



Zoidbergus*, a new genus of Apseudidae (Tanaidacea) with remarks on *Apseudes siegi* and *Apseudes vitjazi

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Abstract: *Zoidbergus*, a new genus of Apseudidae, is described for deep-water Tanaidacea classified previously in the genus *Apseudes*: *A. abyssalis*, *A. lagenirostris*, *A. paragracilis*, *A. tenuimanus*, *A. tenuis* and *A. vicinus*. The new genus differs from *Apseudes s. str.* by having acute eyelobes without visual elements, elongated second article of mandibular palp, and carpus of pereopods 2–3 longer than or as long as propodus. *Zoidbergus* gen. n. can also be distinguished from *Apseudes s. str.* by the lack of large bases of pereopods 5–6 covered by numerous plumose setae as well as the lack of dense plumose setation on lateral margins of pereonites and pleonites. By general body habitus and structure of pereopods *Zoidbergus* gen. n. resembles the apseudid genus *Leviapseudes*, although the genera can be distinguished by the presence of leaf-shaped seta and elongated pereonites 3–6 in *Leviapseudes*. Based on specimens collected during the IceAGE1 Cruise in September 2011, *Zoidbergus tenuis* is redescribed and morphology of an undescribed species *Zoidbergus* sp. A is provided. Supplementary description for *Zoidbergus vicinus* is given based on type material from Statens Naturhistoriske Museum, University of Copenhagen. Additionally comments on the other deep water *Apseudes* species: *A. siegi* and *A. vitjazi*, are given.

Key words: Icelandic waters, Apseudomorpha, *Apseudes*, *Zoidbergus*, deep-sea.

Introduction

Apseudes was the very first genus of Tanaidacea described (Leach 1814). Its initial diagnosis was so imprecise that most members of suborder Apseudomorpha could be easily classified to that genus. In fact this general character of the diagnosis affected further systematics of the genus and for 70 years after Leach's definition all apseudomorph species were classified as *Apseudes* (Błażewicz-Paszkowycz and Bamber 2007). It has since been realized that *Apseudes sensu* Leach (1814) was a polymorphic genus and about 80 species primarily classified in *Apseudes* have been transferred to other genera, 26 of which were new for science (*e.g.*, Lang 1968, 1970; Băcescu and Guțu 1971; Guțu 1981, 2006). Nevertheless *Apseudes* is still

considered a heterogenous group (Guțu 1995, 2002, 2006; Larsen 2005); that functioning as a “garbage can” taxon. Currently, *Apsuedes* includes 49 species, making it the most speciose genus among all of Tanaidacea (Anderson 2013).

The morphology of members of *Apseudes* is highly diversified. Their body might be short and flattened or long and cylindrical, with or without lateral apophyses; eye lobes can be pointed or rounded, fused or not to the cephalothorax and with or without visual elements; cheliped can be large or slim, with or without exopod; pleopods can be well developed or reduced in a different degree, or absent. *Apseudes* also has a worldwide distribution. It occurs from tropical to polar regions and from shelf to abyssal plain, and its members have been recorded in variety of substrata, *e.g.*, muddy or sandy bottom, gravels, sponges or algae, and ecosystems, *e.g.*, coral reefs as well as dead corals, river estuaries or mud volcanoes.

As was shown by Guțu (2002, 2006) the central problem in definition and composition of genus *Apseudes* was a lack of information on the morphology of the type species, *A. talpa* (Montagu, 1808). A backbone for further consideration on *Apseudes* taxonomy was the recent redescription of *A. talpa* by Larsen *et al.* (2011). Of significance, their redescription of *A. talpa* impelled the synonymization of *Androgynella* Guțu, 2006 with *Apseudes* (Larsen *et al.* 2011). Later Błażewicz-Paszkowycz and Bamber (2012) synonymized *Annexos* Błażewicz-Paszkowycz *et Bamber*, 2007 and *Xantapseudes* Guțu, 2008 with *Apseudes*, while Araújo-Silva *et al.* (2013) synonymized *Muramura* Guțu, 2007 with *Apseudes*.

The present paper revises the systematic position of some deep-water species formerly placed within the genus *Apseudes*, whose morphology does not agree with the diagnosis of the type species *A. talpa*. A new genus is established to accommodate *A. abyssalis* Błażewicz-Paszkowycz *et Larsen*, 2004, *A. lagenirostris* Lang, 1968, *A. paragracilis* Kudinova-Pasternak, 1975, *A. tenuimanus* G.O. Sars, 1882, *A. tenuis* Hansen, 1913 and *A. vicinus* Hansen, 1913 as well as a newly discovered but as yet undescribed Icelandic species. Additionally, the systematic position of two other deep-water *Apseudes* species are changed: *Apseudes siegi* Kudinova-Pasternak, 1985 is transferred to *Leviapseudes* Sieg, 1983 and *A. vitjazi* Kudinova-Pasternak, 1970 is transferred to *Fageapseudes* Băcescu *et Guțu*, 1971.

Material and methods

Tanaidacean material was collected off Iceland using an epibenthic sledge (EBS) during the IceAGE1 cruise on R/V *Meteor* M85/3 in August and September 2011. Type material of *Zoidbergus vicinus* was examined during the SYNTHESYS project (DK-TAF 537) in Zoological Museum, Natural History Museum of Denmark.

Appendages were dissected using chemically-sharpened tungsten-wire needles, stained in glycerine and then fixed with euparal as permanent slides. Drawings were prepared using a laboratory microscope combined with a *camera lucida*

and redrawn using a digital tablet as proposed by Coleman (2003). The ratio of articles was measured along their central axis; body length was measured from tip of the rostrum to the end of pleotelson, body width was measured in widest part of cephalothorax. The morphological terminology follows that proposed by Błażewicz-Paszkowycz and Bamber (2007).

Systematics

Order Tanaidacea Dana, 1849
Suborder Apseudomorpha Sieg, 1980
Family Apseudidae Leach, 1814
Subfamily Apseudinae Leach, 1814

Zoidbergus gen. n.

Type species. — *Z. vicinus* (Hansen, 1913) by designation.

Species included. — *Z. abyssalis* (Błażewicz-Paszkowycz *et al.* 2004); *Z. lagenirostris* (Lang, 1968); *Z. paragracilis* (Kudinova-Pasternak, 1975); *Z. tenuimanus* (G.O. Sars, 1882); *Z. tenuis* (Hansen, 1913); *Z. vicinus* (Hansen, 1913).

Etymology. — Named after doctor John A. Zoidberg, a crustacean-like alien from the animated television series *Futurama*.

Gender. — Masculine.

Diagnosis. — Apparently lack of hermaphroditism. Carapace with lateral apophyses, eyelobes fused with carapace without visual elements, rostrum well developed, pointed. Pereonites 4–5 longer than wide, pereonite-6 as long as wide or wider, pereonites 3–6 with distinct acute anterolateral apophyses. Pereonites and pleonites without rows of plumose setae on lateral margins. Mandibles with triarticled palp, palp article-2 at least as long as articles 1 and 3 combined. Cheliped and pereopod-1 with exopod. Maxilliped endite without leaf-shaped seta. Pereopods 2–3 carpus as long as propodus or longer. Pereopod-4 dactylus reduced in length but simple. Pereopods 5–6 basis of similar width as in pereopods 1–3, and with only single plumose setae and propodus with a row of small spines ventrally.

Remarks. — Definition of *Zoidbergus* gen. n. is a further attempt for revising the heterogeneous genus *Apseudes* after *e.g.*, Lang (1968, 1970) or Guțu (1981, 2006). This is the first after redescription of the type species *A. talpa* and rediagnosis of *Apseudes* by Larsen *et al.* (2011). Description of this new genus excludes from *Apseudes* six deep-water species (*Z. abyssalis*, *Z. lagenirostris*, *Z. paragracilis*, *Z. tenuimanus*, *Z. tenuis* and *Z. vicinus*) whose morphology disagrees with the diagnosis of *Apseudes*. Definition of *Zoidbergus* corresponds with the concept of Guțu (1981), who split all *Apseudes* species known at that time into three hypothetical genera (A, B and C).

Genus A, with *A. talpa* as generotype, was characterised by robust and dorso-ventrally flattened body, with or without lateral apophyses; pereonites 5 and 6 wider than long (in Guțu's nomenclature 6 and 7); basis of pereopod-6 (pereopod-7 according to Guțu) wide, with a row of plumose setae on one of the edges and biramous, well developed pleopods in five pairs. Genus B represented by *A. spinosus* M. Sars, 1858 was diagnosed as having: cylindrical body with well marked lateral apophyses on pereonites; pereonites 5 and 6 as long as wide; basis of pereopod-6 cylindrical, with a row of plumose setae on one of the edges and biramous and well developed pleopods in five pairs. The last genus, C, with *A. lagenirostris* as generotype, was described by Guțu (1981) as having cylindrical body, with lateral apophyses on pereonites; pereonites 5 and 6 longer than wide, basis of pereopod-6 cylindrical, but without row of plumose setae. Pleopods in this genus are well developed, reduced or absent. None of these genera were officially described.

Zoidbergus gen. n. reveals a combination of features of genera B and C as proposed by Guțu (1981). Its representatives have a cylindrical body with well developed lateral apophyses on pereonites, pereonites 4 and 5 longer than wide, pereonite-6 as long as wide or wider and pleopods well developed, what makes it closer to genus B, but basis of pereopod-6 cylindrical and without row of plumose setae as in genus C.

Zoidbergus gen. n. can be distinguished from the remaining genera of Apseudinae by combination of characters listed in Table 1. In general view it is morphologically similar to *Langapseudes* Băcescu, 1987 sharing body habitus, shape and armament of cheliped, pereopods and mouthparts. The main character that distinguishes these two genera is the structure of pleopods, which are well developed in both sexes of the new genus (e.g., *Z. paragracilis* see Józwiak and Błażewicz-Paszkowycz 2007, fig. 3H), while males of *Langapseudes* have reduced pleopods with an elongated peduncle and shortened rami. Pleopods in females of *Langapseudes* are unknown (Băcescu 1987). Additionally, *Zoidbergus* gen. n. and *Langapseudes* can be distinguished by the presence of two lateral apophyses on the second pereonite of the latter genus.

Zoidbergus gen. n. has well developed squama that differentiates it from *Taraxapseudes* Leach, 1813, which lacks squama or has shortened squama terminated by a single seta (Lang 1968, fig. 21d; Santos and Hansknecht 2007). Further, the new genus differs from *Tuberapseudes* Băcescu et Guțu, 1971 by combination of: pereonite-6 shorter than wide; carapace, pereonites and pleonites without numerous plumose setae laterally; pereopod-6 basis without row of plumose setae and lack of tubercles on pleonites ventrally (Băcescu and Guțu 1971; Norman and Stebbing 1886).

There is no consensus on the systematic position of *Obscurapseudes* Guțu, 2006, which shows some similarities with *Colobocladus* Gutu, 2006, *Leviapseudes* and deep-water species of *Apseudes* (Guțu 2006), however its original definition lacks information about leaf-shaped setae on maxillipedal endite. Nev-

Table 1
Morphological differences between *Zoidbergus* gen. n. and remaining genera classified to subfamily Apseuidinae Leach, 1814.

Character	<i>Zoidbergus</i> gen. n.	other Apseuidinae genera
Eyelobes	acute, without visual elements, fused with the carapace	rounded with visual elements and separated from carapace (in <i>Apseudes</i> s. str., <i>Falsapseudes</i> Guțu, 2006 and <i>Paradoxapseudes</i> Guțu, 1991)
Article-2 of mandibular palp	elongated – longer than the combined length of articles 1–3	shorter or at least equal to two remaining articles combined length (in <i>Apseudes</i> s. str., <i>Apseudopsis</i> Norman, 1899, <i>Bilobatus</i> Sieg, 1993, <i>Bunakenia</i> Guțu, 1995, <i>Dactyloprion</i> Guțu, 2002, <i>Hainanius</i> Bamber, 1998, <i>Mendamanus</i> Bamber, 1998, <i>Paradoxapseudes</i> and <i>Pectinapseudes</i> Băcescu et Williams, 1988)
Carpus of pereopods 2 and 3	longer than propodus	shorter than or as long as propodus (in <i>Apseudes</i> s. str., <i>Apseudopsis</i> , <i>Bilobatus</i> , <i>Bunakenia</i> , <i>Dactyloprion</i> , <i>Falsapseudes</i> , <i>Mendamanus</i> , <i>Paradoxapseudes</i> and <i>Tuberapseudes</i>)
Bases of pereopods 5-6	slender and missing a row of plumose setae	visibly thicker than pereopods 2–3, with at least one margin of basis of each pereopod covered by a row of plumose setae (in <i>Apseudes</i> s. str., <i>Apseudopsis</i> and <i>Hainanius</i>)
Anterolateral apophyses on pereonites	present	absent (in <i>Bunakenia</i> ; <i>Glabroapseudes</i> Guerrero-Kommritz et Heard, 2003, <i>Paradoxapseudes</i> , <i>Pectinapseudes</i>)
Cheliped and pereopod-1 exopod	present on both appendages	absent on both appendages (in <i>Atlantapseudes</i> Băcescu, 1978 and <i>Typhlapseudes</i> Beddard, 1886)
Rostrum	present	absent (in <i>Glabroapseudes</i>)

ertheless it can be distinguished from *Zoidbergus* by having posterolateral apophyses on first pereonite.

Zoidbergus is distinguished from *Spinapseudes* Guțu, 1996, by having strong spines on the ventral margin of the merus, carpus and propodus of pereopod-1, a relatively short second article in the peduncle of the antenna that is shorter than articles 4 and 5 combined, and a lack of apophyses on coxae of pereopods 2 to 6.

Zoidbergus is classified within subfamily Apseuidinae, however the new genus comprises exclusively deep-water taxa, whose morphology resembles members of subfamily Leviapseudinae Sieg, 1983 e.g., *Leviapseudes* or *Colobocladus* by having a cylindrical and elongated body or smooth pereopods basis. This corresponds with an opinion by Guțu (1972, 1981, 2006) that deep-water Apseuidinae are presumably more similar to Leviapseudinae than to shallow-water Apseuidinae. Moreover Leviapseudinae is considered to be an artificial group as its main diagnostic character, presence of leaf-shaped setae on the maxillipedal endites, is described as not adequate for subfamily level or potentially homoplasious (Kudinova-Pasternak 1978, 1983; Larsen 1999, 2005; Guțu 2006). Błażewicz-Paszkowycz and Larsen (2004) stated that there is no apomorphy that could satisfactorily separate Apseuidinae from

Leviapseudinae, so further comparison of *Zoidbergus* with Leviapseudinae genera is necessary. The new genus differs from Leviapseudinae by combination of following features:

- Sixth pereonite wider than long or maximally a little longer than wide. In *Colobocladus*, *Eliomosa* Guțu, 2006 and *Leviapseudes* pereonite-6 is strongly elongated.
- Simple dactylus of pereopod-4. In *Colobocladus* and partly in *Carpoapseudes* Lang, 1968, *Fageapseudes* and *Leviapseudes* dactylus of fourth pereopod is ventrally serrated.
- “Fossorial” pereopod-1 with wide merus, carpus and propodus, and carpus longer than merus. Members of *Carpoapseudes* have first pereopod apparently slender, with distal articles narrow and parallel to both margins.
- Acute eyelobes and apophyses on pereonites. Rounded eyelobes and smooth lateral margins of pereonites are characteristic for *Eliomosa*.
- Well developed pointed rostrum. Main diagnostic feature of *Fageapseudes* is a lack of a rostrum (Băcescu and Guțu 1971).

Zoidbergus tenuis (Hansen, 1913) n. comb.

(Figs 1–2)

Apsudes tenuis Hansen 1913: 12–13, pl. I, fig. 2.

Material examined. — One female (ZMH-K 44206), one female dissected on slides (ZMH-K 44207), R/V *Meteor*, ME853/1017-1, 62°55.96' N 20°45.98' W, depth 909.5–914.9 m, EBS, 03 Sept 2011.

Diagnosis. — Pereonites 2–4 with midlateral apophyses. Pleonites with apophyses. First article of antennule with serration. Mandibles with serrated outer margin, first article of palp with setae. Second article of maxillipedal palp with outerodistal spine. Cheliped merus with two ventral spines, fixed finger elongated (3.5 times as long as wide). Pereopod-1 carpus with two ventral spines.

Supplementary description of female. — Antennule (Fig. 1A) peduncle first article 6.3 times as long as wide, with serration with adjacent two short setae and three long setae on inner margin; outer margin with simple and bipinnate setae as figured. Second article 3.6 times as long as first article, with two simple setae subdistally on inner margin and three simple and two bipinnate setae distally. Third article about three-quarter as long as second article, with three simple and two minute setae distally. Fourth article naked. Accessory flagellum of four articles, setation as figured; last article terminated by three simple setae. Main flagellum of eight articles; article-6 with aesthetasc; last article with four simple setae; setation on remaining articles as figured.

Antenna (Fig. 1B) peduncle of five articles; first article with simple seta proximally and few denticles on inner margin; second article three times as long as wide, with two denticles with adjacent seta in the middle of inner margin and two denticles distally on inner margin and short seta distally on outer margin; squama

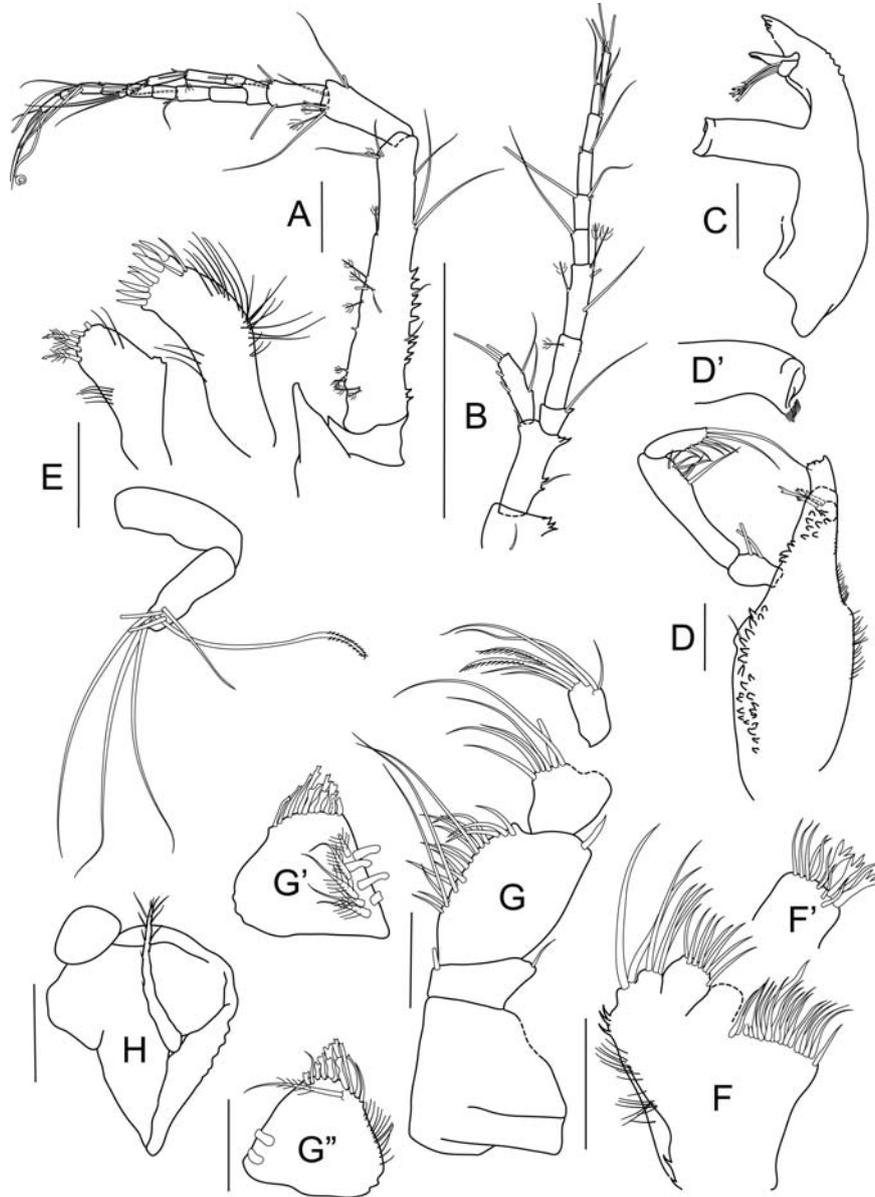


Fig. 1. *Zoidbergus tenuis* (Hansen, 1913) female: antennule (A), antenna (B), left mandible (C), right mandible (D), molar process (D'), maxillule (E), maxilla (F), outer lobe of fixed endite (F'), maxilliped (G), maxillipedal endites (G'–G''). Scale bars = 0.2 mm for A; 0.5 mm for B and 0.1 mm for C–H.

well developed, with six (?) simple setae; third article of peduncle short, 0.3 times as long as article-2, with one small denticle and one simple seta outerodistally. Articles 4–5 equal in length; fourth article with two bipinnate setae subdistally; article-5 with two simple and two bipinnate setae on inner margin and one bipinnate

outer seta. Flagellum of six articles; each article with at least one long simple seta; last article terminated with three setae.

Mouthparts: Left mandible (Fig. 1C) with serration on outer margin; molar strongly chitinised and with minute setae terminally; incisor with four denticles; *lacinia mobilis* with at least two denticles, setiferous lobe with five bi- and multifurcated setae. Right mandible (Fig. 1D) body with outer denticles and minute setae; incisor with four small denticles; setiferous lobe with four bi- and multifurcated setae; palp of three articles; first article short, with two setae on inner margin; second article about three times as long as first article, with a row of simple setae (one distinctly longer); third article half as long as second article, with a row of seven simple setae increasing in length towards distal margin. Maxillule (Fig. 1E) inner endite with five setae terminally, at least three of them plumose and two of them with compound tip; lateral margins with simple setae. Outer endite with two simple setae subdistally and eight spines terminally; lateral margins with numerous simple setae. Palp of two articles; second article with seven setae terminally, one of them with minute hooks on distal part. Maxilla (Fig. 1F) outer lobe of moveable endite with two subdistal and four distal setae; inner lobe of moveable endite with about eight setae distally and minute setation on lateral margins; outer lobe of fixed endite (Fig. 1F') distally with combination of nine simple and three multifurcate setae; inner lobe of fixed endite with 19 simple setae in front and one stronger seta at the back. Maxilliped (Fig. 1G) basis naked; palp first article with one inner and one outer setae; second article with 15 short and three long setae on inner margin and one outerodistal spine; third article with six setae on inner margin; last article with five simple and two serrated setae. Endites (Fig. 1G', G'') inner margin with apparently four coupling hooks and a row of plumose setae; distal margin with simple, bi- and multifurcated setae and one large plumose seta. Epignath (Fig. 1H) broad, with long terminal seta covered by minute setae.

Cheliped (Fig. 2A) basis with strong spine and tuft of three setae ventrally; merus with five simple setae and two spines ventrally; carpus elongated, 2.2 times as long as merus, with eight setae ventrally and three setae dorsally. Propodus 0.4 times as long as carpus, with one seta on each dorsal and ventral margin and two simple and one small serrated setae near dactylus insertion. Fixed finger with four setae ventrally and 10 setae on cutting edge. Dactylus similar in length to fixed finger, with tuft of three setae dorsally.

Pereopod-1 (Fig. 2B) basis 3.8 times as long as wide, with four minute simple and one bipinnate setae dorsally, two minute and one simple setae ventrally and two setae and one spine ventrodistally; ischium with two minute and one long simple setae; merus 0.6 times as long as basis, with a row of six simple setae on midlength, five simple setae and one spine ventrally and one simple seta and one spine dorsally; carpus 0.9 times as long as merus, with four short, two long simple setae and two spines ventrally and nine setae and one spine distodorsally; propodus as long as carpus, with five spines ventrally, three setae and two spines dorsally and one simple

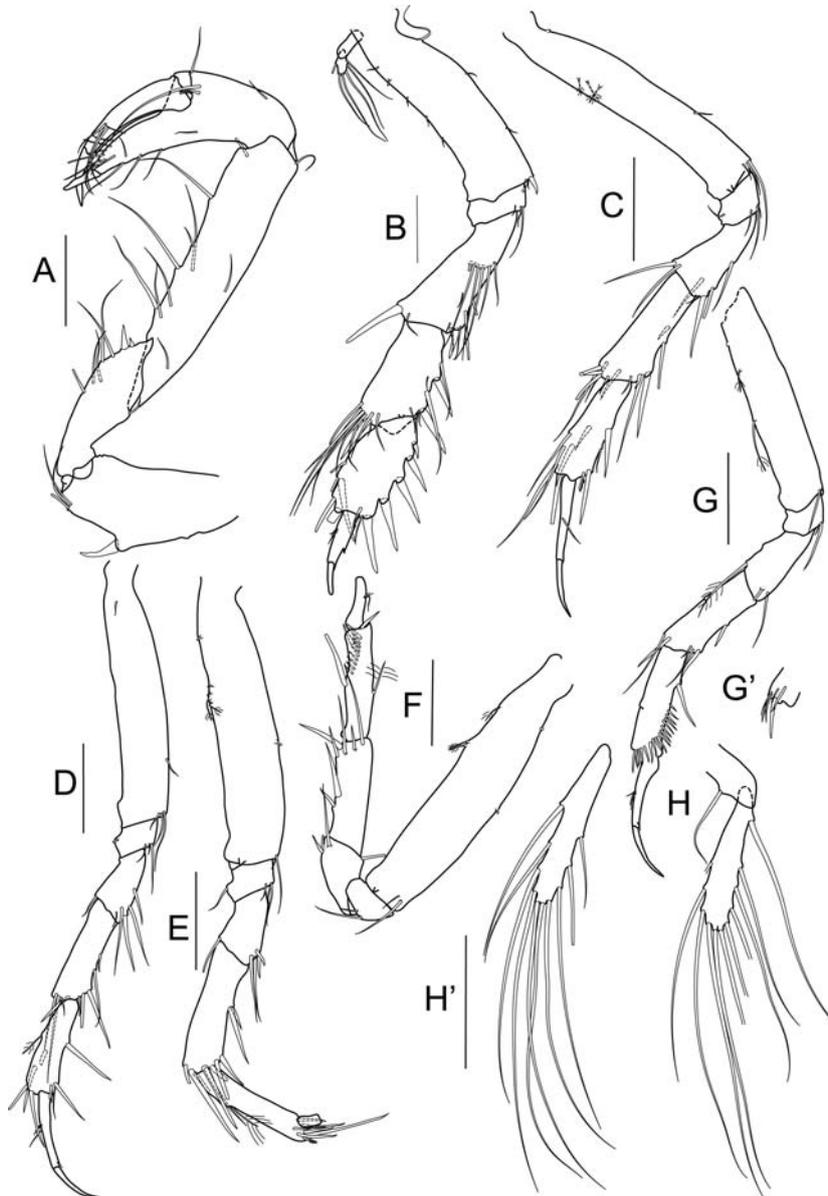


Fig. 2. *Zoidbergus tenuis* (Hansen, 1913) female: cheliped (A), pereopod-1 (B), pereopod-2 (C), pereopod-3 (D), pereopod-4 (E), pereopod-5 (F), pereopod-6 (G), propodus distally (G'), basis and endopod of pleopod (H), exopod of pleopod (H'). Scale bars = 0.2 mm.

and one serrated setae distally; dactylus with two ventral denticles and three minute setae dorsally.

Pereopod-2 (Fig. 2C) basis five times as long as wide, with three bipinnate setae dorsally and one bipinnate and one simple setae ventrally and three simple

setae distoventrally; ischium with two short and one long setae ventrally and one seta dorsally; merus 0.3 times as long as basis, with three setae ventrally, one subdistally and two setae in dorsodistal corner; carpus 1.5 times as long as merus, with three setae (one stronger) and two short spines ventrally, three setae distally and five setae distodorsally; propodus 0.9 times as long as carpus, with one simple and two stronger setae ventrally, one serrated and one simple setae distally and three simple and two stronger setae dorsally; dactylus and unguis 1.3 times as long as propodus, dactylus with at least one dorsal seta.

Pereopod-3 (Fig. 2D) similar to pereopod-2, but with bipinnate dorsal seta on propodus.

Pereopod-4 (Fig. 2E) basis five times as long as wide, with five bipinnate setae dorsally, one bipinnate seta ventrally and two simple setae distoventrally; ischium with three ventral and one dorsal setae; merus 0.2 times as long as basis, with one seta distodorsally and two setae and two spines distoventrally; carpus twice as long as merus, with one strong seta and one spine ventrally midlength and eight setae distally; propodus subequal to carpus, with bipinnate seta dorsally and six simple and one serrated setae distally.

Pereopod-5 (Fig. 2F) basis 5.7 times as long as wide, with three bipinnate setae dorsally, two bipinnate setae ventrally and two simple setae distoventrally; ischium with two setae; merus with one seta distodorsally and three setae ventrodistally; carpus 1.5 times as long as wide, with two spines ventrally midlength and one spine and three setae distally; propodus similar in length to carpus, with one bipinnate seta dorsally and one strong seta and a row of small spines ventrally; dactylus with three minute setae dorsally.

Pereopod-6 (Fig. 2G) basis with three bipinnate setae dorsally and one simple seta distoventrally; ischium with two setae; merus with two simple setae distoventrally and one plumose seta distodorsally; carpus 1.2 times as long as merus, with one spine on midlength ventrally and two strong and three simple setae distally; propodus just longer than carpus, with bipinnate seta dorsally, one seta on midlength ventrally, one spine and five setae distodorsally and a row of small spines ventrally and distally; dactylus with one ventral and three dorsal setae; dactylus and unguis 1.2 times as long as propodus.

Pleopod (Fig. 2H, H') basis with dorsal seta; endopod with one proximal seta and 10 setae in distal part; exopod with 10 setae (all setae plumose).

Remarks. — This species can be distinguished from the other members of the genus by combination of characters as: the presence of two ventral spines on the cheliped merus, serration on the antennule basis, and presence of midlateral apophyses on pereonites 3–4. Additionally *Z. tenuis* has a serrated outer margin of the mandible that distinguishes it from *Z. abyssalis*, *Z. lagenirostris*, *Z. paragracilis* and *Zoidbergus* sp. A. Outerodistal spine on maxillipedal article-2 allows to distinguish *Z. tenuis* from *Z. abyssalis*, *Z. lagenirostris* and *Z. paragracilis* which have long, simple setae on second article of maxilliped.

Distribution. — This species is widely distributed in North-east Atlantic: Denmark Strait, Davis Strait, Hebrides Slope, Rockall Trough, Porcupine Seabight, North Biscay, South Biscay in a depth range 909.5–2910 m (Hansen 1913; Bird 2001; this paper).

Zoidbergus vicinus (Hansen, 1913) n. comb.

(Figs 3–5)

Aapseudes vicinus Hansen, 1913: 11–12, pl. I, fig. 1.

Material examined. — Female from type collection (ZMUC-CRU-20397), R/V *Thor*, 62°57' N 19°58' W, depth 924 m.

Diagnosis. — Pereonites 3 to 4 with midlateral apophyses. Pleonites with apophyses. First article of antennule with serration. Mandibles with serrated outer margin, first article of palp with setae. Cheliped merus with one ventral spine, fixed finger short (2.4 times as long as wide). Pereopod-1 carpus with two ventral spines.

Supplementary description of female (paratype). — Antennule (Fig. 3A) first article of peduncle 4.7 times as long as wide, with serration and at least nine simple setae of different length on inner margin; outer margin with five bipinnate and two simple setae; distally three simple and three bipinnate setae. Second article 0.25 times as long as first article, with four bipinnate and six simple setae distally and subdistally. Third article 0.7 times as long as second article, with four simple setae distally. Fourth article naked. Main flagellum partly broken, with at least nine articles; articles usually with one or two simple setae distally, article-8 additionally with one aesthetasc. Accessory flagellum with nine articles, setation as figured.

Antenna (Fig. 3B) peduncle of five articles. First article wider than long, naked. Second article with serration and few simple setae on inner margin and one simple seta on outero-distal corner; squama well developed, reaching end of fourth peduncle article, with six setae laterally and three setae distally. Third peduncle article wider than long, with single inner seta. Fourth article four times as long as third article, with single bipinnate seta. Fifth article subequal in length to fourth, with total number of three simple and four bipinnate setae. Flagellum of nine articles, setation as figured; last article terminated with three long simple setae.

Mouthparts. Labrum not examined. Left mandible (Fig. 3C) with serrated outer margin; molar (Fig. 3C') strongly calcified and with minute setae distally; *lacinia mobilis* terminated in five teeth; incisor with numerous minute setae; setiferous lobe with five multifurcated setae. Mandibular palp of three articles, first article with serrated inner margin and two long simple setae; second article six times as long as wide, longer than articles 1 and 3 combined, in distal part with a row of serrated setae; third article with a row of serrated setae increasing in length toward distal part of article. Labium (Fig. 3D) with single denticle on outer margin and numerous setae on inner margin; palp with serration on outer margin and strong setation on both margins, terminally with three strong setae. Maxillule (Fig.

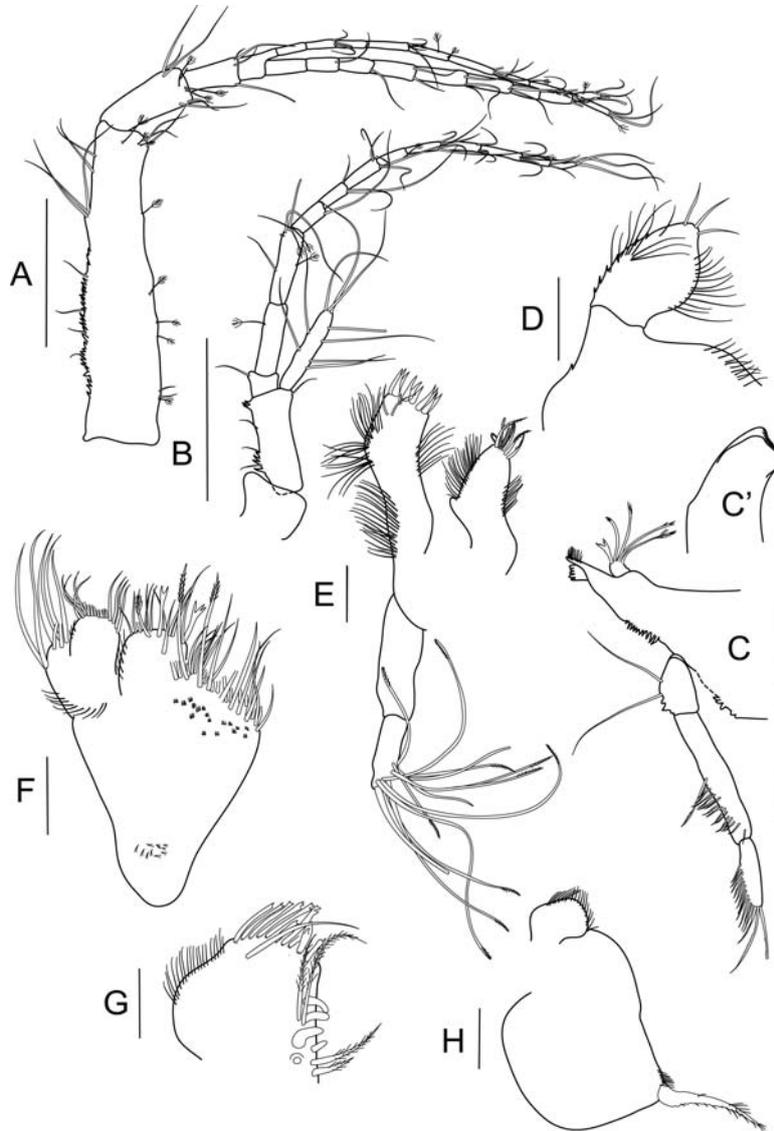


Fig. 3. *Zoidbergus vicinus* (Hansen, 1913) female: antennule (A), antenna (B), left mandible (C), molar process (C'), labium (D), maxillule (E), maxilla (F), maxillipedal endite (G), epignath (H). Scale bars = 0.2 mm for A–B and 0.1mm for C–H.

3E) inner endite with eight setae, four of them serrated; outer endite with two strong setae subdistally and 10 spines terminally, lateral margins of endites covered by numerous setae; palp bi-articled, second article with at least 14 setae terminated with a row of hook-shaped short spines. Maxilla (Fig. 3F) outer lobe of moveable endite with two subdistal and four distal setae; inner lobe of moveable endite with about 16 setae distally and minute setation on lateral margins; outer

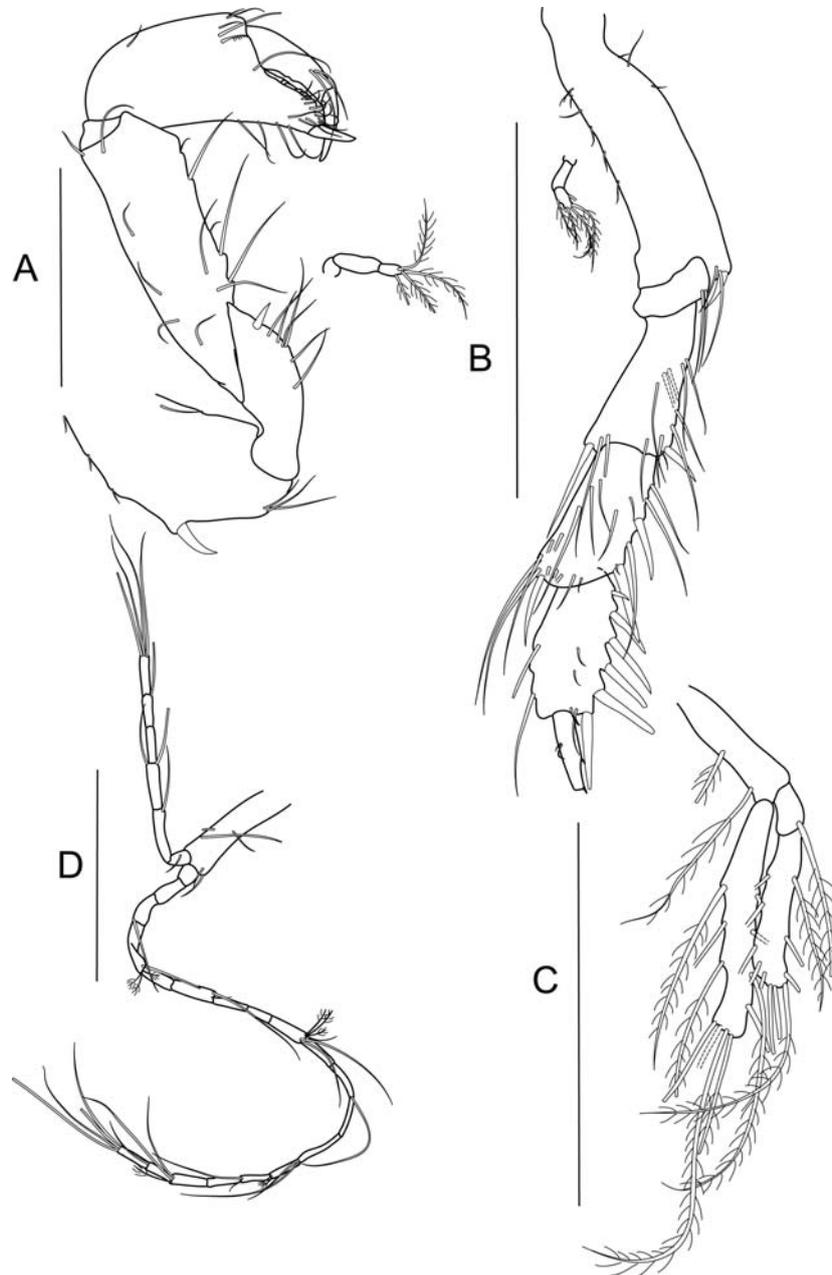


Fig. 4. *Zoidbergus vicinus* (Hansen, 1913) female: cheliped (A), pereopod-1 (B), pleopod (C), uropod (D). Scale bars = 1 mm.

lobe of fixed endite distally with combination of one plumose, one bifurcate, one trifurcate and 10 simple setae, one simple seta subdistally, lateral margins with minute setation; inner lobe of fixed endite with two rows of 27 simple setae and

with two serrated setae distally. Maxillipedal endite (Fig. 3G) with setulose outer margin, distally with 11 bi- or multifurcate setae, one subdistal simple seta and inner margin with four plumose setae and five coupling hooks (one broken).

Epignath (Fig. 3H) with some setation distally; seta as long as half of lobe, with minute lateral setation.

Cheliped (Fig. 4A) basis ventral margin with at least three minute setae proximally, strong spine in midlength and tuft of three simple setae distally; dorsal margin with single seta. Exopod of three articles, last article terminated with four plumose setae. Merus with six simple setae and one spine ventrally. Carpus 3.2 times as long as wide, with five simple setae dorsally, seven simple setae ventrally (two of them short) and one distal seta. Propodus with one dorsal seta, four simple and one serrated setae near dactylus insertion and one seta near cutting edge. Fixed finger with four simple setae ventrally and a row of setae as well as some denticles on cutting edge. Dactylus with tuft of three setae.

Pereopod-1 (Fig. 4B) basis 3.6 times as long as wide, with short simple setae on lateral margins, distally with two longer setae and strong spine. Exopod with three articles, last article with five plumose setae. Ischium with two long setae. Merus about half as long as basis, with one single spine distally on both dorsal and ventral margins, remaining setation as figured. Carpus as long as merus, with one dorsal and two ventral spines, remaining setation as figured. Propodus similar in length to carpus, with six ventral spines, apparently three simple setae dorsally, two small setae on outer margin and one simple and one serrated setae distally. Dactylus with two dorsal setae and two ventral denticles. Unguis broken.

Pereopod-2 (Fig. 5A) basis 5.3 times as long as wide, with one bipinnate and one simple setae proximoventrally and tuft of three setae distoventrally. Ischium with one short and one long setae. Merus with two setae on each dorsodistal and ventrodial corner, two setae ventrally and two setae distally. Carpus about twice as long as merus, with one spine dorsodistally and two spines ventrodial, rest of setae as figured. Propodus as long as carpus, with two spines and three setae dorsally, one spine on outer margin and two spines, one simple and one serrated setae ventrally. Dactylus with two minute setae dorsally; dactylus and unguis combined longer than propodus.

Pereopod-3 (Fig. 5B) basis 4.3 times as long as wide, with one simple and two bipinnate setae on ventral margin, and distoventral corner with three simple setae. Ischium with two setae. Merus with one dorsodistal spine and two ventrodial spines, remaining setation as figured. Carpus 3.4 times as long as wide, twice as long as merus, with two setae ventrally and two spines and six setae of different length distally. Propodus similar in length to carpus, dorsally with one spine and one bipinnate and simple setae, ventrally with spine and simple seta, distally with two spines, one simple and one serrated setae, on outer margin midlength with one spine and one serrated spine. Dactylus with three minute setae dorsally. Dactylus and unguis combined, 1.2 times as long as propodus.

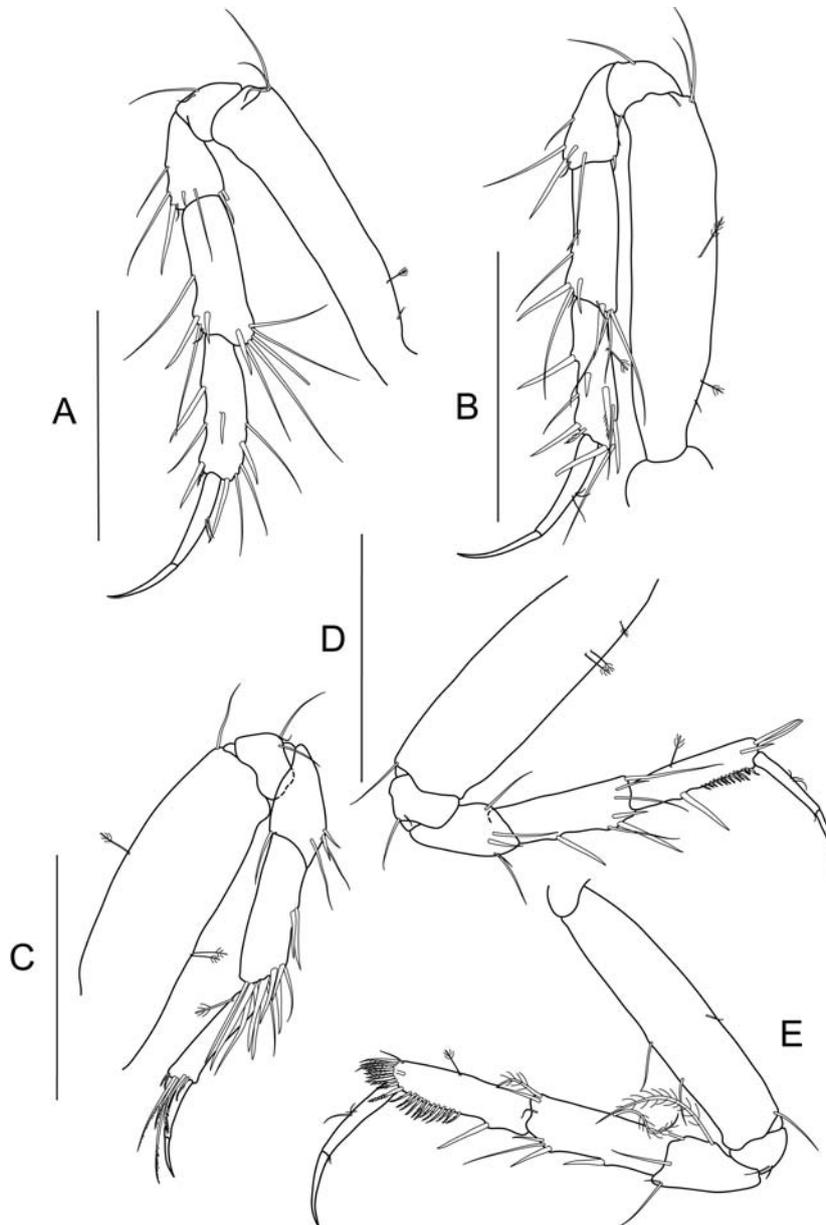


Fig. 5. *Zoidbergus vicinus* (Hansen, 1913) female: pereopod-2 (A), pereopod-3 (B), pereopod-4 (C), pereopod-5 (D), pereopod-6 (E). Scale bars = 0.5 mm.

Pereopod-4 (Fig. 5C) basis three times as long as wide, with two bipinnate setae dorsally and one bipinnate and one simple setae ventrally. Ischium with three setae. Merus with one dorsodistal seta and two setae and two spines ventrally. Carpus twice as long as merus, with two spines midlength ventrally and three setae and

seven spines distally. Propodus half as wide as carpus and 0.9 times as long as carpus, with one bipinnate seta dorsally and seven serrated setae (of different length) distally. Dactylus and unguis reduced in length, 0.8 times as long as wide.

Pereopod-5 (Fig. 5D) basis three times as long as wide, with three bipinnate setae dorsally and one ventrodiscal simple seta. Ischium with two setae. Merus with one dorsodistal seta, three simple setae and one spine ventrodistally. Carpus 1.6 times as long as merus, with one simple seta and three spines ventrally, one dorsodistal simple seta and two setae distally. Propodus about as long as carpus, with one bipinnate seta dorsally, one simple seta and two spines distodorsally, and spine and row of small serrated spines ventrally. Dactylus with three minute setae dorsally and one seta at unguis insertion; dactylus and unguis combined as long as propodus.

Pereopod-6 (Fig. 5E) basis 4.5 times as long as wide, with two setae dorsally, one seta ventrally and one distoventrally. Ischium with two setae. Merus with one plumose seta midlength dorsally and four setae distally. Carpus twice as long as merus, with two spines and two setae ventrally, one seta distally, one simple and one plumose setae distodorsally and one plumose seta midlength dorsally. Propodus as long as carpus, with one bipinnate seta dorsally, one simple spine midlength ventrally and row of short serrated spines ventrally and distally. Dactylus with three setae dorsally and two setae at unguis insertion; dactylus and unguis combined 1.3 times as long as propodus.

Pleopods (Fig. 4C) basis 4.1 times as long as wide, with two plumose setae on outer margin. Rami subequal in length; endopod with two articles, article-1 short, with one plumose seta, article-2 with 11 plumose setae; exopod with 11 plumose setae.

Uropod (Fig. 4D) basal article with two simple setae on outer margin, one seta on inner margin and two setae distally on inner margin. Exopod with six articles, endopod with 19 articles, setation as figured.

Remarks. — Stout cheliped fixed finger (twice as long as wide) differentiates *Z. vicinus* from *Z. paragracilis*, *Z. tenuis*, *Z. tenuimanus* and *Zoidbergus* sp. A. From the remaining species (*Z. abyssalis*, *Z. lagenirostris* and *Z. paragracilis*) it differs by the presence of midlateral apophyses on the pereonites.

Distribution. — This species was recorded at several stations in Celtic Sea and from south of Iceland in a depth range 610–1180 m (Hansen 1913; Băcescu 1981).

Zoidbergus sp. A

(Figs 6–8)

Material examined. — One female partly dissected (ZMH-K 44208), R/V *Meteor*, ME853/1017-1, 62°55.96' N 20°45.98' W, depth 909.5–914.9 m, EBS, 03 Sept 2011.

Diagnosis. — Pereonites 3–4 with midlateral apophyses. Pleonites with apophyses. First article of antennule with serration. Mandibles outer margin smooth,

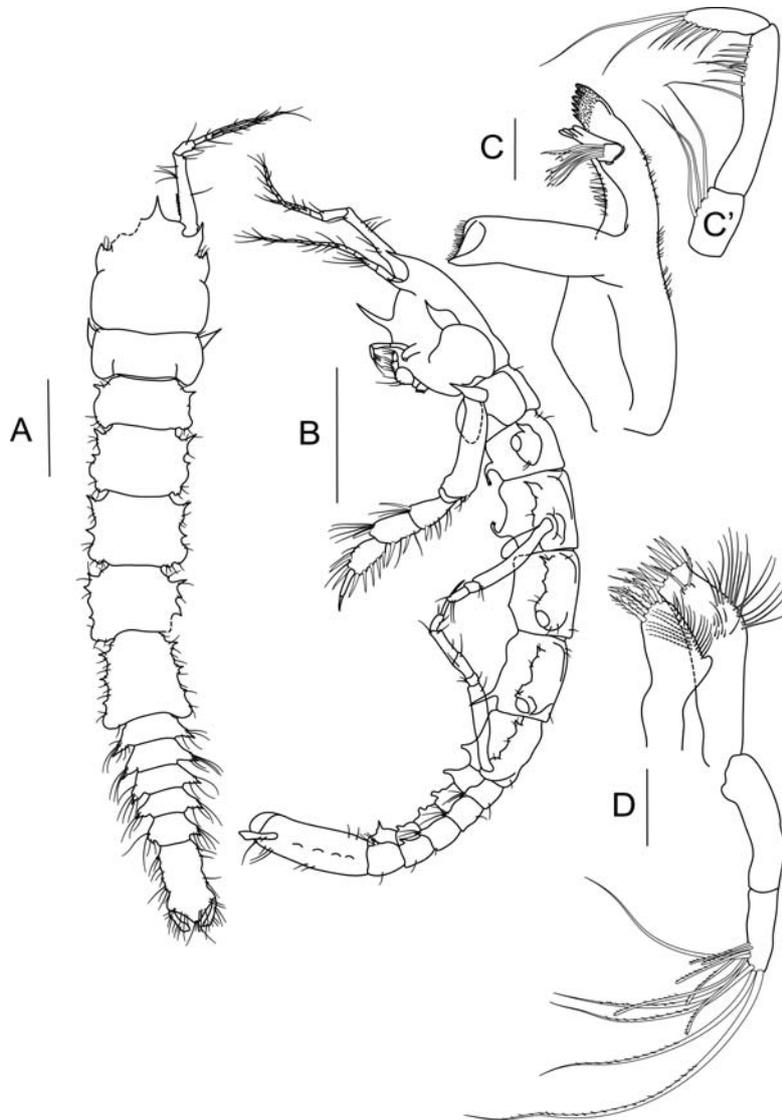


Fig. 6. *Zoidbergus* sp. A, female: dorsal view (A), lateral view (B), left mandible (C), mandible palp (C'), maxillule (D). Scale bars = 1 mm for A–B and 0.1 mm for C–D.

first article of palp with setae. Second article of maxillipedal palp with outerodistal spine. Cheliped merus with one ventral spine, fixed finger elongated (about four times as long as wide). Pereopod-1 carpus with two ventral spines.

Description of female. — Body (Fig. 6A, B) 6.3 times as long as wide, with six free pereonites and five free pleonites. Cephalothorax 19% of total body length, 1.2 times as long as wide; rostrum pointed, with well developed prominences at the basis; eye lobes pointed, fused to cephalothorax, without visual ele-

ments; lateral margin of carapace with additional lateral apophysis and simple setae. Pereonites length/width ratio 0.4, 0.5, 0.8, 1, 1.1 and 0.9, respectively. First pereonite laterally smooth, second with one proximolateral apophysis, third and fourth with two apophyses – one proximolateral and one at midlength, fifth and sixth pereonite with three apophyses; each pereonite with setae laterally. Ventral margin of pereonites with hyposphenia; on second and third pereonite hyposphenium curved and bifurcate. Pleon 29% of total body length; pleonites subequal in length, each with pointed lateral apophysis covered by tuft of setae, ventrally with hyposphenium. Pleotelson laterally with few small projections and adjacent setae; distally with five pairs of simple setae; apex with one pair of long and one pair of short setae.

Antennule (Fig. 7A) first article of peduncle eight times as long as wide, with at least six simple setae and serration on inner margin and seven bipinnate and five simple setae on outer margin; second article 0.2 times as long as first article, with five simple and three bipinnate setae distally; third article with four simple (?) setae distally; common article with one bipinnate seta; inner flagellum with four articles (but third article apparently with fusion line), setation as figured; outer flagellum with nine articles, each with simple setae distally as figured, article-7 additionally with aesthetasc.

Antenna (Fig. 7B) peduncle of five articles; first article with short, simple seta distally and serration on inner margin; second article with two setae and two apophyses on inner margin and one seta distally; squama as long as fourth article of peduncle, with 10 setae; third peduncle article trapezoidal, about 0.3 times as long as article-2, with one seta and one apophysis distally; article-4 with two bipinnate setae subdistally; article-5 similar in length to article-4, with one bipinnate seta on outer margin midlength, one simple seta on inner margin midlength and two simple and three bipinnate setae distally; flagellum of eight articles, setation as figured.

Mouthparts: Mandible (Fig. 6C) inner and outer margin covered by minute setae; molar distally strongly calcified and with numerous minute setae; incisor calcified with six denticles; *lacinia mobilis* with apparently four denticles; setiferous lobe with one simple, one serrated and four bifurcate setae. Palp (Fig. 6C') of three articles; article-1 with three long simple setae on inner margin; article-2 with a row of setae decreasing in length towards distal part of article; article-3 with eight setae (last two longer). Maxillule (Fig. 6D) inner lobe with one simple and four serrated setae distally and numerous setae on outer margin; outer lobe with two serrated setae subdistally and eight spines distally, lateral margins with numerous simple setae; palp biarticled, second article with one simple and 10 serrated setae distally. Maxilliped (Fig. 7C) basis with minute setae on outer margin; palp article-1 with one short outer and one long inner setae; article-2 with outerodistal spine and numerous ventral setae (of different length); article-3 with seven long setae ventrally; last article with five simple and three serrated setae distally. Endite (Fig. 7C') inner margin with four coupling hooks and seven

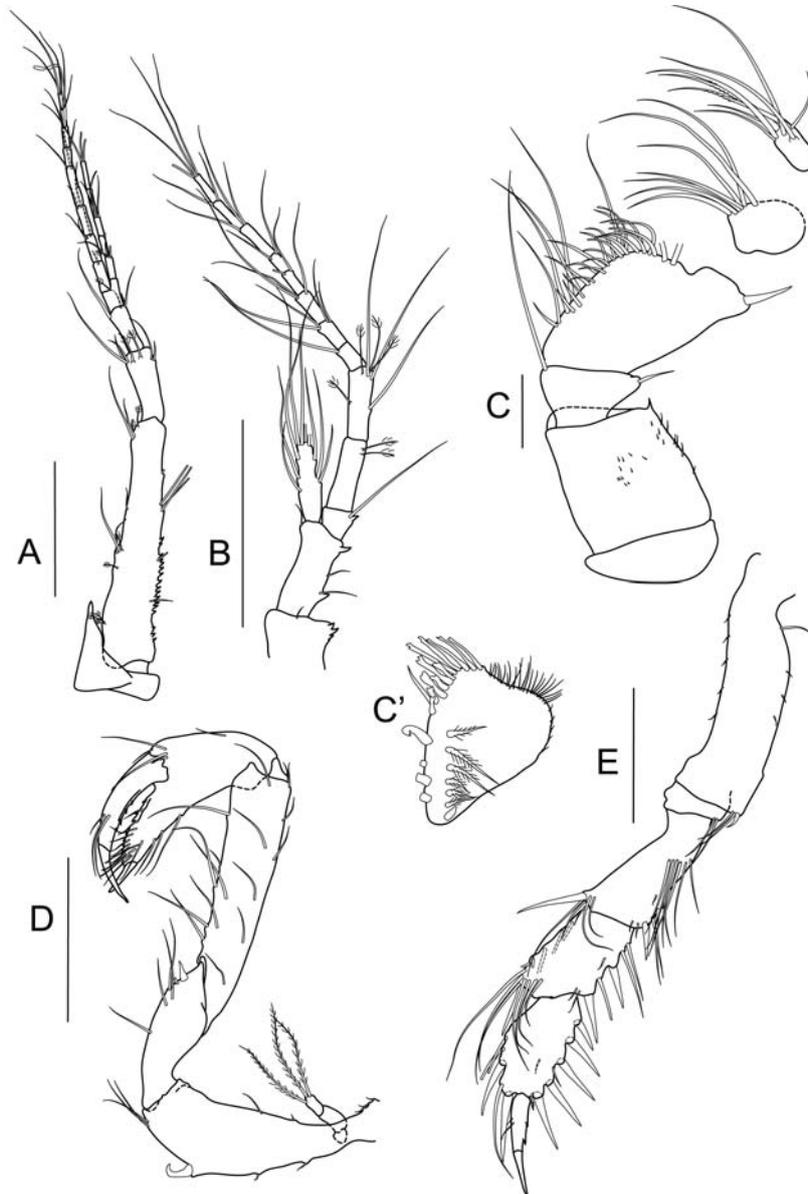


Fig. 7. *Zoidbergus* sp. A, female: antennule (A), antenna (B), maxilliped (C), maxillipedal endite (C'), cheliped (D), pereopod-1 (E). Scale bars = 0.2 mm for A–B, D–E and 0.1 for C.

plumose setae; outer margin with numerous minute setae; distally with one simple and 11 bi- or trifurcate setae.

Cheliped (Fig. 7D) basis 3.2 times as long as wide, with minute simple setae on both margins and strong spine ventrally and tuft of three simple setae disto-ventrally; exopod of three articles, last article terminated with apparently three

plumose setae; merus about half as long as basis, with five setae and strong spine ventrally; carpus 1.1 times as long as basis, with simple setae on ventral, outer and dorsal margins; propodus 0.4 times as long as carpus, with simple seta dorsally and one serrated and three simple setae near dactylus insertion; fixed finger subequal to dactylus, with three simple setae ventrally, inner margin with a row of simple setae and short apophyses; dactylus with three setae dorsally and serration on inner margin.

Pereopod-1 (Fig. 7E) basis 3.7 times as long as wide, with a row of minute setae on both margins and strong spine and two simple setae distoventrally; ischium with two simple setae; merus 0.6 times as long as basis, with a row of simple setae on ventral margin midlength, one spine and six simple setae distoventrally and one spine and five simple setae distodorsally; carpus 0.7 times as long as merus, with one spine and 12 setae dorsally and two spines and six setae ventrally; propodus 1.1 times as long as carpus, with two spines and three setae dorsally and five spines, two simple setae and one serrated seta ventrally; dactylus with two dorsal setae and two ventral apophyses.

Pereopod-2 (Fig. 8A) coxa with seta; basis 7.4 times as long as wide, with one simple and two bipinnate setae dorsally and three simple setae distally; ischium with two setae; merus 0.3 times as long as basis, with five setae distodorsally, one seta ventrally and two setae and one distoventral spine; carpus 1.4 times as long as merus, with two setae ventrally and four spines and eight setae distally and subdistally; propodus 0.8 times as long as carpus, with two spines ventrally and two spines and three setae dorsally; dactylus with two dorsal setae, dactylus and unguis combined 1.4 times as long as propodus.

Pereopod-3 (Fig. 8B) basis 5.1 times as long as wide, with one bipinnate seta ventrally and two simple setae distoventrally; ischium with two setae ventrally and one dorsal seta (?); merus with simple seta on ventral margin midlength, one spine and four setae distoventrally and one seta distodorsally; carpus 1.4 times as long as merus, with three spines and two setae ventrally, two setae distally and five setae dorsally; propodus 0.8 times as long as carpus with two spines and one seta ventrally, three spines on midlength and one spine, one bipinnate and one simple setae dorsally; dactylus with two dorsal setae, dactylus and unguis 1.6 times as long as propodus.

Pereopod-4 (Fig. 8C) basis 4.7 times as long as wide, with several bipinnate setae on lateral margins (as figured) and two short and one long distoventral simple setae; ischium with three setae ventrally and one dorsally; merus with simple seta on midlength and two spines and two setae distoventrally; carpus 1.7 times as long as merus, with two spines on ventral margin midlength and five spines and two setae distally; propodus half as wide and 0.9 times as long as carpus, with six simple and two serrated setae distally; dactylus with two dorsal setae, dactylus and unguis 0.8 times as long as propodus.

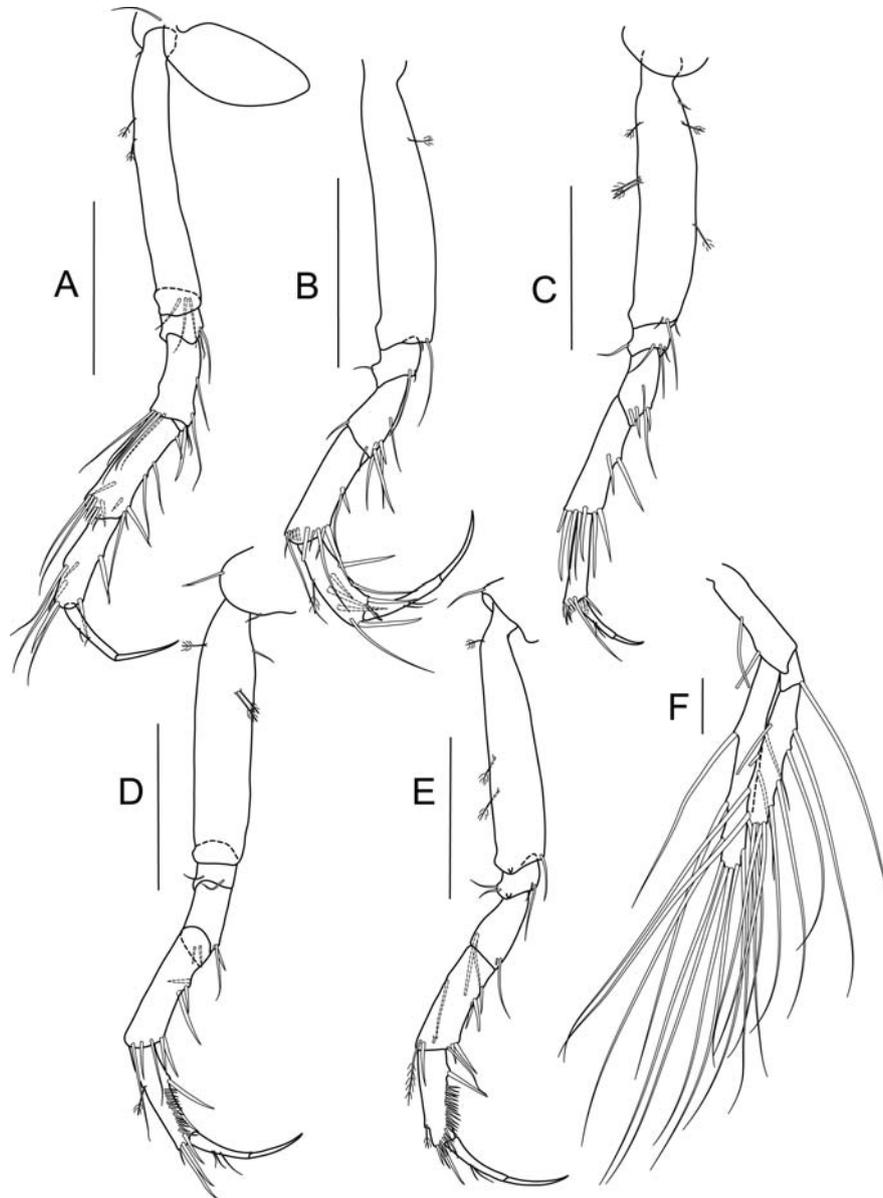


Fig. 8. *Zoidbergus* sp. A, female: pereopod-2 (A), pereopod-3 (B), pereopod-4 (C), pereopod-5 (D), pereopod-6 (E), pleopod (F). Scale bars A–E= 0.2 mm and 0.1 for F.

Pereopod-5 (Fig. 8D) coxa with two setae; basis 4.6 times as long as wide, with one bipinnate seta dorsally and one simple and two bipinnate setae ventrally; ischium with two setae; merus about 0.3 times as long as basis, with three spines and one seta distoventrally; carpus 1.7 times as long as merus, with three spines on ventral margin midlength and three spines and two setae distally;

propodus 0.8 times as long as carpus, with two longer spines and row of short spines ventrally, one bipinnate seta dorsally and three spines and one simple seta distodorsally; dactylus with three simple setae dorsally, dactylus and unguis 1.1 times as long as propodus.

Pereopod-6 (Fig. 8E) similar to pereopod-5, but ischium with four setae, merus with four setae distally, carpus with additional dorsal seta, propodus with one longer ventral spine, only one spine distally and bipinnate seta more distal than in pereopod-5.

Pleopod (Fig. 8F) basis 4.3 times as long as wide, with two plumose setae on outer margin; endopod about 0.9 times as long as exopod, of two articles; first article short, with distal plumose seta; second article with 12 plumose setae; exopod with 11 plumose setae.

Remarks. — The species is not formally described due to the collection of only one specimen.

The serrated outer margin of the mandible, elongated fixed finger, cheliped merus with one ventral spine, serrated inner margin of the antennule, and the presence of midlateral apophyses on pereonites 3–4 distinguish *Zoidbergus* sp. A from other members of the genus. Additionally a strong outerodistal spine on maxillipedal article-2 differs *Zoidbergus* sp. A from *Z. abyssalis*, *Z. lagenirostris* and *Z. paragracilis*. A possibly unique character of this species is the presence of bifurcated hyposphenia on pereonites 2 and 3.

Distribution. — Species is known only from one station (ME853/1017-1) south of Iceland in a depth range from 909.5 to 914.9 m.

Identification key for *Zoidbergus* species (only females)

- | | |
|---|-------------------------|
| 1. Pereonites 3–4 with midlateral apophyses | 2 |
| Pereonites 3–4 without midlateral apophyses | 5 |
| 2. Antennule basis with serrated inner margin | 3 |
| Antennule basis without serrated inner margin | <i>Z. tenuimanus</i> |
| 3. Cheliped merus with one ventral spine | 4 |
| Cheliped merus with two ventral spines | <i>Z. tenuis</i> |
| 4. Fixed finger elongated (about three times as long as wide), mandible outer margin smooth | <i>Zoidbergus</i> sp. A |
| Fixed finger massive (two times as long as wide), mandible outer margin serrated | <i>Z. vicinus</i> |
| 5. Pleonites with lateral apophyses | 6 |
| Pleonites without lateral apophyses | <i>Z. paragracilis</i> |
| 6. Pereopod-1 carpus with three ventral spines, mandible palp article-1 without setae | <i>Z. abyssalis</i> |
| Pereopod-1 carpus with two ventral spines, mandible palp article-1 with setae | <i>Z. lagenirostris</i> |

Discussion

After moving six species formerly classified as *Apseudes* to *Zoidbergus*, the total number of *Apseudes* species is reduced to 43, although there are still some species that are certainly not members of *Apseudes*, particularly apseudids described by Kudinova-Pasternak as *Apseudes levis* Kudinova-Pasternak, 1985, *A. siegi* and *A. vitjazi*, which were not included in the revision of *Apseudes* by Guțu (2006). As was noticed by Guțu (2006) *A. levis* shows some similarities with *Colobocladus*, but limited morphological data impede transferring this species to that genus. Two remaining species, although poorly described, are hereby moved to other genera: *A. siegi* to *Leviapseudes* and *A. vitjazi* to *Fageapseudes*.

Generic position of *Leviapseudes siegi* was suggested by Kudinova-Pasternak (1985), who classified this species in the subgenus *Leiopus* (= *Leviapseudes*). Moreover, according to the description (Kudinova-Pasternak 1985, p. 689, fig. 3) maxillipedal endite in this species has a distinct leaf-shaped seta. *L. siegi* has also elongated pereonites 3–6, slim cheliped, elongated epignath seta and serrated dactylus of pereopod-4, the characters commonly observed in *Leviapseudes* members. Additional arguments for transferring *Apseudes siegi* to *Leviapseudes* were pointed out by Kudinova-Pasternak (1985) who mentioned several similarities between *A. siegi* and *Leviapseudes wolffi* Lang, 1968 in e.g., structure of antenna, cheliped and pereopods 2–3 and 5–6.

A smooth cheliped basis without apophyses or spines, and pereopod-1 with a merus shorter than the carpus and propodus combined, place *L. siegi* close to *L. conspicuus* Lang, 1968, *L. demerarae* Băcescu, 1984, *L. drachi* Băcescu, 1984 and *L. segonzaci* Băcescu 1981. *Leviapseudes siegi* can be distinguished from those species by the following combination of characters: presence of three setae on labial palp (two in *L. conspicuus* and *L. demerarae*, one or two in *L. drachi* and one in *L. segonzaci*), propodus of pereopods 2–6 similar in length to carpus (shorter in *L. conspicuus*), first article of mandibular palp naked (with three setae in *L. conspicuus*, two in *L. demerarae*), and three spines distoventrally on the carpus of pereopod-1 (two in *L. conspicuus*, *L. demerarae* and *L. segonzaci*).

Description of *L. zenkevitchi* Kudinova-Pasternak, 1966 lacks information about armament of cheliped basis and length of pereopod-1 merus, although this species can be easily distinguished from *L. siegi* by having strongly reduced, comb-like dactylus/unguis of pereopod-4 and setation on first article of mandibular palp.

Kudinova-Pasternak (1970) in description of *A. vitjazi* did not describe the shape of caudodistal seta of maxilliped endite or shape of pereopod-4 dactylus (according to the text pereopod-4 is broken), although this species is characterised by the lack of rostrum that is observed only in two Apseuididae genera – *Fageapseudes* and *Glabroapseudes*. Although the latter genus does not show lateral apophyses on pereonites either on pleonites. A transfer of *A. vitjazi* to *Fageapseudes* is supported by Kudinova-Pasternak (1970), who compared this species

with Leviapseudinae (e.g., *Leviapseudes zenkevitchi*, *L. galathea* Wolff, 1956) and particularly *Fageapseudes retusifrons* (Richardson, 1912). First two species share with *Fageapseudes vitjazi* the shape of pleotelson and cheliped while last species shares the lack of rostrum, shape of pereonites 1 and 6 and pleon. *F. vitjazi* matches with recent diagnosis of genus *Fageapseudes* proposed by Drumm and Bamber (2013).

Fageapseudes vitjazi differs from *F. bicornis* Kudinova-Pasternak, 1973 by having a more massive labial palp terminated by three spines, an elongated carpus of pereopod-1 (twice as long as wide) and pereonites 2 and 3 wider than long (0.7 and 0.8 respectively). In *F. bicornis*, the labial palp is smooth, apparently without terminal spines and the carpus of pereopod-1 is 1.3 times as long as wide while pereonites 2 and 3 (in female) are 1.5 and 1.3 times as long as wide, respectively.

F. vitjazi can be distinguished from *F. brachyomos* Bamber, 2007 by more prominent apophyses on pleonites and more elongated cheliped carpus and basis of pereopod-3 with length/width ratio 5.3 and 5.4 respectively (in *F. brachyomos* 4.0 and 3.4 respectively).

F. vitjazi differs from type species of the genus, *F. retusifrons* by having short apophyses on the lateral margin of pereopods and pereopod-1 coxa (in *F. retusifrons* apophyses are at least as long as half of pereonite, and coxa apophysis reaches half of carapace), in length of pereonites 2 and 3 (in *F. retusifrons* those pereonites are longer than wide) the length of the pleotelson which is 4.3 times as long as wide in *F. vitjazi* and 3.3 times as long as wide in *F. retusifrons*.

Differences between *F. vitjazi* and *F. suprema* Józwiak et Błażewicz-Paszkowycz, 2007 comprise shape and armament of labial palp (*F. vitjazi* with massive palp terminated by three spines and *F. suprema* with slender palp and only one spine), length of pereonites 2 and 3 (longer than wide in *F. suprema*), and shape of cheliped (in *F. suprema* more robust with apophysis on inner margin of fixed finger).

From all *Fageapseudes* members, *F. vitjazi* is most similar to *F. pluma* Drumm et Bamber, 2013, but differs from this species in slenderness of second article of mandibular palp (at least five times as long as wide in *F. vitjazi* and four times as long as wide in *F. pluma*) and more massive carpus and propodus of pereopod-1 (two and 1.3 times as long as wide respectively in *F. vitjazi* and 2.9 and 1.9 times as long as wide in *F. pluma*).

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