1353 m depth, 1870 (dredging 3 of Norman & Stebbing 1886), Alfred Merle Norman Collection, The Natural History Museum, London.

Material examined. 1♀, (BMNH.2010.464), 1 fragmented ♂, Cruise TTR15, Station AT575, Mercator mud volcano, 35°17.903'N 06°38.715'W, 355 m depth, mud breccia, boxcore, 26.07.2005; 1 fragmented ♂, (BMNH.2010.465), Cruise TTR14, Station AT541, Meknès mud volcano, 34°59.103'N 07°04.435'W, 703 m depth, mud breccia and H_2S, TV-grab, 05.08.2004; 2♂♂, (BMNH.2010.466-467), Cruise TTR15, Station AT581, Meknès mud volcano, 34°59.178'N 07°04.353'W, 700 m depth, mud breccia, TV-grab, 28.07.2005; all coll. MRC.

Other GoC material. 2 specimens, Cruise TTR14, Station AT559, Kidd mud volcano, 35°24.777'N 06°43.782'W, 552 m depth, mud, boxcore, 08.08.2004; 1 specimen, Station AT560, Kidd mud volcano, 35°25.306'N 06°43.976'W, 498 m depth, mud breccia, boxcore, 08.08.2004; 1 specimen, Station AT561, Kidd mud volcano, 35°25.602'N 06°44.099'W, 526 m depth, mud, boxcore, 08.08.2004; 2 specimens, Station AT566, Fiúza mud volcano, 35°15.510'N 06°41.702'W, 414 m depth, mud breccia, TV-grab, 09.08.2004; 1 specimen, Cruise TTR15, Station AT577, Mercator, 35°17.305'N 06°39.672'W, 485 m depth, reference, off MV hemipelagic mud, USNEL boxcore, 26.07.2005; 4 specimens, Cruise TTR15, Station AT585, Meknès mud volcano, 34°59.137'N 07°04.343'W, 701 m depth, crater top, mud breccia, Kasten boxcore, 28.07.2005; 5 specimens, Station AT586, Meknès mud volcano, 34°59.146'N 07°04.380'W, 701 m depth, mud breccia, TV-grab, 28.07.2005; 3 specimens, Station AT597, Bonjardim mud volcano, 35°27.563'N 09°00.030'W, 3061 m depth, mud breccia, TV-grab, 02.08.2005; all coll. MRC.

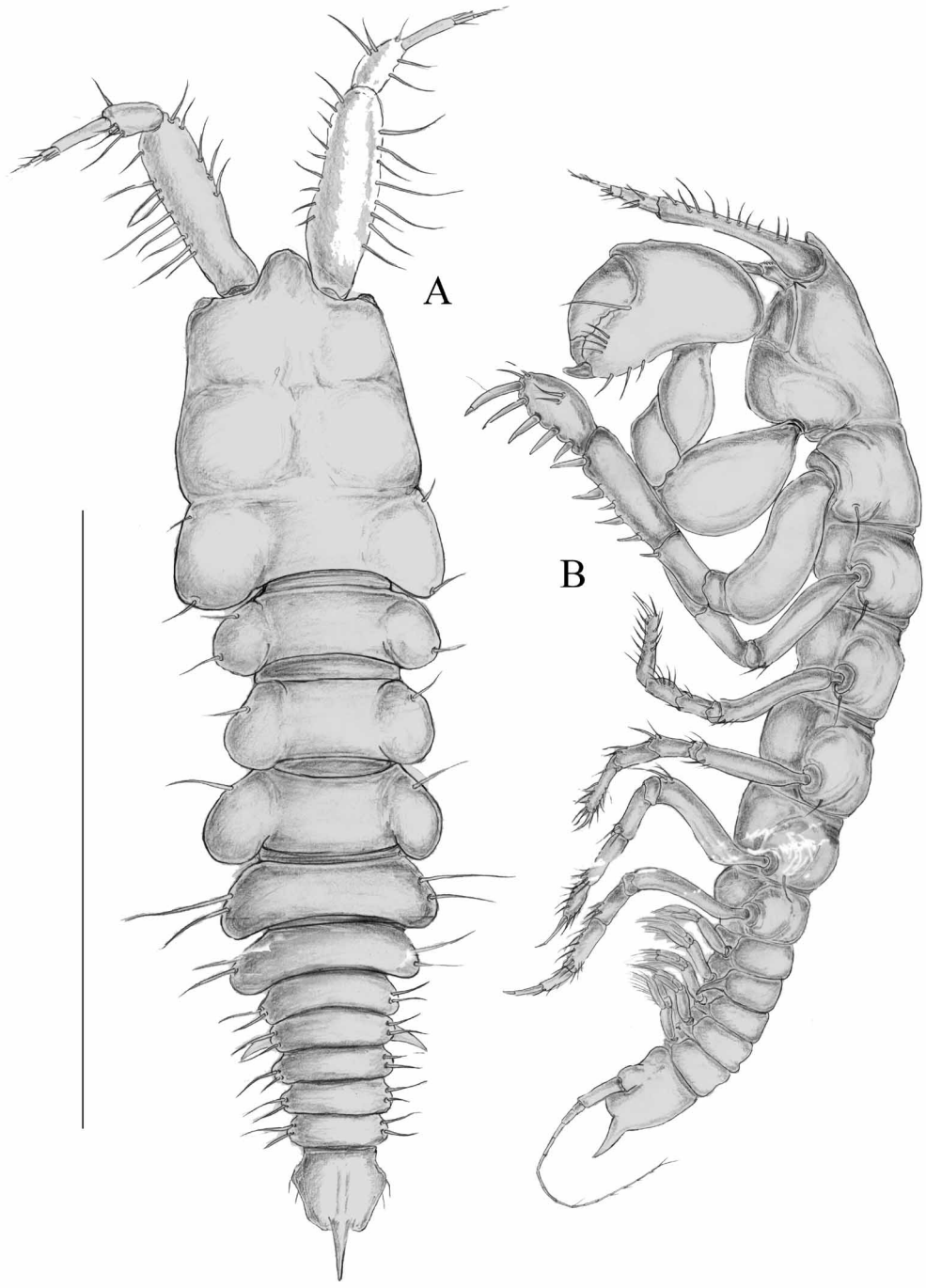

FIGURE 13. *Sphyrapus malleolus*, female, A, dorsal and B, lateral. Scale line = 1 mm.

Remarks. This species has hardly been re-described since the original description of Norman and Stebbing (1886), in which there were few detailed figures, and the reference of those authors to male and female were incorrect, their female being a male, and *vice versa*. The type-locality is the north-east Atlantic south of Rockall (for the lectotype listed above) and to the west of Portugal (for the paralectotypes listed above); other syntypes listed by Norman and Stebbing (*loc. cit.*) were from Cape Farewell, off Greenland, but this material cannot be found for confirmation of con-specificity. Bonnier (1896) refigured the species in a somewhat stylized fashion, based on material from the Bay of Biscay at 410 and 650 m.

In the light of the unlikelihood of the wide distribution recorded for this species (including in the Mediterranean, Lo Bianco 1903; off North America, Richardson 1905; off South Africa, Barnard 1920; off Equatorial West Africa, Bamber 2000), based almost entirely only on the presence of "wing-like" lateral apophyses on pleonite 2, a

full description is necessary to allow detailed comparison of other aspects of the morphology of "winged" *Sphyrapus* recorded elsewhere, in order to determine whether this species is really widespread, or rather one of a group of sibling deep-sea taxa. In addition to providing such a description from the Gulf of Cadiz material available to us (which is morphologically consistent with the type-material), we have re-examined syntypes held in the collections of the Natural History Museum, London; of these, we herein designate a female (BMNH.1911.11.8.7191) as the lectotype, and the remaining two specimens, a male and a female (BMNH.1911.11.8.7189-7190), as paralectotypes.

Description of female. *Body* (Fig. 13A, B), dorsoventrally flattened, holotype 1.6 mm long, 4.4 times as long as wide, narrower posteriorly. Cephalothorax subrectangular, as long as wide, anterior margin with conspicuous rounded rostrum. Eyes absent; eyelobes small. Pereonite 1 fused to cephalothorax, one third as long as cephalothorax, laterally rounded, with single fine anterolateral and posterolateral setae. Five free pereonites lateral margins uniformly convex, with single (pereonites 2 to 4) or paired (pereonites 5 and 6) lateral setae; pereonite 2 as long as but narrower than pereonite 1; pereonites 3 and 4 subequal in length, 1.2 times as long as pereonite 1; pereonite 5 shorter, 0.8 times as long as pereonite 1; pereonite 6 shortest, 0.7 times as long as pereonite 1 (all pereonites respectively 3.3, 2.7, 2.2, 2.5, 3.3 and 3.6 times as wide as long). Pleon four times as long as pereonite 5, of five free subequal pleonites bearing pleopods, and pleotelson; pleonites dorsally convex, 1.5 times as wide as long, with two lateral setae, mostly laterally rounded but pleonite 2 with curved, sharp lateral spine-like apophyses. Pleotelson subrectangular, 0.3 times length of whole pleon, as long as wide, laterally expanded at attachment of uropods and with long distal spine 0.7 times as long as pleotelson.

Antennule (Fig. 14A, A') peduncle 4-articled, proximal article robust, 3.5 times as long as wide, setose along inner and outer margins; second article, apparently the fusion of two articles, one-quarter as long as article 1, with outer subdistal tuft of three setae, inner subdistal pair of penicillate setae, and inner distal pair of unequal setae; third and fourth articles indistinctly articulated, subequal in length, together 0.2 times as long as second, with outer distal seta, ventral array of penicillate setae, inner margin extended distally with paired setae and fused to accessory flagellum. Accessory flagellum a partially-segmented fused extension of the peduncle with three distal setae. Main flagellum of five segments, proximal segment two-thirds as long as whole flagellum, distal four segments subequal in length, segments 2 and 3 bearing convoluted aesthetascs.

Antenna (Fig. 14B) peduncle 4-articled, squama absent; proximal article with outer expansion with crenulated margin, proximally setulose; articles 2 and 3 indistinctly articulated, often appearing fused, subequal in length, article 2 naked or with ventral seta, article 3 naked, together 0.7 times as long as article 1; peduncle article 4 elongate, 2.4 times as long as article 2, with penicillate seta at midlength and distal crown of five shorter and one longer setae. Flagellum of three segments.

Mouth parts. Labrum (Fig. 14C) rounded, distally concave and marginally setose. Left mandible (Fig. 14D) pars incisiva and lacinia mobilis with sharp distal teeth, setiferous lobe with six mainly bifurcate setae, pars molaris (Fig. 14D') robust, distally with complex crenulations and plumose marginal setae; mandibular palp absent. Right mandible as left but without lacinia mobilis. Maxillule (Fig. 14E) inner endite with four finely setulate distal setae, outer distal margin with sparse setules; outer endite with ten distal spines and two subdistal setae, distal margins finely setose; palp of two articles, distally with five setae. Maxilla (Fig. 14F) with microtrichia on margins; outer lobe of moveable endite with five finely denticulate setae; inner lobe of movable endite with two finely denticulate, three plumose and four simple setae; outer lobe of inner endite with one simple seta, four sickle-shaped finely-denticulate spines, and three trifurcate spines; inner lobe of fixed endite with rostral row of 30 setae guarding five longer finely-denticulate setae. Labium (Fig. 14G) marginally naked, palp with fine lateral setules and one distal spine. Maxilliped (Fig. 14H) basis with one long distal seta; palp article 1 with single short seta on outer margin, and long plumose seta on inner margin; palp article 2 longer than wide, with 11 inner setae mainly in two rows, single outer distal spine; palp article 3 with six distally-tapering setae along inner margin; palp article 4 with six distal setae. Endite (Fig. 14H') distally with four stout plumose setae and three stout spines; two coupling hooks. Epignath not retrieved.

Cheliped (Fig. 15A) hammer-like. Basis 1.3 times as long as wide, dorsally with two small proximal setae, ventrally with two distal setae; exopodite (not figured) present, 3-articled, distal article with four plumose setae. Merus subrectangular, ventrally with single proximal and distal setae. Carpus almost twice as long as wide, with three simple setae along dorsal margin, one midventral seta. Propodus massive, proximally overhanging carpus; fixed finger half as long as palm, ventral margin with four setae, three setae in axis of chela, cutting edge of fixed

finger finely denticulate with row of eight adjacent setae, distal claw robust; dactylus with fine setae but no apophyses on cutting edge, one subdistal seta, distal claw robust.

Pereopods: Pereopod 1 (Fig. 15B) much larger than remaining pereopods. Basis stout, 2.2 times as long as wide, with four ventrodistal setae; exopodite present, 3-articled, distal article with five distal plumose setae. Merus 0.8 times as long as basis, with three ventral setae and ventrodistal spine. Carpus 1.2 times as long as merus, with six setae along dorsal margin and five spines along ventral margin. Propodus 0.7 times as long as carpus, with dense row of dorsal marginal setae, ventral margin with four spines, single distal seta. Dactylus stout, curved, unguis short, both together 0.65 times as long as propodus.

Pereopod 2 (Fig. 15C) smaller than pereopod 1; basis 3.4 times as long as wide with two dorsal penicillate setae and tuft of five ventrodistal setae. Ischium with one ventral seta. Merus 0.8 times as long as carpus, with four ventral setae. Carpus with rows of six dorsal and five ventral marginal setae. Propodus 1.5 times as long as carpus, dorsal margin with nine long setae, ventral margin with seven setae and five short spines, distal seta adjacent to dactylus. Dactylus slender, curved, unguis short, the two together half as long as propodus.

Pereopod 3 (Fig. 15D) similar to pereopod 2, but ischium with two setae, remaining articles with fewer setae.

Pereopod 4 (Fig. 15E) basis 4.6 times as long as wide, with mid-dorsal plumose seta and four ventrodistal setae; ischium with one ventral seta; merus 0.6 times as long as carpus, with three distal setae; carpus with seven plumose ventral setae and two ventral spines, dorsally with five simple setae; propodus 0.73 times as long as carpus, with three ventral spines, distally with crown of ten finely-denticulate setae and one longer simple seta; dactylus plus claw 0.6 times as long as propodus and shorter than longest dorsodistal propodal setae.

Pereopod 5 (Fig. 15F) basis 3.3 times as long as wide with two penicillate setae and three ventrodistal setae; ischium with one long ventral seta; merus more than half length of carpus, with five dorsal and four ventral plumose setae; carpus with four dorsal and six ventral plumose setae; propodus just over half as long as carpus, with ventral row of 16 short leaf-like, bilaterally-setulose spines, strong distal seta exceeding length of dactylus plus unguis; dactylus and short unguis curved, together just longer than propodus.

Pereopod 6 (Fig. 15G) similar to pereopod 5, but basis with eight simple and one plumose setae along ventral margin, mesial row of four plumose setae, dorsally with three simple and five plumose setae.

Pleopods (Fig. 15H) all alike. Basis elongate, with three outer plumose setae. Endopod shorter than exopod with proximal articulation bearing plumose seta; both rami oar-shaped, with plumose marginal setae.

Uropod (Fig. 15I) biramous, both rami filiform. Basis with two setae on inner margin; exopod of two segments, nearly reaching distal end of third endopod segment; endopod elongate, three times as long as pleotelson, with 12 segments.

Distinctions of male. Generally as female. Antennule (Fig. 16A) peduncle of four distinct articles, first article more attenuate than that of female, 6.2 times as long as wide, third and fourth articles distinctly articulated, subequal in length; flagellum with single aesthetascs on each of four proximal segments. Antenna (Fig. 16B) with two-segmented flagellum. Cheliped (Fig. 16C) dimorphic, proportionately larger than that of female; carpus curved, distal on merus, with ventral proximal apophysis, three ventral marginal setae; propodus not overhanging carpus proximally, chela forcipate, fixed finger with squared distal tip bearing six inner setae; gap between fingers with setulose rounded apophysis and tuft of four setae; dactylus with four rounded apophyses along cutting edge, three distal setae. Pereopod 1 (Fig. 16D) proportionately longer and more slender than that of female, carpus only sparsely setose dorsally, ventral propodal spines more slender; dactylus and unguis more slender, together just longer than propodus. Other pereopods (e.g. Fig. 16E) more slender than those of female, dactyli and ungues proportionately longer.

Remarks. Subtle variation exists in the articulation of the peduncle of the antennules and the antennae. The third and fourth articles of the antennular peduncle in the female show partial fusion in the lectotype, as does the small tubercle-like accessory flagellum: in neither case is the line of articulation complete; in the figured specimen from the Gulf of Cadiz, these lines of articulation are completely absent. Similarly, the second and third articles of the peduncle of the antenna in both sexes are fused in the Gulf of Cadiz specimens, while retaining a slight line of articulation in the lectotype.

The present material extends the depth range for this species to 199 to 3061 m.

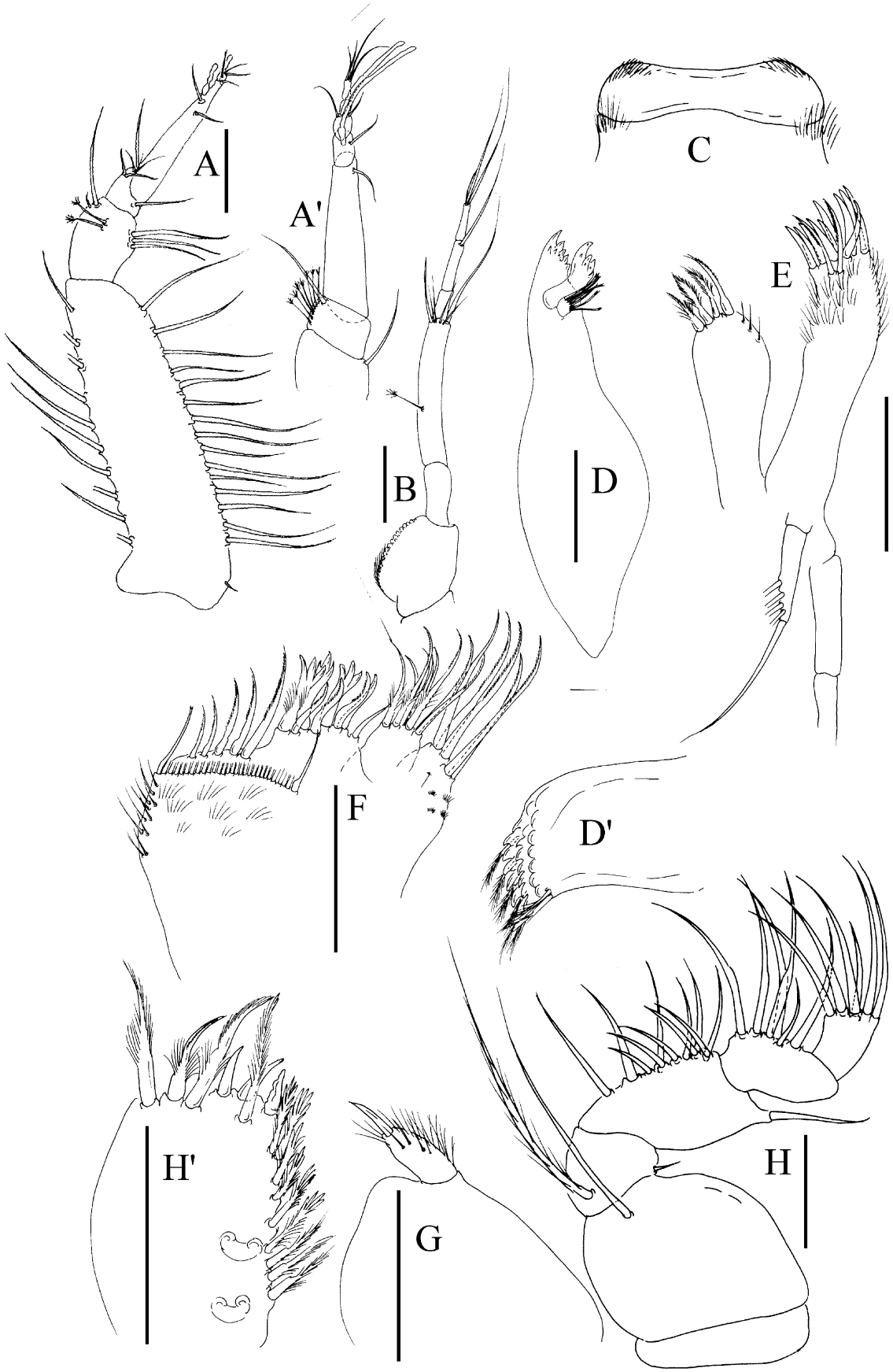

FIGURE 14. *Sphyrapus malleolus*, female, A, antennule, with A', detail of distal articles; B, antenna; C, labrum; D, left mandible, with D', detail of pars molaris; E, maxillule; F, maxilla; G, labium; H, maxilliped, with H', detail of endite. Scale lines = 0.1 mm for A, B, H; 0.01 for C–G, H'.

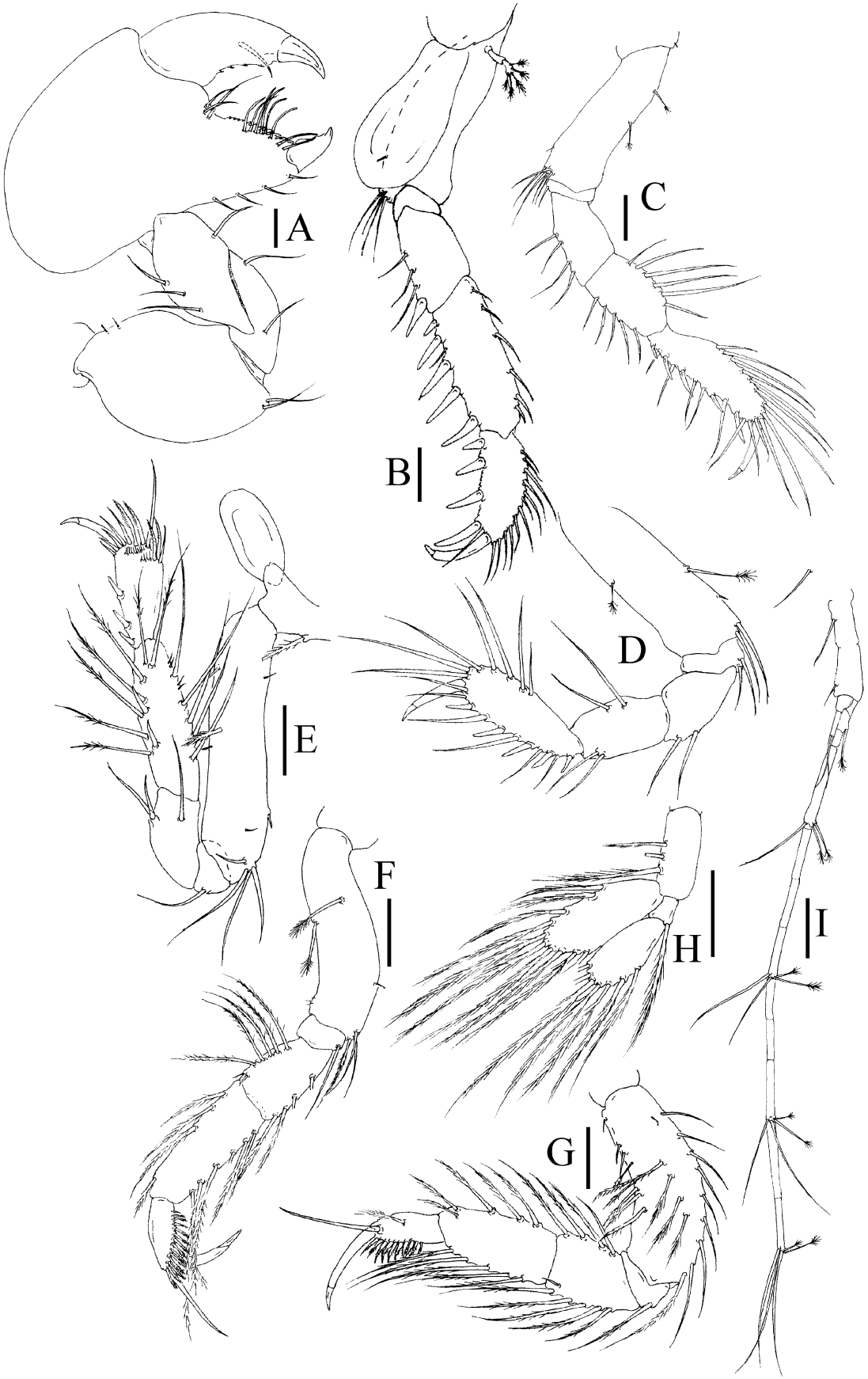

FIGURE 15. *Sphyrapus malleolus*, female, A, cheliped; B–G, pereopods 1–6; H, pleopod; I, uropod. Scale lines = 0.1 mm.

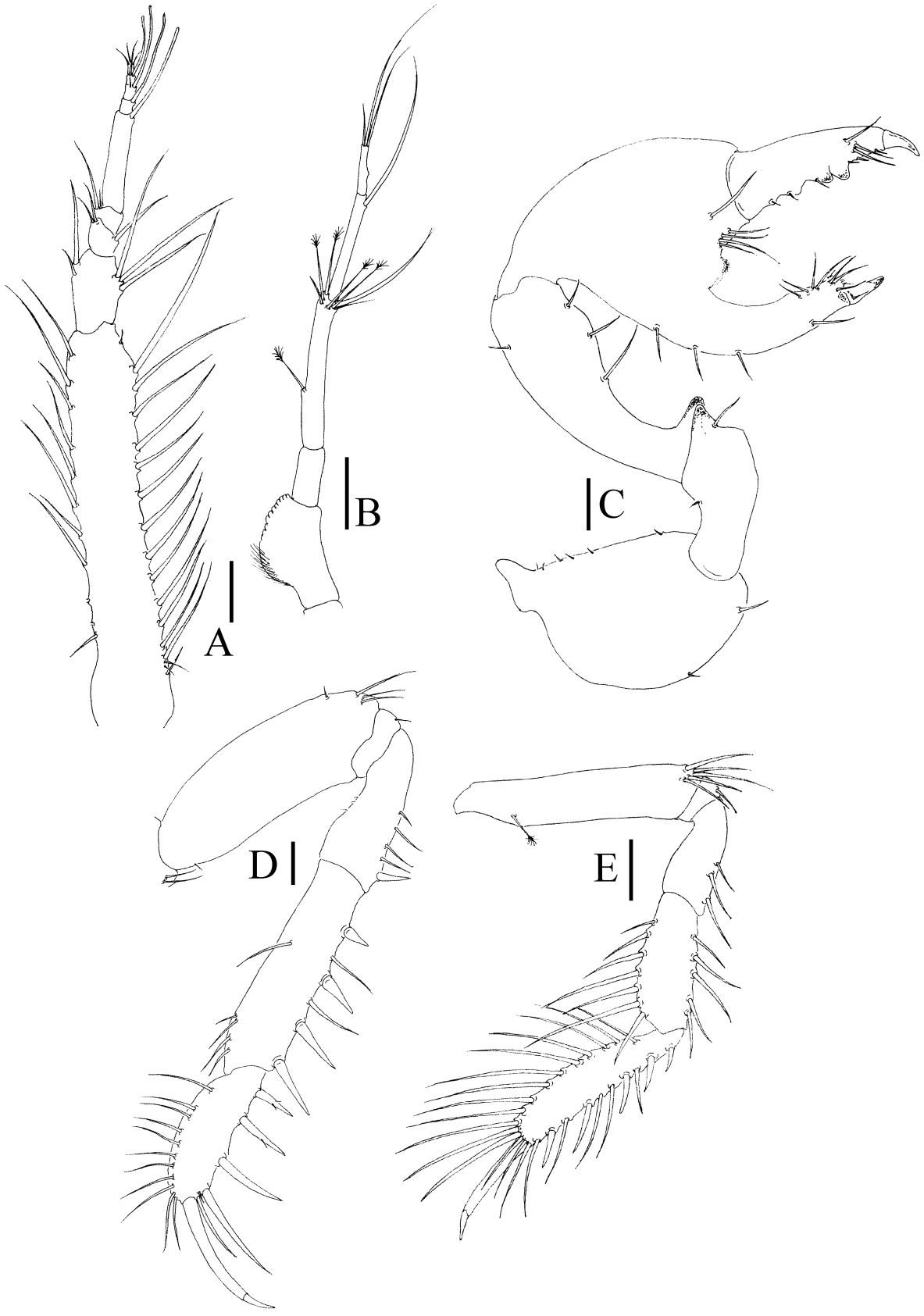

FIGURE 16. *Sphyrapus malleolus*, male, A, antennule; B, antenna; C, cheliped; D, pereopod 1; E, pereopod 2. Scale lines = 0.1 mm.

***Sphyrapus meknes* sp. nov.**
(Figs 17–19)

Material. 1 brooding ♀, **holotype** (BMNH.2010.468), 1 subadult ♀, dissected on three microscope slides, paratype (BMNH.2010.469), Cruise TTR14, Station AT541, Meknès mud volcano, 34°59.103'N 07°04.435'W, 703 m depth, mud breccia and H_2S, TV-grab, Cruise TTR14, 05.08.2004. Coll. MRC.

Description of female. *Body* (Fig. 17), dorsoventrally flattened, elongate, holotype 2.3 mm long, 4.8 times as long as wide, narrowing posteriorly. Cephalothorax subrectangular, slightly longer than wide, anterior margin with conspicuous rounded rostrum. Eyes absent; eyelobes very small; single fine seta posterior to anterolateral corners. Pereonite 1 fused to cephalothorax, one third as long as cephalothorax, laterally rounded, naked. Five free pereonites lateral margins uniformly convex, with three (pereonites 2 to 4), two (pereonite 5) or one (pereonite 6) lateral setae; pereonite 2 as long as but narrower than pereonite 1; pereonites 3 and 5 subequal in length, just longer than pereonite 1; pereonite 4 slightly longer and wider; pereonite 6 shortest, half as long as pereonite 4 (all pereonites respectively 2.8, 2.5, 2.1, 2.1, 2.0 and 3.1 times as wide as long). Pleon three times as long as pereonite 1, of five free subequal pleonites bearing pleopods, and pleotelson; pleonites dorsally convex, narrower posteriorly, pleonite 1 three times as wide as long, pleonite 5 2.3 times as wide as long; each pleonite with two lateral setae, all laterally rounded with no lateral spine-like apophyses. Pleotelson oval, one-third of length of whole pleon, as long as wide, laterally expanded at attachment of uropods and with long distal spine 0.8 times as long as pleotelson.

Antennule (Fig. 18A, A') peduncle 3-articled, proximal article robust, 3.3 times as long as wide, setose along inner and outer margins; second article one-quarter as long as article 1, with inner and outer subdistal pair of simple setae; third article 0.65 times as long as second, with single inner subdistal and distal setae, longer outer medial seta. Accessory flagellum absent. Main flagellum of four segments, proximal segment three-quarters as long as whole flagellum, distal three segments subequal in length, segments 1 and 2 bearing convoluted or annulated aesthetascs.

Antenna (Fig. 18B) peduncle 3-articled, squama absent; proximal article with outer expansion with slightly denticulated, setulose margin; article 2 with inner rounded apophysis and mesial seta, 0.6 times as long as article 1; peduncle article 3 elongate, three times as long as article 2, with two penicillate setae at mid-length and distal crown of two simple and two penicillate setae. Flagellum of three segments.

Mouth parts. Labrum rounded, distally concave and marginally setose. Left mandible (Fig. 18C) pars incisiva and lacinia mobilis with sharp distal teeth, setiferous lobe with six robust setae, pars molaris short, distally with curved denticulations and plumose marginal setae; mandibular palp absent. Right mandible (Fig. 18D) as left but without lacinia mobilis, lacinia teeth more rounded. Maxillule (Fig. 18E) inner endite with four finely setulate distal setae, outer distal margin with seta; outer endite with ten distal spines and two subdistal setae, distal margins finely setose; palp (Fig. 18E') of two articles, distally with one setulose seta. Maxilla (Fig. 18F) with microtrichia on margins; outer lobe of moveable endite with denticulate outer margin, five finely denticulate setae distally; inner lobe of movable endite with three finely denticulate and three simple setae; outer lobe of inner endite with three finely-denticulate spines and three trifurcate spines; inner lobe of fixed endite with rostral row of 17 setae guarding one longer seta. Labium (Fig. 18G) marginally naked, palp with fine lateral setules and one distal laterally-setulose spine. Maxilliped (Fig. 18H) basis not recovered; palp article 1 with single short seta on outer margin; palp article 2 longer than wide, with nine inner setae mainly in two rows and one longer proximal seta, single outer distal spine; palp article 3 with four simple and three distally-tapering setae along inner margin; palp article 4 with six distal setae; endite not recovered. Epignath (Fig. 18I) large, cup-shaped, with inner lobes and setulose distal seta.

Cheliped (Fig. 19A) hammer-like. Basis 1.2 times as long as wide, glabrous; exopodite present, 3-articled, distal article with four setae. Merus subrectangular, ventrally with single distal seta. Carpus 1.5 times as long as wide, with two simple setae along ventral margin, one submarginal mid-dorsal seta. Propodus massive, proximally overhanging carpus, 1.3 times as long as wide; fixed finger 0.6 times as long as palm, ventral margin with four setae, two setae in axis of chela, cutting edge of fixed finger with blunt denticulations and six adjacent setae, distal claw robust; dactylus with two fine setae and distal lamella on cutting edge, three subdistal setae, distal claw robust.

Pereopods: Pereopod 1 (Fig. 19B) much larger than remaining pereopods. Basis stout, 2.2 times as long as wide, with one ventrodistal seta and penicillate seta and two setules dorsoproximally; exopodite present, 3-articled, distal article with five distal plumose setae. Merus 0.6 times as long as basis, with four ventral setae and ventrodistal spine. Carpus 1.5 times as long as merus, with five setae along dorsal margin and four spines and one seta along

ventral margin. Propodus 0.7 times as long as carpus, with 12 dorsal marginal setae, including one dendritic seta, ventral margin with four spines, single distal seta. Dactylus slender, curved, unguis short, both together 0.7 times as long as propodus.

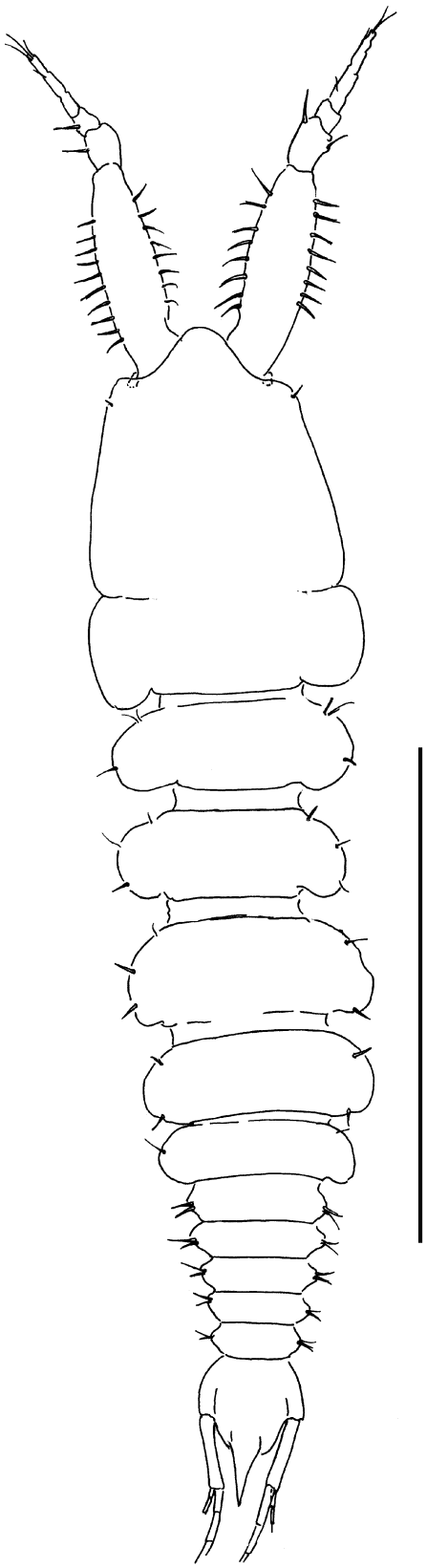

FIGURE 17. *Sphyrapus meknes* **sp. nov.**, holotype female, dorsal. Scale line = 1 mm

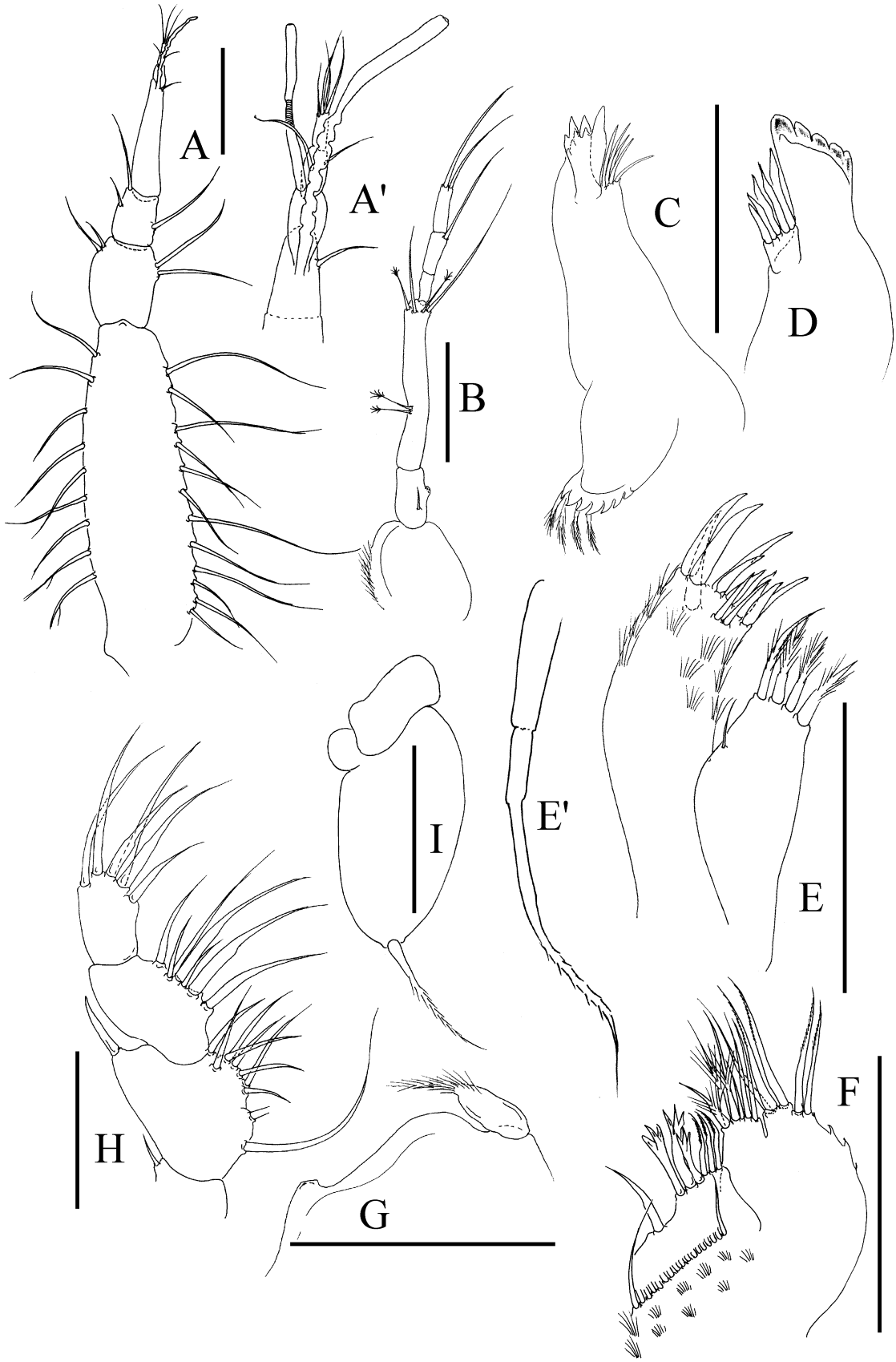

FIGURE 18. *Sphyrapus meknes* **sp. nov.**, paratype female, A, antennule, with A', detail of distal articles; B, antenna; C, left mandible; D, right mandible, distal; E, maxillule endites and E', palp; F, maxilla; G, labium; H, maxilliped palp; I, epignath. Scale lines = 0.1 mm.

FIGURE 19. *Sphyrapus meknes* **sp. nov.**, paratype female, A, cheliped; B–G, pereopods 1 to 6; H, pleopod; I, uropod. Scale lines = 0.1 mm.

Pereopod 2 (Fig. 19C) smaller than pereopod 1; basis 3.6 times as long as wide with two penicillate setae at mid-length and two ventrodistal setae. Ischium with one ventral seta. Merus 0.9 times as long as carpus, with one

simple and one bifurcate ventral setae. Carpus with rows of eight dorsal and five ventral marginal setae. Propodus 1.4 times as long as carpus, dorsal margin with ten long setae, ventral margin with six setae and five shorter spines, distal seta adjacent to dactylus. Dactylus slender, curved, unguis short, the two together just over half as long as propodus. Pereopod 3 (Fig. 19D) similar to pereopod 2, but with fewer setae, propodus with four ventral spines.

Pereopod 4 (Fig. 19E) basis 3.9 times as long as wide, with two dorsoproximal penicillate seta, fine ventral subdistal seta, and two ventrodistal setae, vestigial exopod present proximally; ischium with one ventral seta; merus half as long as carpus, with three ventrodistal setae; carpus with one ventral seta, submarginal row of seven setae curving to mid-distal margin, and dorsally with two simple setae in distal half; propodus 0.6 times as long as carpus, with two ventral spines, distally with crown of ten finely-denticulate setae and one pectinate spine; dactylus with ventrodistal setule, together with short claw 0.7 times as long as propodus and shorter than longest dorsodistal propodal setae.

Pereopod 5 (Fig. 19F) basis 3.5 times as long as wide with two dorsal penicillate setae, fine ventral subdistal seta, and three plumose ventrodistal setae, vestigial exopod present proximally; ischium with one ventral seta; merus just more than half length of carpus, with one simple and four plumose-dendritic dorsal setae, ventrally with one plumose and two plumose-dendritic setae; carpus dorsally with three plumose and one plumose-dendritic setae, ventrally with four plumose and one plumose-dendritic setae plumose setae; propodus just over half as long as carpus, with ventral row of 10 short leaf-like, bilaterally-setulose spines, strong distal seta exceeding length of dactylus plus unguis; dactylus and short unguis curved, together 1.3 times as long as propodus.

Pereopod 6 (Fig. 19G) basis with four simple and four dendritic setae along ventral margin, no vestigial exopodite; seta on ischium dendritic; merus almost as long as carpus, with two plumose dorsal setae and three plumose-dendritic ventral setae; carpus with three simple dorsal setae and three finely plumose ventral setae; propodus half as long as carpus, with ventral row of 6 short leaf-like, bilaterally-setulose spines, strong distal seta as long as dactylus plus unguis; dactylus and short unguis straight, together 1.4 times as long as propodus.

Pleopods (Fig. 19H) all alike. Basis elongate, with one outer plumose setae. Endopod and exopod subequal in length without proximal articulation; both rami with one proximal and four distal plumose marginal setae.

Uropod (Fig. 19I) biramous, both rami filiform. Basis with penicillate seta on outer margin; exopod with two segments; endopod elongate with 12 segments.

Male unknown.

Holotype has 10 eggs in the brood-pouch.

Etymology. Named after the Meknès mud volcano, the type-locality (noun in apposition).

Remarks. The only genus of the Sphyrapinae without a multi-segmented accessory flagellum on the antennule is *Sphyrapus*, with which genus the morphology of *S. meknes* **sp. nov.** is largely consistent. The only previously-described species of *Sphyrapus sensu stricto*, *S. malleolus* (see above) has spine-like lateral apophyses on pleonite 2; *S. meknes* is thus immediately distinguished as not having these apophyses. Further, while the accessory flagellum on the antennule is present either as a 1-segmented or unsegmented small setose tubercle in *S. malleolus*, it is quite absent in the present species.

Other characterizing, and unusual, features of *Sphyrapus meknes* include the bifurcate-dendritic setae on pereopods (e.g. Fig. 19F); these are essentially branched setae, which on the posterior pereopods are also plumose, and have not been recorded in any other sphyrapid species. The presence of a vestigial exopod on the basis of each of pereopods 4 and 5 in the adult female is also unprecedented; exopods have been found to be present on these two pereopods in the manca of some sphyrapids, e.g. *Pseudosphyrapus quintolongus* Kakui *et al*., 2007 (q.v.) (as also in some kalliapseudids, e.g. Lang 1956), but this is the first time any trace of exopods on posterior pereopods has been found to persist in an adult apseudomorph.

Sphyrapus meknes was only found at the Meknès mud volcano at 703 m depth in sulphurous mud.

Subfamily Pseudosphyrapodinae Guțu, 1980

Genus *Pseudosphyrapus* Guțu, 1980

cf. *Pseudosphyrapus* sp. A nov.
(Fig. 20)

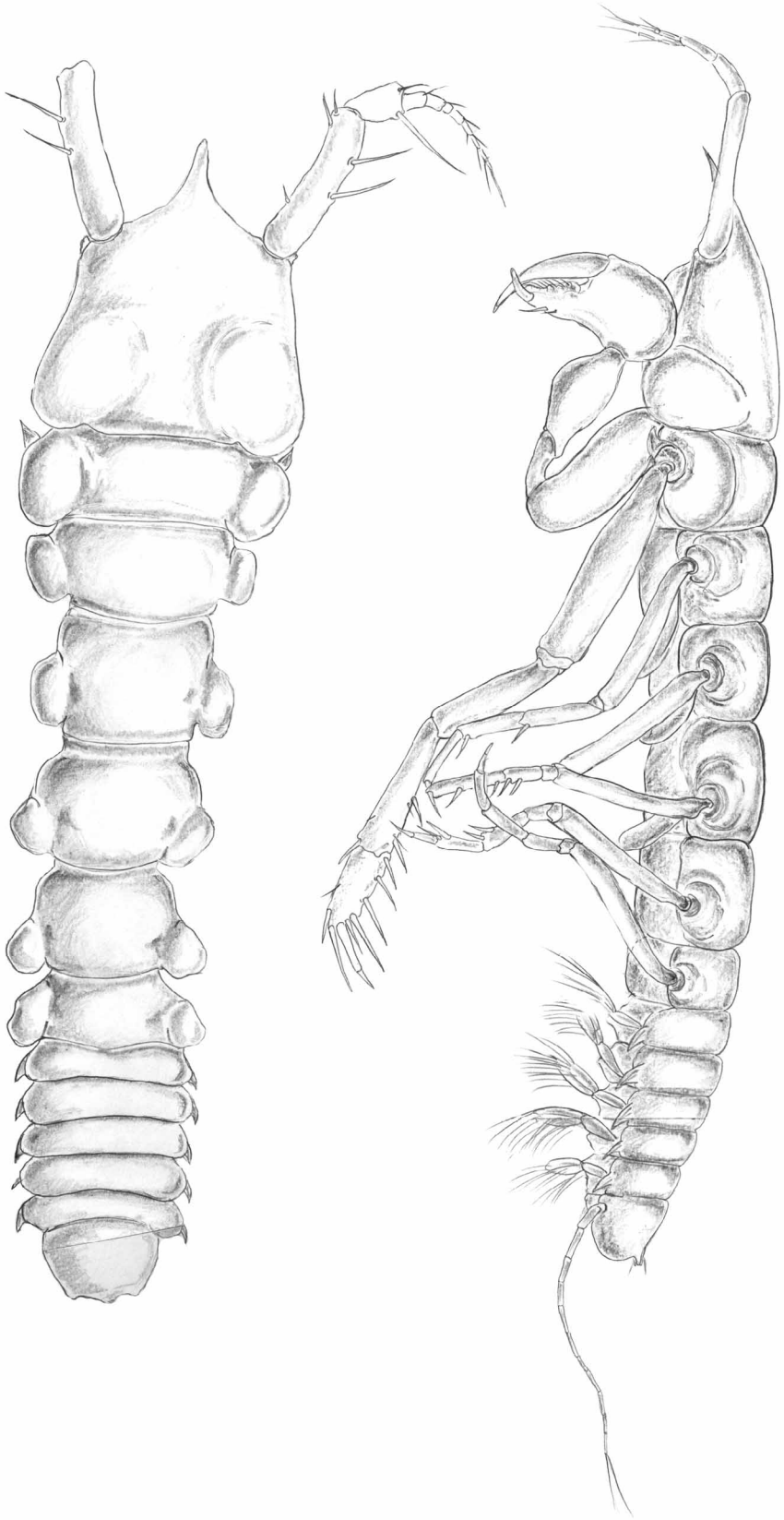

FIGURE 20. cf. *Pseudosphyrapus* sp. A nov., female, dorsal (left) and lateral (right).

Material examined. 1 damaged ♀ with oostegites (BMNH.2010.470), Cruise TTR15, Station AT559, Kidd mud volcano, 35°24.777'N 06°43.782'W, 552 m depth, mud, Boxcore, 08.08.2004; 3 fragmented ♀♀ (BMNH.2010.471-

473), Station AT391, Jesus Baraza mud volcano, 35°35.439'N 07°12.264'W, 1105 m depth, carbonate clay and mud breccia, TV-grab, 09.07.2002; coll MRC.

Partial description of female. Body (Fig. 20) typical of a sphyrapid, length of adult female 1.86 mm, five times as long as wide; cephalothorax subrectangular, glabrous, about as long as wide, with pronounced pointed, tapering rostrum; eyes absent, eyelobes reduced to small pointed tubercles. Six free pereonites, pereonite 1 not fused to cephalothorax; all pereonites laterally convex, expanded at attachment of coxae; pereonites 1 and 6 subequal in length, about one-quarter as long as cephalothorax; pereonites 2 and 5 subequal in length, 1.2 times as long as pereonite 1; pereonites 3 and 4 subequal in length, 1.5 times as long as pereonite 1. Pleon three times as long as pereonite 1, of five free subequal pleonites bearing pleopods, and pleotelson; pleonites all of equal width with short, posteriorly-oriented lateral spine-like apophyses, each about five times as wide as long. Pleotelson semicircular, one-third of length of whole pleon, 0.7 times as long as wide, with distinct posterolateral corners and small dorsal mid-distal tubercle but no distal spine; uropods attached anteriorly.

Antennule with 4-articled peduncle, main flagellum of 5 or 6 subequal articles, accessory flagellum absent. Antenna without squama or pseudosquama. Cheliped typically hammer-like. Pereopod 1 longer than other pereopods, merus and carpus subequal in length, propodus 0.6 times as long as carpus with five ventral spines.

Remarks. The material of this taxon is too damaged to allow a competent description, and thus we refrain from naming this undoubtedly new species. In particular, the presence or absence of a mandibular palp is unknown. The conspicuous rostrum, articulation of pereonite 1 with the cephalothorax, parallel-sided pleon with small lateral spine-like apophyses, and short proximal article in the antennular main-flagellum are all typical of *Pseudosphyrapus*, but the present species has no accessory flagellum on the antennule, a feature of *Sphyrapus* (see above) but of no species of *Pseudosphyrapus* or indeed of any other genus of the Sphyrapodidae. The only species of *Pseudosphyrapus* recorded previously from the north-east Atlantic is *P. centobi* Băcescu, 1981 (*q.v.*), but, in addition to a two-segmented accessory flagellum, that species has a rounded rostrum, and has pereonites and pleonites of quite different proportion from the present species.

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