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Taxonomy and systematics

A new deep-sea species of the genus *Gracilimesus* (Isopoda: Asellota: Ischnomesidae) from the Bay of Campeche, southwestern Gulf of Mexico

Una especie nueva de aguas profundas del género Gracilimesus *(Isopoda: Asellota: Ischnomesidae) de la bahía de Campeche en el suroeste del golfo de México*

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Abstract

A new deep-sea species of isopod is described and illustrated. The material was collected in soft substratum in the Bay of Campeche, SW Gulf of Mexico, at a depth of 2,548 m aboard the research vessel "Justo Sierra" on September 4, 2009. *Gracilimesus tzasnae* sp. nov. can be distinguished from all other known species by its antennula with 5 articles; uropod length vs. pleotelson 0.3×; pereonite 7 not reduced; pereopod 7 absent; pleotelson dorsal surface smooth and not separated in lateral fields. The new species represents the first described *Gracilimesus* in the Gulf of Mexico. We present a table with the most important diagnostic characters to separate all the known species of the genus *Gracilimesus*.

Keywords: Bathyal zone; Benthos; Peracarida; Distribution; Morphology; Sediment; Species richness; Taxonomy

Resumen

Se describe e ilustra una especie nueva de isópodo de aguas profundas. El material fue colectado en sustrato blando en la bahía de Campeche, suroeste del golfo de México, a una profundidad de 2,548 m, a bordo del buque de investigación "Justo Sierra" el 4 de septiembre de 2009. *Gracilimesus tzasnae* sp. nov. se puede distinguir de todas las demás especies conocidas por tener anténulas con 5 artejos; longitud del urópodo vs. pleotelson 0.3×; pereonite 7 no reducido; pereópodo 7 ausente; superficie dorsal del pleotelson lisa y no separada en campos laterales. La nueva especie representa el primer *Gracilimesus* descrito para el golfo de México. También se presenta una tabla con los caracteres diagnósticos más importantes para separar todas las especies conocidas del género *Gracilimesus*.

Palabras clave: Zona batial; Bentos; Peracarida; Distribución; Morfología; Sedimento; Riqueza de especies; Taxonomía

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Introduction

The family Ischnomesidae comprises deep-sea asellote isopodes (Crustacea), which are brittle in nature and distributed from 213 to 9,000 m depth in the bathyal and abyssal zones of the Atlantic Ocean (Kavanagh et al., 2006; Kussakin, 1988; Menzies, 1962; Wilson, 2008; Wolff, 1962). The described diversity of these isopods has been increasing due to recent reports of several new species (Brökeland & Brandt, 2004; Merrin & Poore, 2003; Schotte et al., 2009).

In a revision of the genus *Haplomesus* s. l., Kavanagh and Wilson (2007) created 4 new genera: *Contrarimesus*, *Cornuamesus*, *Fortimesus*, and *Gracilimesus*, in addition to *Haplomesus* s. str. The species of *Gracilimesus* are unusual because they bear an elongate pereonite 5 and several species lack pereopod 7 in adult specimens, which also occurs in *Stylomesus hexapodus* Brökeland & Brandt, 2004 (Kavanagh & Wilson, 2007). Prior to this study, the genus *Gracilimesus* included 11 nominal species: *G. angustus* (Hansen, 1916), *G. insignis* (Hansen, 1916), *G. modestus* (Hansen, 1916), *G. tenuispinis* (Hansen, 1916), *G. gorbunovi* (Gurjanova, 1946), *G. orientalis* (Birstein, 1960), *G. tropicalis* (Menzies, 1962), *G. modestatenuis* (Menzies & George, 1972), *G. corniculatus* (Brökeland & Brandt, 2004), *G. hanseni* (Kavanagh, Wilson & Power, 2006), and *G. celticensis* (Kavanagh, Wilson & Power, 2006).

Literature on the deep-sea isopods of the Gulf of Mexico is scarce (Schotte et al., 2009). Wilson (2008) documented 22 families and 95 genera associated with soft bottoms in the NE Gulf of Mexico at depths between 213 and 3,732 m. Ischnomesidae included the *Haplomesus* s.l., *Heteromesus*, and *Ischnomesus* genera; this family was distributed across the continental slope (542-3,409 m depth) at a frequency of 49% across the samples.

During an expedition along the Bay of Campeche, SW Gulf of Mexico, several lots of peracarids were collected in the bottom sediment samples. Within these samples, we recognized a member of the family Ischnomesidae, which represents a new species of the genus *Gracilimesus*. Here we compare the morphology of this new species to the 11 known species. This is the first described specimen of this genus from the Gulf of Mexico.

Materials and methods

The samples examined in this study were collected during the oceanographic cruise Xcambó-4, carried out jointly by PEMEX Exploration and Production and Cinvestav-Mérida (Bay of Campeche, SW Gulf of Mexico from September 4 to October 10, 2009) aboard the research vessel "Justo Sierra" of the Universidad Nacional Autónoma de México (UNAM). Samples were collected using a benthic box corer (Hessler-Sandia MK II) in a sampling grid oriented between 50 and 3,300 m depth. Four subsamples were taken from each sample using a 20-cm diameter PVC corer. Material was sieved at a mesh size of 500 µm, relaxed with $MgCl_2$, and fixed with 4% formalin. At the Cinvestav Benthos Laboratory, organisms were sorted, washed, taxonomically identified, and preserved in 70% alcohol.

Images were captured with the aid of a Motic microscope BA210 equipped with a camera lucida, and figures were illustrated with CorelDRAW 12 software. Terminology and taxonomic classification were taken from Kavanagh et al. (2006), Kavanagh and Wilson (2007), and Boyko et al. (2008). The specimen is deposited in the Colección Nacional de Crustáceos, Universidad Nacional Autónoma de México (CNCR-IB-UNAM).

Description

Of all the biological material collected during the sampling effort, the new species of *Gracilimesus* was observed at only 1 station (Fig. 1) at a depth of 2,548 m, where it was represented by a single female adult.

Order Isopoda Latreille, 1817
Suborder Asellota Latreille, 1802
Superfamily Janiroidea Sars, 1897
Family Ischnomesidae Hansen, 1916
Genus *Gracilimesus* Kavanagh & Wilson, 2007
Gracilimesus tzasnae new species
(Figs. 2-5)

Material examined. *Holotype*. Adult female, 3.3 mm total length (CNCR29115), collected from the type locality Bay of Campeche, SW Gulf of Mexico; PEMEX station number: 81_49; 21°00'00" N, 93°00'00" W; soft bottom at 2,548 m depth; September 13, 2009; coll., María Teresa Herrera-Dorantes.

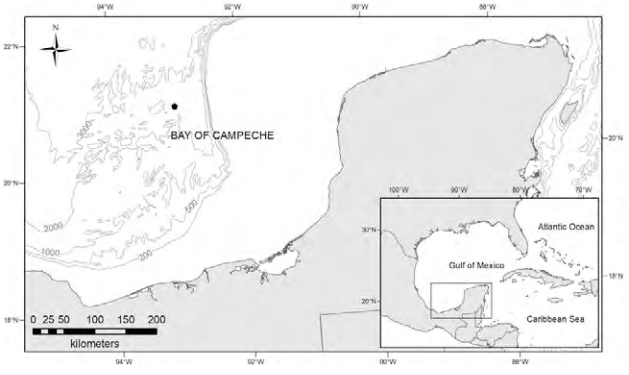

Figure 1. Location of the sampling station in the Bay of Campeche, Gulf of Mexico. Solid circle = PEMEX Station 81_49.

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Diagnosis. Antennula with flagellum 5 articulated; maxilliped with 2 coupling hooks. Pereonites 1 and 4 each with 1 lateral subequal spine; spines of pereonite 1, 0.4× as long as pereonite 1; pereonites 2 and 3 without spines. Pereopods 1-6 with neck; pereopod 1 ischium ventral margin with 1 distal robust seta. Merus lacking robust setae; carpus dorsal margin without setae, ventral margin with 1 proximal robust seta; propodus with 1 short subdistal robust seta, ventrally; pereopods 2 and 4 posterior margin of basis and merus devoid of robust setae. Pereonite 7 length not reduced; pereopod 7 absent; pleotelson posterolateral margins with pedestal spines; pedestal spines 0.5× length of uropods. Uropods surpassing posterior margin of pleotelson.

Description. *Holotype.* Adult female 3.3 mm total length. Body (Fig. 2A, B), head 0.7× as long as wide; frontal margin curved, lobe on ventrolateral margin poorly developed, dorsal cuticle covered with sparse setae. Pereonites (Fig. 2A, B, C), 2 and 4 bearing anterolateral conical simple spines; pereonite 5 length 6× width, 0.31× total body length. Antennula (Fig. 2A, B, C), 5 articulated; article 2 length 1.2× width of head, with 2 short ventromedial setae; 3 distal articles combined half-length of article 2; aesthetascs absent. Antenna (Fig. 2A, B), article 2, 1.6× longer than article 1; article 3, 0.3× shorter than 2; remaining articles missing; cuticle smooth.

Mouthparts: maxilliped (Fig. 3A), basis 2.6× broader than palp; with 2 coupling hooks with rounded tips on

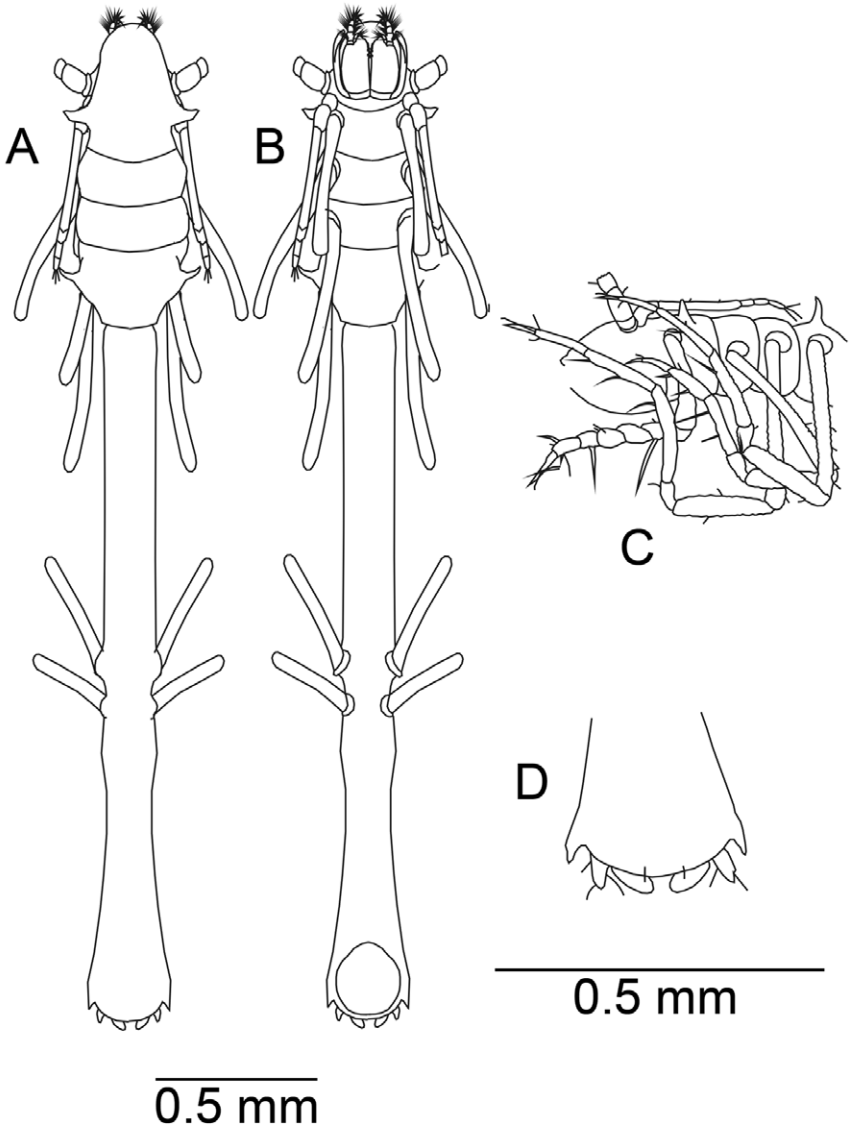

Figure 2. *Gracilimesus tzasnae* sp. nov., holotype female. A, Dorsal view of body; B, ventral view of body; C, pereopods 1-4 in situ; D, dorsal view of pleotelson.

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inner margin; palp article 2, 1.3× wider than 3; articles 4-5 tapering distally. Maxillula (Fig. 3B), outer lobe with 9 robust distal setae and 1 subdistal; inner lobe length 0.3× of outer; with 3 distal and 2 subdistal robust setae, 1 midway on inner margin. Maxilla (Fig. 3C), outer lobe with 3 long distal setae: medial lobe with 2 long and 3 short distal setae; inner lobe the widest, with 2 setae on inner margin and 13 short and 2 long on upper and outer margins. Mandible (Fig. 3D, E), without palp, molar big and triturative, with 3 racket robust setae; left mandible (Fig. 3D), bearing 6 incisors; lacinia mobilis linguiform; right mandible (Fig. 3E), with 3 incisors; lacinia mobilis missing. Paragnath (Fig. 3F), upper margins of left lobe with 6 setae and 9 on right.

Pereopods (Fig. 4A-F), with neck; long and slender; paucisetose: pereopod 1 (Fig. 4A), poorly prehensile; basis as long as ischium-merus-carpus combined; ischium and carpus, both bearing 1 robust seta on posterior margin; carpus with 2 long robust setae on distal half of anterior margin; with small robust seta on posterior margin; dactylus as long as propodus. Pereopod 2 (Fig. 4B), basis as long as ischium-merus-carpus combined; carpus with 2 robust setae on posterior margin; propodus, with 1 robust setae on posterior margin, dactylus as long as propodus. Pereopod 3 (Fig. 4C), basis 1.7× as long as ischium and merus combined; carpus with 1 seta on posterior margin; propodus with 2 robust setae on posterior margin, dactylus as long as propodus. Pereopod 4 (Fig. 4D), basis 1.6× as long as ischium and merus combined; carpus posterior margin with 1 robust seta; dactylus 0.7× as short as propodus. Pereopod 5 (Fig. 4E), basis 1.3× as short as ischium; ischium with 1 robust seta on anterior margin; merus with 1 seta on anterior margin; propodus with 1 robust seta on posterior margin; dactylus 0.6× as short as propodus. Pereopod 6 (Fig. 4F) basis 1.6× longer than ischium; basis with 3 setae on anterior margin and 1 on the posterior; ischium with 1 posterior robust seta; merus with 2 robust setae on posterior margin, 1 on the anterior; carpus with 2 robust setae on posterior margin; dactylus 0.6× as long as propodus. Pereopod 7 absent.

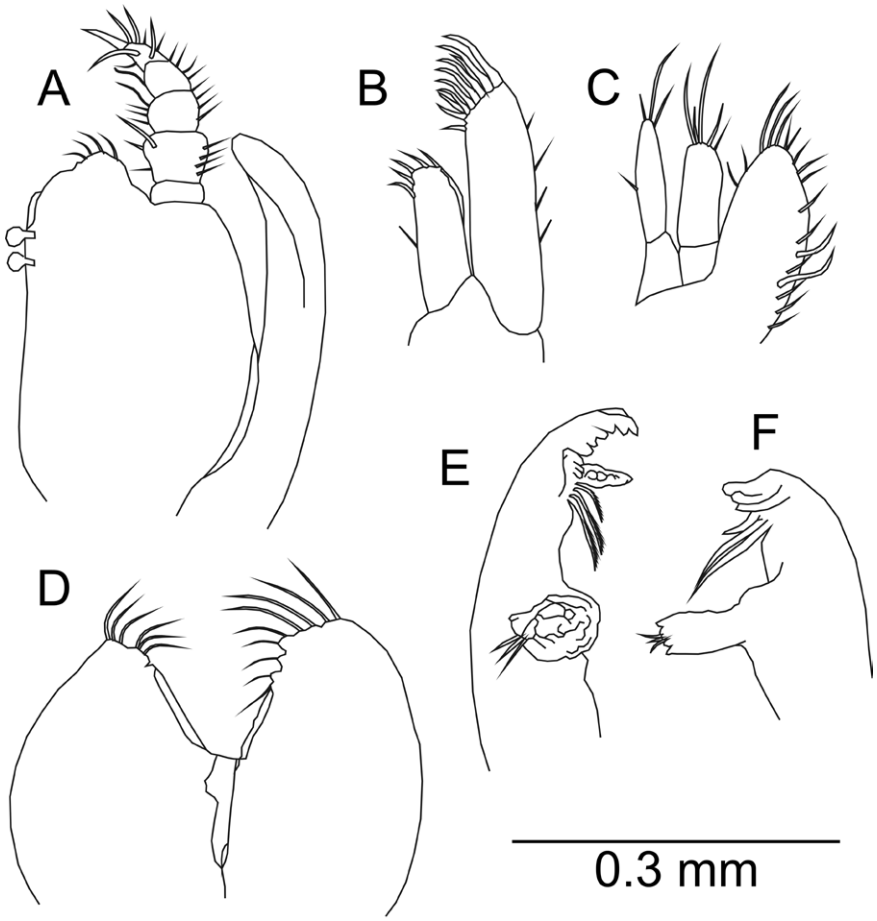

Figure 3. *Gracilimesus tzasnae* sp. nov., holotype female. A, Maxilliped; B, maxillula; C, maxilla; D, paragnath; E, left mandible; F; right mandible.

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Pleopods (Fig. 5A, B, C): operculum (pleopod 2), ovoidal, without proximal neck; as wide as long, with 1-3 simple lateral and 4 distal plumose setae. Pleopod 3 inner lobe wider and longer than outer. Pleopod 4 ovoid.

Uropods (Fig. 2D), longer than wide, length 0.3× length of pleotelson; surpassing posterior margin of pleotelson, with 5 long distal setae.

Pleotelson (Fig. 2A), length 1.2× width; dorsal surface axial ridge poorly vaulted, not separated from lateral fields, lacking dorsal spines on pleonite 1 of pleotelson.

Male unknown.

Etymology. This new species is named to honor Dr. Claudia Tzasná Hernández Delgado, Facultad de Estudios Superiores Iztacala, UNAM.

Associated Fauna at PEMEX Station 81_49. The fauna associated with the isopod *Gracilimesus tzasnae* sp. nov. at this station was scarce. The Polychaeta class was the most abundant with 4 individuals belonging to 4 families (Syllidae, Sabellidae, Spionidae, and Fauveliopsidae) and 4 genera (*Streptosyllis*, *Sabellonga*, *Spiophanes*, and *Fauveliopsis*).

Discussion

Cinvestav-Mérida has conducted oceanographic expeditions in the Gulf of Mexico from 1999 to the present, sampling a range of depths from 50 to 3,500 m. However, after more than twenty expeditions, this is the first appearance of this new species of isopod. Even so, the species was represented by a single adult female, suggesting that it is infrequently found and occurs in low abundance. It is clear that more intense fieldwork is needed to better document the presence, abundance, and distribution of this species in the area. Yet it is worth mentioning that recording a new species in deep-sea waters is expensive in terms of funding, time, and effort, such that even a single individual is highly valuable from the taxonomic point of view.

It is not easy to conduct a comparative study among the species of this genus, especially since data are not available for all the corporal structures of each sex. There is no doubt that the presence of peoreonite 7 and perepopod 7, as well as the presence of the anterolateral projection in pereonite 4, should be considered the most salient characteristics in the taxonomy of this genus. Taking into account the above, it can be established that *Gracilimesus tzasnae* sp. nov. is taxonomically very close to *G. modestus* and *G. tenuispinis*, all of which have these corporal structures. Both of these other species are from the Davis Strait (northern Canada), very far from the sampling site where *G. tzasnae* sp. nov. was collected.

As the genus *Gracilimesus* has not been previously reported in the Gulf of Mexico, it becomes necessary to

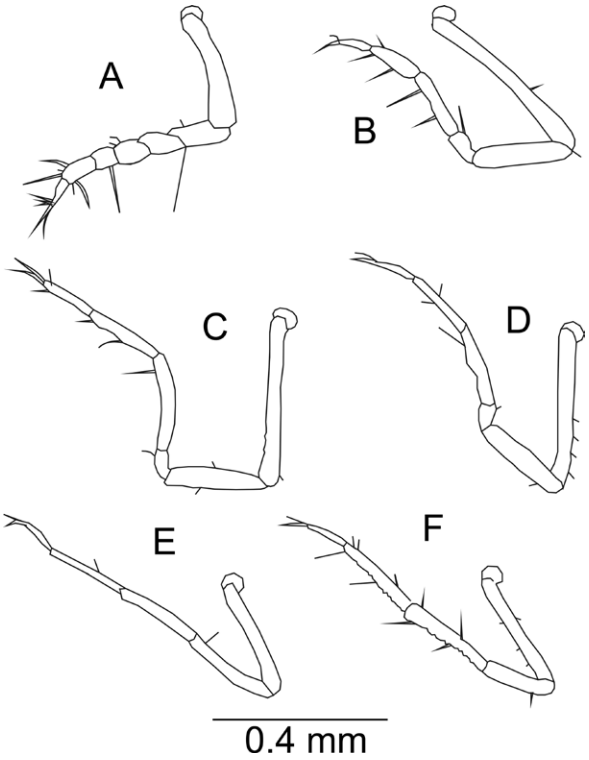

Figure 4. *Gracilimesus tzasnae* sp. nov., holotype female. A, Pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pereopod 6.

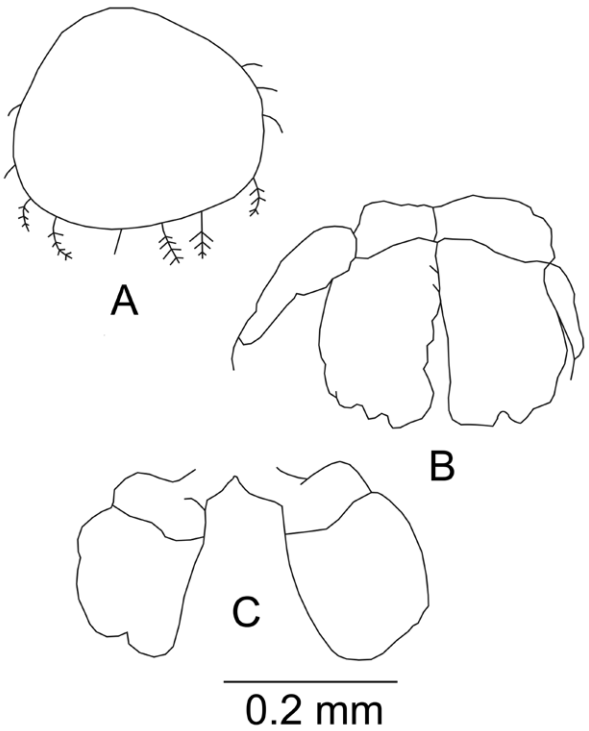

Figure 5. *Gracilimesus tzasnae* sp. nov., holotype female. A, Operculum; B, pleopod 3; C, pleopod 4.

distinguish *Gracilimesus tzasnae* sp. nov. from all other known species. The new species differs based on 2 maxilliped coupling spines; well-developed lateral spine on pereonal segment 4; posterodistal part of ischium on pereopod 1 and posteromedial margin of carpus, each with a long robust seta; propodus on pereopod 4 with 1 robust seta midway on posterior margin; pedestal spines well developed and directed backward; dorsal surface of pleotelson smooth. Finally, all other known *Gracillimesus* species have a distribution outside the Gulf of Mexico and the Caribbean Sea. The major differences between *G. tzasnae* sp. nov. and all other *Gracilimesus* species are summarized in table 1.

Table 1
Morphological differences among *Gracilimesus tzasnae*, a new species, and all other known species of *Gracilimesus* (* female unknown; ** male unknown; – not documented).

Gracilimesus species	Pereonite 7	Pleotelson dorsal surface	Antero-lateral projection on pereonite 4 (female)	Articles antennula	Articles antenna	Pereopod 7	Uropod length vs. pleotelson	Distribution
angustus *	absent	weakly vaulted, separated from lateral fields by shallow elongate concavities	–	5	–	absent	0.2×	Denmark Strait
celticensis	absent	weakly vaulted, separated from lateral fields by shallow elongate concavities	absent	5	–	absent	0.11×	Celtic Sea
corniculatus *	not reduced	weakly vaulted, separated from lateral fields by shallow elongate concavities	–	6	26	absent	0.2×	Drake Passage
*gorbunovi***	not reduced	smooth, not separated from lateral fields	absent	6	12	present	0.11×	Arctic Ocean
hanseni	absent	weakly vaulted, separated from lateral fields by shallow elongate concavities	present	6	26	absent	0.1×	Argentina Basin
insignis *	reduced, lesser pereonite 6	weakly vaulted, separated from lateral fields by shallow elongate concavities by weak indentations	present	6	25	present	0.27×	Davis Strait
modestatenuis *	not reduced	smooth, not separated from lateral fields	–	6	16	present	–	Peru-Chile Trench
*modestus***	not reduced	smooth, not separated from lateral fields	present	–	–	present	–	Davis Strait
orientalis *	--	weakly vaulted, separated from lateral fields by shallow elongate concavities by weak indentations	–	6	–	present	0.23×	North Pacific
*tenuispinis***	not reduced	smooth, not separated from lateral fields	present	6	–	present	2.6×	Davis Strait
tropicalis	absent	weakly vaulted, separated from lateral fields by shallow elongate concavities	absent	–	–	absent	0.2×	Mediterranean Sea
tzasnae sp. nov. **	not reduced	unvaulted, smooth, not separated from lateral fields	present	5	–	absent	0.3×	Campeche Bay, Gulf of Mexico

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