

Short Communication

Ingolfiellids (Crustacea, Peracarida, Ingolfiellidea) from the Intra-Americas Sea with the description of a new deep-sea species of *Ingolfiella* from the southern Gulf of Mexico

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ABSTRACT. The order Ingolfiellida (Crustacea, Peracarida) represents a small group of peracarid crustaceans, usually less than 3 mm long and comprising 53 species in several ecosystems worldwide. Previously, eight ingolfiellid species had been documented from the Intra-Americas Sea: one from the Gulf of Mexico and eastern Florida and seven from the Caribbean Sea, including the Bahamas. A new deep-sea species of *Ingolfiella* is described based on material collected from bathyal soft bottoms (2650 m depth) offshore Veracruz State, southern Gulf of Mexico. The new species can be differentiated as follows: accessory flagellum 2-articulate; antenna 2 flagellum 4-articulate; pereopods 5-6 with long curved seta on dactylus; rami of uropod 1 subequal in length; uropod 3 ramus longer than peduncle, unarticulated; pleopods 1-3 as long as pleonal segments; maxilla 1 inner plate with one tiny seta distally; mandible without palp; molar poorly developed; pleopods reduced; telson as a fleshy ovoidal lobe with two slender dorsal setae. A table and a map featuring the nine ingolfiellids recorded in the Gulf of Mexico, the Caribbean Sea, and eastern Florida are also provided. The new species increases the number of *Ingolfiella* species to 35 worldwide, representing the second record of ingolfiellids from the Gulf of Mexico.

Keywords: *Ingolfiellidae*; marine crustaceans; malacostraca; new species; bathyal zone; Bay of Campeche; Gulf of Mexico

The Intra-Americas Sea (IAS) is a complex and dynamic semi-enclosed marine basin in the tropical and subtropical mid-western Atlantic Ocean. This huge region encompasses the Gulf of Mexico (GM), the Caribbean Sea, the straits of Florida and Yucatan, the Bahamas, and adjacent waters (Maul 2019). Based on several oceanographic campaigns carried out along the IAS, benthic crustacean biodiversity of this region, either anchialine, shallow-water, or deep-sea, can be considered as moderately well-known (LeCroy et al. 2009, Miloslavich et al. 2010).

The order Ingolfiellida Hansen, 1903 (Crustacea, Peracarida) represents a small group of peracarid crus-

taceans, usually less than 3 mm long (Senna & Serejo 2005), inhabiting several ecosystems worldwide, such as deep-sea sediments (Hansen 1903, Shimomura et al. 2006), brackish water (Stock 1976); interstitial shallow water (Vonk & Schram 2003), freshwater (Karaman 1957), mountain streams (Noodt 1965, Rodríguez et al. 2017), and continental underground waters (Ruffo 1985).

Based on a cladistic analysis, Lowry & Myers (2017) raised the peracarid ingolfiellids as an order according to the eucarpochele gnathopods (the propodus is reduced and combined with the dactylus to form a dactylar complex) and the six-segmented pleosome.

Taxonomically, ingolfiellids comprise two families, six genera and 53 species (Vonk & Jaume 2013, Lowry & Myers 2017); among which the family Ingolfiellidae Hansen, 1903 includes five genera occurring marine and freshwater ecosystems: *Ingolfiella* Hansen, 1903; *Proleleupia* Vonk & Schram, 2003; *Rapaleleupia* Vonk & Schram, 2007; *Stygobarnardia* Ruffo, 1985; and *Trogloleleupia* Ruffo, 1975; and the family Metaingolfiellidae Ruffo, 1969 with its single genus *Metaingolfiella* Ruffo, 1969 (Lowry & Myers 2017).

Members of the Ingolfiellidae can be differentiated from other families based on the combination of the following features: body vermiform; mandible palp absent or minute; pleopods reduced; and uropod 3 uniramous. In contrast, the Metaingolfiellidae display a subcylindrical body, retain the mandible palp, the pleopods are well-developed, and the uropod 3 is biramous (Lowry & Myers 2017).

Due to their tiny dimensions and mesh gear size, the Ingolfiellida are rarely collected from deep-sea soft bottoms, describing a new deep-sea material species from a single or very few specimens from a single locality. Before the present study, seven ingolfiellid species had been documented from the IAS: one from the GM, and eastern Florida, and seven from the Caribbean Sea, including the Bahamas (Vonk & Scram 2003).

During a taxonomic project focused on deep-sea amphipods from the GM carried out by the Crustacea Laboratory, Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México (UNAM), a single specimen of a tiny benthic amphipod was identified as a new *Ingolfiella* species of the family Ingolfiellidae. The material was collected in 1965 during the campaign R/V Academic Kovaliewsky to the southern GM, Straits of Florida, and SW-NE Cuba, where samples were taken from 25 to 3200 m depth (Ortiz & Winfield 2023). The benthic organisms were collected using an Okean grab (0.25 m²) on soft bottoms and ulterioresly preserved in 90% ethanol solution (Santana 1966).

The ingolfiellid specimen, a male, was examined and dissected at the Crustacean Laboratory (FESIztacala-UNAM) using Motic Microscopes SMZ168 and BA210, both equipped with camera lucida and illustrated with Corel Draw V-X7 software. The terminology used in descriptions and taxonomic classification follows Bousfield & Hendrycks (1995), Lowry & Myers (2017), Corbari et al. (2019), and Ortiz (2021). The type material is deposited in the Colección Nacional de Crustáceos (CNCR), Instituto de Biología, UNAM, México.

Taxonomy

Superorder Peracarida Calman, 1904

Order Ingolfiellida Hansen, 1903

Family Ingolfiellidae Hansen, 1903

Genus *Ingolfiella* Hansen, 1903

Ingolfiella poorei sp. nov. (Figs. 1-4)

Type material. Holotype: adult male (illustrated), 1.8 mm; CNCR 37076.

Type locality. The specimen was collected offshore on soft bottoms at 2650 m depth (19°53'45.30''N, 95°04'55.85''W), Bay of Campeche, SE of GM.

Etymology. The species is named in honor of Gary Poore for his valuable contribution to the study of crustaceans. It is derived from the noun "poore" in the genitive case.

Diagnosis. Antenna 1 accessory flagellum 2-articulate; antenna 2 flagellum 4-articulate; pereopods 5-6 with a long curved seta on dactylus; rami of uropod 1 subequal in length; uropod 3 ramus longer than peduncle, unarticulated, slender, distally pointed; pleopods 1-3 as long as pleonal segments, foliaceous; maxilla 1 inner plate with one tiny seta distally; mandible without palp; molar poorly developed; coxae 1-3 degraded; gnathopods similar, eucarpocheleate; pleopods reduced; telson as a fleshy lobe ovoidal, with two slender dorsal setae.

Description. Body (Fig. 1) slender, vermiform; pleonites 1-7 increasing in length toward posterior; urosome less than half-length of pleon; head quadrangular, 1.3x longer than pereonite 1; eyes absent; ocular lobe very small.

Antenna 1 (Fig. 3a) segment 1 ovoidal, longer than segments 2-3 combined, segment 3 shortest; main flagellum 4-articulate; accessory flagellum 2-articulate. Antenna 2 (Fig. 3b) segment 4 longer than 5; flagellum 4-articulate.

Mandibles without palp and with poorly developed molar. Left mandible (Fig. 2d) with 4 min incisive teeth; lacinia mobilis quadrate. Right mandible (Fig. 2e) devoid of lacinia mobilis; incisor with five rounded teeth. Maxilla 1 (Fig. 2a) inner plate with one tiny seta distally; outer plate upper margin 5-dentate; palp 2-segmented, proximal segment with one seta, distal segment with two. Maxilla 2 (Fig. 2b), the inner plate is wider than the outer counterpart and is devoid of facial setae; one distal seta is present on each plate. Maxilliped (Fig. 2c), narrow; outer plate attaining half-length of the inner plate; five setae on inner plate; palp

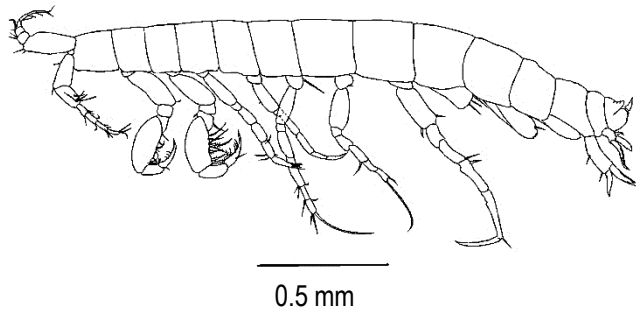


Figure 1. *Ingolffiella poorei* sp. nov. habitus, lateral view.

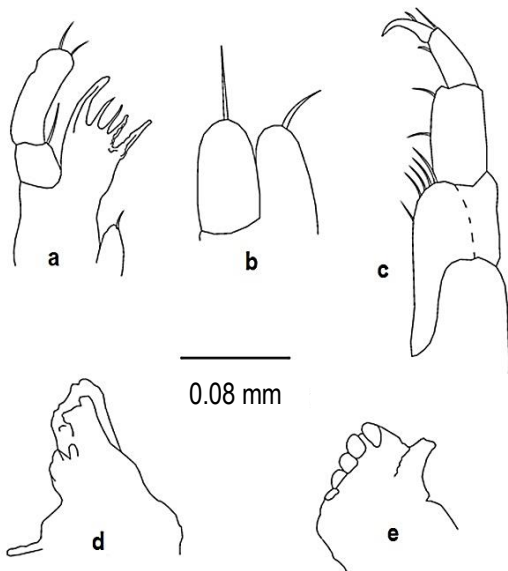


Figure 2. *Ingolffiella poorei* sp. nov. a) Maxilla 1, b) maxilla 2, c) maxilliped, d) left mandible, e) right mandible.

4-segmented, distal segment curved inward, with a few setae marginally.

Gnatopods 1-2 similar; eucarpocheilate. Gnatopod 1 (Fig. 3c) coxa degraded; basis slightly curved forward, with one posterodistal seta; ischium quadrangular; merus triangular; carpus ovoidal, as long as basis, with eight short setae on posterior margin; dactylus 1.2x longer than propodus, posterior margin with three tiny setae placed midway and three basal setae. Gnatopod 2 (Fig. 3d) coxa degraded; basis straight; ischium short, rectangular; merus subtriangular; carpus ovoidal, slightly curved backward, posterior margin with eight setae, of which three simple and other five setulose; propodus as long as dactylus; dactylus posterior margin with five short setae.

Pereopod 3 (Fig. 3e), coxa degraded; basis narrow, as long as merus and carpus combined; propodus anterior margin with two curved setae, posterior margin with one seta basally; dactylus 1.2x longer than propo-

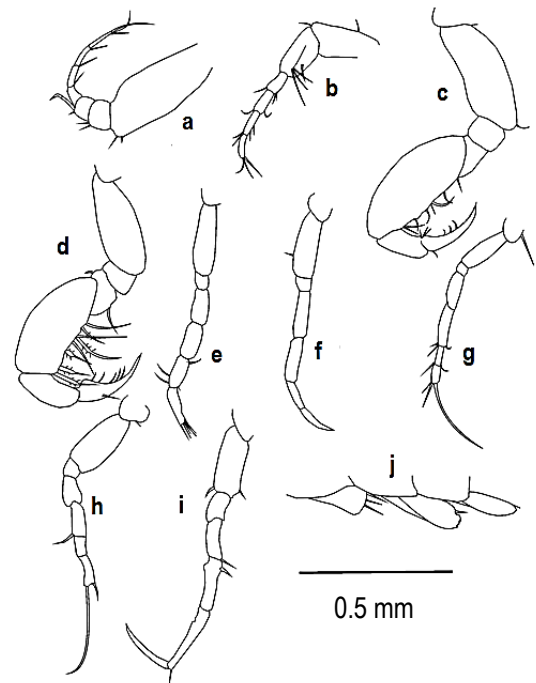


Figure 3. *Ingolffiella poorei* sp. nov. a) Antenna 1, b) antenna 2, c) gnathopod 1, d) gnathopod 2, e) pereopod 3, f) pereopod 4, g) pereopod 5, h) pereopod 6, i) pereopod 7, j) lateral view of pleopods 1-3.

dus, with tuft of distal setae. Pereopod 4 (Fig. 3f) coxa small, rounded; basis 0.7 x as long as merus and carpus combined; basis anterior margin convex, with one short seta placed midway, posterior margin right; dactylus 1.2x as long as propodus. Pereopod 5 (Fig. 3g), coxa rounded; basis 0.7x as long as merus and carpus combined; carpus anterodistal corner with two setae, posterodistal with one seta; propodus as long as dactylus, with one distal seta on each margin; dactylus with a long-curved seta as long as carpus, propodus and dactylus combined. Pereopod 6 (Fig. 3h) coxa rounded, with one seta on the concavity of posteroventral margin; basis as long as merus and carpus combined, anterior margin with curved seta; propodus shorter than dactylus; dactylus slightly curved forward, with a short posterodistal seta, and long curved seta 1.2x as long as carpus, propodus and dactylus combined. Pereopod 7 (Fig. 3i) longest, coxa reduced; basis as long as merus and carpus combined; merus with posterodistal seta; carpus as long as dactylus, with posterobasal seta; dactylus curved forward.

Pleopods 1-3 reduced (Fig. 3j). Pleopod 1 rectangular, with three posterior setae. Pleopod 2 foliaceous, with a posterior margin crenulate and a notch with a seta. Pleopod 3 smaller than pleopod 2, foliaceous, with a subdistal seta.

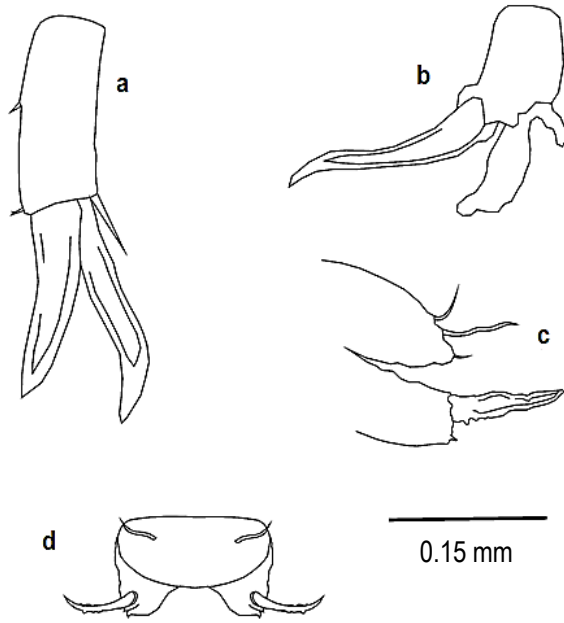


Figure 4. *Ingolffiella poorei* sp. nov. a) Uropod 1, b) uropod 2, c) lateral view of telson and uropod 3, d) telson and uropod 3 in dorsal view.

Uropod 1 (Fig. 4a) peduncle as long as outer ramus, outer margin with two short setae, distomedial corner with long, robust seta; rami naked, tapering, unarticulated; inner ramus 1.2x as long as outer ramus. Uropod 2 (Fig. 4b) peduncle as long as inner ramus, slightly curved distally, naked; inner ramus sinuous, blunt, half-length of the outer ramus, with spur proximally on medial margin; outer ramus slender and sickle-shaped. Uropod 3 (Fig. 4c) is unarticulated, slender, and pointed distally. Telson (Fig. 4d), a fleshy, ovoidal lobe with two slender dorsal setae, distally bilobate, and one robust curved seta in each lobe.

Remarks

The *Ingolffiella* species inhabitant in several ecosystems worldwide, such as soft bottoms of the deep-sea floor, high mountain freshwater riverbeds, subterranean fresh and brackish waters, and as a troglobitic and stygobitic species (Vonk & Schram 2003).

The information regarding the ingolffiellids group throughout the IAS summarized eight species of ingolffiellid (Vonk & Schram 2003), and the new species described herein: three marine species, four

Table 1. Ingolffiellid species recorded in the Intra-Americas Sea. GM: Gulf of Mexico, CS: Caribbean Sea, WTA: Western Tropical Atlantic, NR: not registered.

Species	Geographic distribution	Depth (m)	Remarks	Reference
<i>I. atlantisi</i>	NW Bahamas, WTA	4743-4892	Marine	Mills (1967), Dojiri & Sieg (1967), Vonk & Schram 2003
<i>I. putealis</i>	Bacuna, Bonaire (CS)	NR	Freshwater, hole	Stock (1976), Vonk & Schram (2003)
<i>I. fontinalis</i>	Bonaire (CS)	NR	Freshwater, hole	Stock (1977), Vonk & Schram (2003)
<i>I. tabularis</i>	Curazao, Aruba (CS)	NR	Freshwater, anchihaline subterranean pool cave	Stock (1977), Vonk & Schram (2003)
<i>I. grandispina</i>	Curazao, Gravel land sand (CS)	NR	Brackish, cave Blauw Baai	Stock (1979), Vonk & Schram (2003)
<i>I. quadridentata</i>	Curazao, 500 m far from Wol Piscadera (CS)	4	Marine, coarse coral sand flat	Stock (1979), Vonk & Schram (2003)
<i>I. margaritae</i>	Isla Margarita (CS)	NR	Freshwater	Stock (1979), Vonk & Schram (2003)
<i>I. (Tethydiella) fuscina</i>	South Carolina, Crystal River, Panama City, Tampa Bay (GM)	17-48	Marine	Dojiri & Sieg, (1987), Vonk & Schram (2003)
<i>I. poorei</i> sp. nov.	Offshore Veracruz State, SW GM	2650	Marine, soft bottoms	Present study

other freshwater species, and another brackish item. Additionally, with the new species described herein, nine ingolffiellid species occur along the IAS: *I. (Tethydiella) fuscina* Dojiri & Sieg 1987 from the GM and eastern Florida (Dojiri & Sieg, 1987), *I. poorei* sp. nov. in SW GM, besides the Caribbean Sea *I. fontinalis* Stock, 1977; *I. grandispina* Stock, 1979; *I. margaritae* Stock, 1979; *I. quadridentata* Stock, 1979; *I. putealis* Stock, 1976; and *I. tabularis* Stock, 1977, and *I. atlantisi* Mills 1967 in NW Bahamas (Table 1, Fig. 5).

Taxonomically, *I. poorei* sp. nov. is easily distinguished from other ingolffiellids recorded from the IAS by the antenna 2 flagellum with four articles; pereopods 5-6 tip of dactylus with a long (at least 2x longer than dactylus) curved seta; rami of uropod 1 subequal in length; uropod 3 ramus longer than peduncle; and pleopods 1-3 as long as pleonal segments, foliaceous.

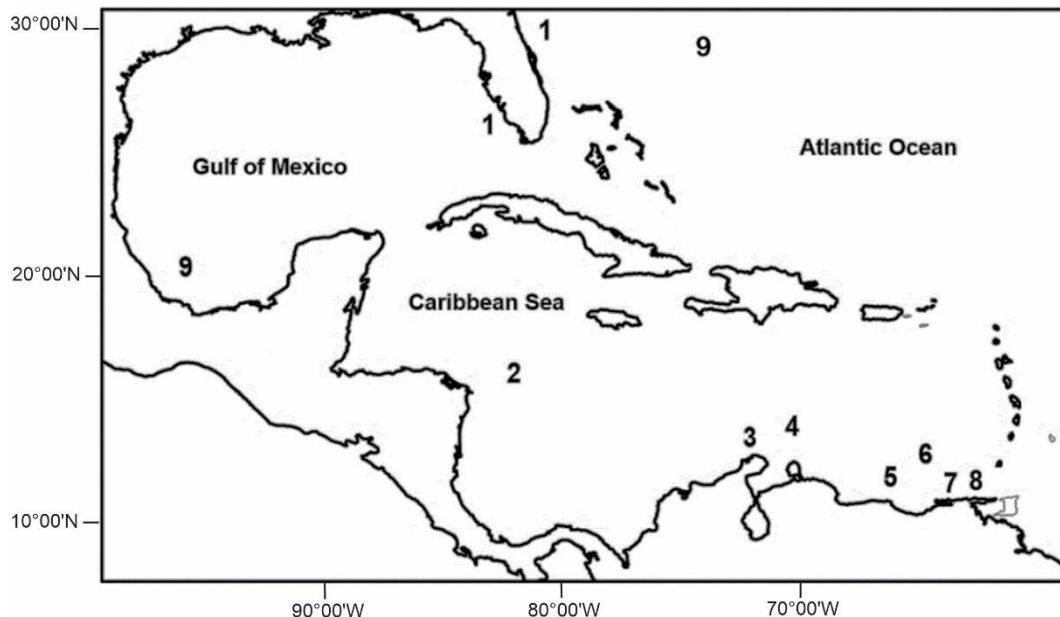


Figure 5. Geographic distribution of *Ingolfiella* spp. throughout the Intra-Americas Sea: Gulf of Mexico, Caribbean Sea, and adjacent water of the western Atlantic Ocean. 1: *Ingolfiella (Tethydiella) fuscina*, 2: *Ingolfiella* sp. B, 3: *I. tabularis*, 4: *I. grandispina*, 5: *I. fontinalis*, 6: *I. puntealis*, 7: *I. quadridentata*, 8: *I. margaritae*, 9: *I. poorei* sp. nov.

Credit author contribution

M. Ortiz: conceptualization, validation, methodology, formal analysis, writing-original draft; I. Winfield: methodology, data curation, review, and editing; S. Cházaro-Olvera: methodology, supervision, review, and editing. All authors have read and accepted the published version of the manuscript.

Conflict of interest

The authors declare no potential conflict of interest in this manuscript.

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