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A NEW SPECIES OF *INGOLFIELLA* (CRUSTACEA, AMPHIPODA, INGOLFIELLIDEA) FROM MIXOHALINE WATERS IN MADEIRA

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With 6 figures

SUMMARY. In a resurgence on a beach in Madeira, of brackish water originating from an anchihaline pool, a new species of *Ingolfiella* was discovered. It belongs to the insular/amphi-Atlantic subgenus *Antilleella*.

SUMÁRIO. UMA NOVA ESPÉCIE DE *INGOLFIELLA* (CRUSTACEA, AMPHIPODA, INGOLFIELLIDEA) DE ÁGUAS SALOBRAS DA MADEIRA. O autor descreve uma nova espécie de *Ingolfiella*, encontrada numa poça de águas salobras, que pertence ao subgénero insular/anfiatlântico *Antilleella*.

INTRODUCTION

During two visits, in October 1991 and April/May 1992, to Madeira, a number of samples were taken from the interstitia of riverine and marine sediments (gravel, sand), with the aid of a biophreatical pump (the so-called Bou-Rouch pump, see Bou, 1975). On one of the sites an apparently undescribed species of the genus *Ingolfiella* (subgenus *Antilleella*) was encountered, which forms the subject of the present paper.

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Genus *Ingolfiella* HANSEN, 1903
 Subgenus *Antilleella* RUFFO & VIGNA, 1989
Ingolfiella (Antilleella) unguiculata n. sp.

Material and locality.- 1 holotype (female), 1 allotype (male), 25 paratypes (all deposited in the Zoölogisch Museum, Amsterdam, cat. no. Amph. 108.962 & 109076, but for 5 paratypes in the Museu Municipal do Funchal, no.25230). Madeira, Lugar de Baixo, 17 Oct. 1991 and 24 Apr. 1992. An anchihaline pool is located just W of a banana packing factory; the lagoon is fed at its N.E. end by a small freshwater brooklet; it is separated from the sea by a gravel wall; at high tide, sea water percolates through the gravel and sand into the lagoon, whereas at low tide lagoon water escapes into a tidal pool, forming a small resurgence on the seaward slope of the gravel barrier; the tidal influence is well marked in the lagoon. The electric conductivity and temperature of the lagoon water are 9.8 mS/cm and 22.9° C, those of the resurgence 19.0 mS/cm and 22.4°, respectively. The resurgence is covered by sea water at high tide, and consequently the salinity is more elevated during immersion (33 p.p.t.) and the temperature is lower (19.0°). The *Ingolfiella* was collected in coarse sand with a Bou-Rouch pump (probe at 40-70 cm under the sediment surface) in the resurgence. The UTM coordinates of the resurgence are CB ³0457 x ³⁶1725. Note that the lagoon is not properly marked as such on the "Carta Militar de Portugal", edition 1975, sheet Madeira 8, scale 1:25,000; in fact it is indicated as a terrestrial feature, viz. a dry depression. The accompanying stygofauna consists of Bogidiellidae (Crustacea, Amphipoda) and Microparasellidae (Crustacea, Isopoda).

Description. Body length (tip rostrum to tip telson) variable 1.08-1.74 mm (consequently, this is the smallest species of *Antilleella* known up to date). Colourless, blind.

Body (fig. 1a) of the characteristic ingolfiellid shape: worm-like. Coxal plates (fig. 1b) very small, widely spaced, more or less trapezoidal, armed with 2 or 3 setae. Dorsum of body armed with some short setules. Antennal sinus not marked; ocular lobe vestigial, indicated as a sort of duplication of the anterior cephalic margin.

Antenna 1 (fig. 1d): Peduncle slender, longer than flagellum; segment 3 much longer than wide. Flagellum 5-segmented; one aesthetasc on each of the segments 2 through 5. Accessory flagellum almost reaching distal end of flagellum segment 2, 3-segmented.

Antenna 2 (fig. 1c) shorter than antenna 1, rather slender; flagellum 5-segmented, distal segment with small aesthetasc.

Left mandible (fig. 2a): Molar pointed; pars incisiva reduced, 3-dentate; left

lacinia mobilis 3-dentate; right lacinia faintly serrate; 3 prae-molar spines.

Maxilla 1 (fig. 2b): Palp 2-segmented, distal segment with 3 setae. Outer lobe with 1 smooth, medial spine and 4 distal spines: one naked, two bidentate, and one unidentate. Inner lobe rounded, with 1 distal setule.

Maxilla 2 (fig. 2c) bilobed, each lobe with 4 distal setae.

Maxilliped (fig. 2d): Basal endite bicuspidate at tip, with 1 distal and 1 medial setae.

Gnathopod 1 (fig. 3a): Basis swollen, short. Ischium and merus hardly longer than wide. Carpus elongate-oval; palmar angle marked by 2 spines; distad of largest palmar angle spine, a triangular notch and 2 low triangular processes are found; proximad of most proximal palmar angle spine, a small, sharp process is found; palmar margin with 3 or 4 bifid setules. Propodus + dactylus + unguis forming together a large claw; propodus with disto-endal process; dactylus with 3 endal teeth; unguis unarmed, thin, about as long as dactylus.

Gnathopod 2 (fig. 3b): Basis more slender than that of gnathopod 1. Ischium much longer than wide, with pointed posterodistal process. Carpus wider but shorter than in gnathopod 1, with 2 palmar angle spines, and low triangular process just proximad of largest angle spine. Ratio c/p (for definition see Stock, 1977, fig. 56d) 1.91 (male) to 2.24 (female). Palmar margin female (fig. 3c) armed with 4 setae and 7 tooth-like processes, tooth 2 largest, teeth 4, 5, and 7 very low. Palmar margin male (fig. 6a) as in female, but teeth 1 and 2 larger. Propodus with bilobate disto-endal process (fig. 6b). Dactylus with 3 endal teeth (distalmost largest). Unguis at least equal to, or longer than, dactylus, smooth, thin, slender.

Pereiopod 3 (fig. 3d): Basis with convex posterior margin. Merus short, wide, with strongly convex posterior margin. Carpus slightly swollen, longer than propodus. Claw rather slender; dactylus with 1 disto-endal tooth; unguis bifid, shorter than dactylus. Pereiopod 4 (fig. 3e) similar to pereiopod 3.

Pereiopod 5 (fig. 4e) shorter than P3 and P4. Basis somewhat swollen. Merus and carpus subequal, both short and wide. Propodus short, as long as carpus. Claw slender, dactylus and unguis subequal, each with 1 tooth.

Coxal gills ovate, small, on pereionites 3, 4, and 5. No oostegites in female.

Pereiopod 6 (fig. 4f) slightly longer than P5, but resembling P5 in morphology.

Pereiopod 7 (fig. 4g) much longer than P6. Basis elongate, not swollen, with more or less straight margins. Merus and carpus subequal; carpus with posterodistal, bent, denticulate spine. Propodus slightly shorter than carpus. Claw long and slender; dactylus and unguis each with 1 tooth.

Pleopod 1 male (fig. 5a) rather narrow; endal margin convex with 2 faint notches; 2 terminal setae. Pleopod 1 female (fig. 5d) molariform, without setae. Pleopods 2 and 3 (male, female) molariform, i.e. ectal and endal margins subequal

in length (figs. 5b, c, e, f). Pleopods of juvenile female more triangular, with small endal setule (figs. 5g-i).

Uropod 1 (fig. 4a): Exopodite short, pointed, with 1 subdistal seta. Endopodite with dorsolateral row of 5 long setae, 1 ventro-subdistal seta, 1 small ventro-subdistal process, 2 dorso-subdistal pointed processes, and 1 spine.

Uropod 2 female (fig. 4b) longer than uropod 1. Pedunculus long, with 3 medial rows of laterodorsal setae (in holotype 8, 12, and 10 setae per row, respectively) and long distoventral seta. Endopodite longer than exopodite. Endopodite with 2 dorsal setae and 1 long + 1 short ventral seta. Exopodite with 1 dorsal and 1 ventral seta. Uropod 2 male (fig. 6c): ventroproximal margin of peduncle with crooked spine, absent in female.

Uropod 3 (fig. 4c): Peduncle with 3 setae. Single ramus short, squarish, with 1 long terminal seta.

Telson (fig. 4d) fleshy, with 2 long, subdistal setae, near implantation of which a pair of sensory setules arise.

Variability. Except for a large range in body lengths, some variation has been observed in gnathopod 2 (suture between dactylus and unguis sometimes distinct, sometimes not), in the peduncle of uropod 2 (number of setae per row sometimes slightly higher than in holotype), and in the rami of uropod 2 (sutures in exo- and endopodite often indistinct). In one male, pleopods 2 and 3 are also provided with a distal seta (normally these pleopods are naked).

Etymology. The specific name, *unguiculata*, alludes to the long unguis of the claw of gnathopods 1 and 2.

Remarks. The most recent revision of the subgeneric division of the genus *Ingolfiella* is published in an elegant paper by RUFFO & VIGNA (1989). According to their criteria, the present Madeiran material belongs to the subgenus *Antilleella* RUFFO & VIGNA, 1989, since it has a triangular first male pleopod and a small ocular lobe. The structure of the rami of uropod 2, that is also used by Ruffo & Vigna, is in our opinion not suitable for the distinction of subgenera, since in the present new species from Madeira, this character is subject to intraspecific variation. However, in one character, the Madeiran taxon resembles the subgenus *Gevgeliella* S. KARAMAN, 1959: the female is devoid of oostegites (presumed to be present in *Antilleella*).

The subgenus *Antilleella* contains 5 species, all from near-coastal ground waters, with salinities fluctuating between oligohaline and euhaline, of insular areas in the tropical and subtropical Atlantic (Leeward group of the Antilles, the Canary

Islands): *I. (A.) putealis* STOCK, 1976 (from Bonaire), *fontinalis* STOCK, 1977 (likewise from Bonaire), *tabularis* STOCK, 1977 (from Curaçao and Aruba), *margaritae* Stock, 1979 (from Margarita), and *similis* RONDÉ-BROEKHUIZEN & STOCK, 1987 (from Fuerteventura).

All these species differ from the Madeiran taxon in the claw of gnathopod 2 (and in most cases also that of gnathopod 1). In the Madeiran taxon, the toothed part of the claw (homologous to the dactylus) and the glabrous part (= unguis) are at least of equal length. In the other taxa, the dactylus is larger than the unguis. Another feature in which the Madeiran species differs from all other *Antilleella* species is found in pleopods 2 and 3 of the adults, which are molariform (or spatulate) in the former, and triangular (endal margin much shorter than ectal margin) in the latter.

Moreover, *I. (A.) fontinalis* differs in having robust (instead of slender) antennae 1 and 2. *I. (A.) tabularis* is characterized by a very short claw on pereopod 6, but its pleopods 2 and 3 come closest to those of the Madeiran taxon. *I. (A.) margaritae* differs from the Madeiran taxon by a more slender claw on pereopods 3 through 7. *I. (A.) putealis* is much larger than the Madeiran taxon (1.9-3.0 mm, versus 1.1-1.7 mm)

It would have been logical if *I. (A.) similis* (from the Canary Islands) would show the strongest phenetic resemblance to the taxon from Madeira, but this is not really the case. Several distal spines on the outer lobe of maxilla 1 are finely denticulate in *similis*, whereas the homologous spines in the Madeiran taxon are uni- or bidenticate. The merus and claw of pereopods 3 and 4 are much more slender, as are the basis and merus of pereopod 7.

I am aware that these differences are of subtle nature, but I consider them sufficient to regard the Madeiran material as a distinct species. The biogeographic aspects of this discovery are interesting, since the subgenus *Antilleella* unites an insular, amphi-Atlantic group of species, suggesting an origin in an era when the Atlantic Ocean was still closed or at least less widely opened than nowadays, i.e. at the end of the Mesozoic or perhaps the beginning of the Tertiary.

It should be noted that another recently described species from the Canary Islands, *I. canariensis* Vonk & Sánchez, 1991, differs at first sight from the Madeiran taxon in having 4-dentate (instead of 3-dentate) dactyli on gnathopods 1 and 2.

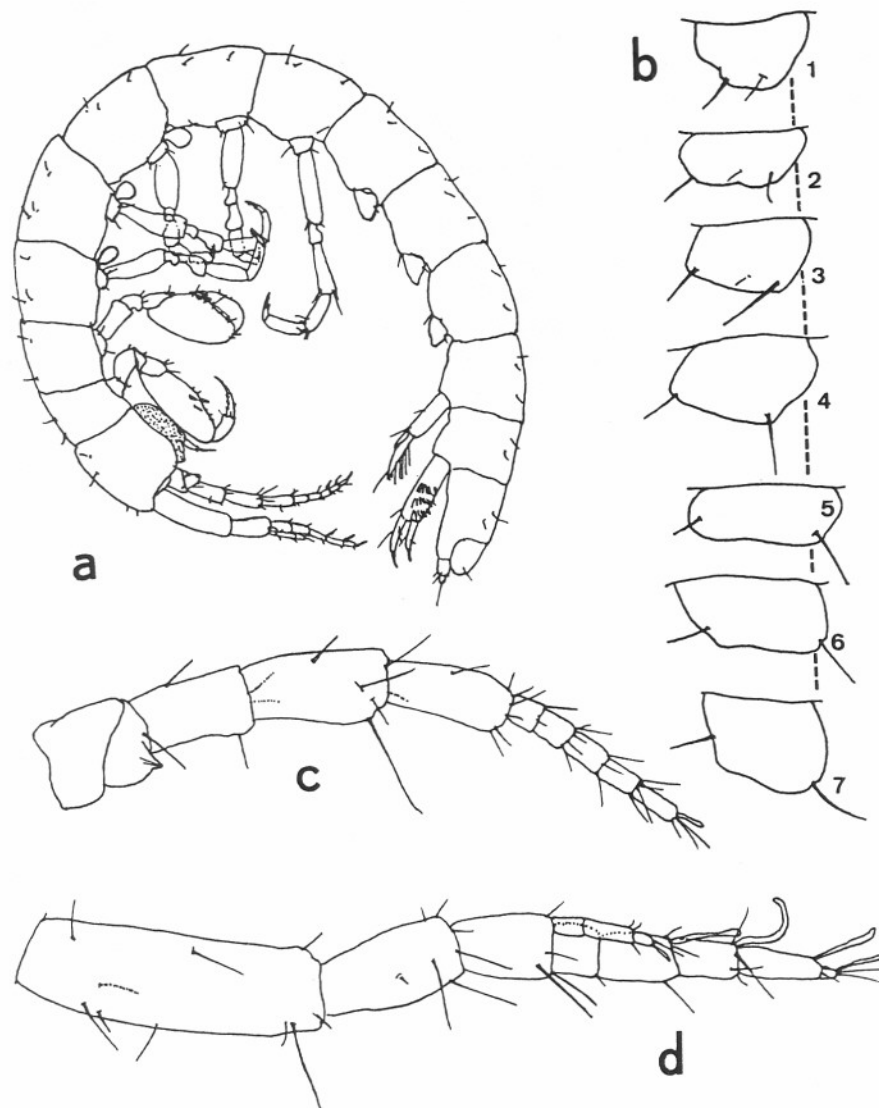


Fig. 1. *Ingolfiella (Antilleella) unguiculata* n. sp., female holotype a) entire animal, from the left (actual size 1.08 mm); b) coxal plates 1 to 7, from the left (scale A); c) antenna 2 (A); d) antenna 1 (A). Scale on fig. 3.

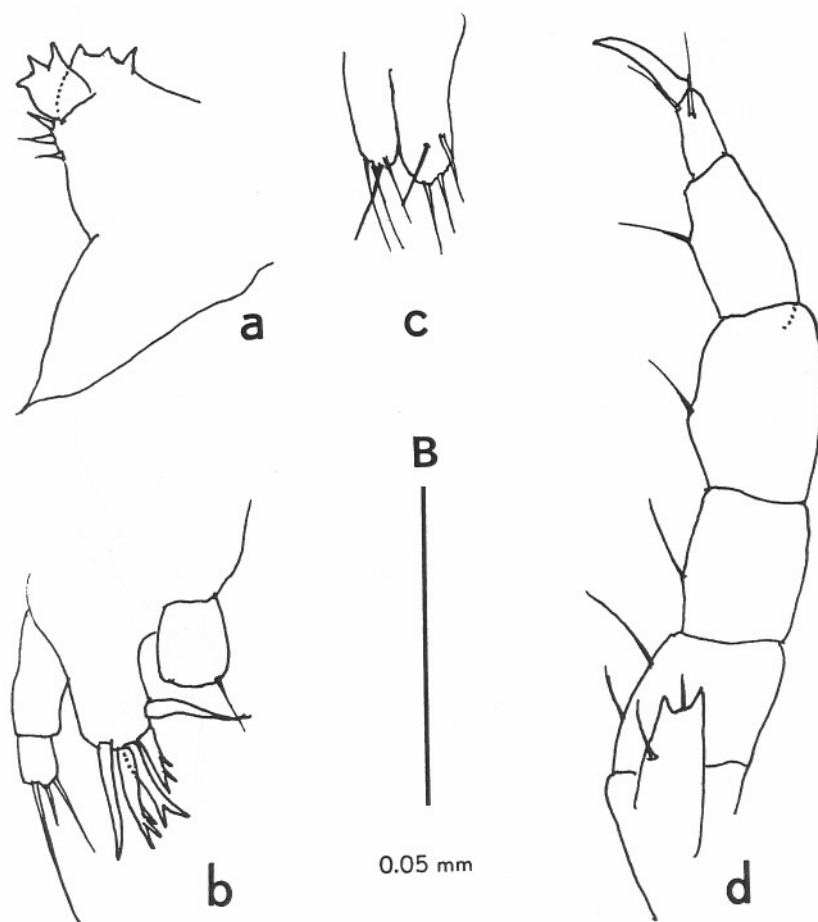


Fig. 2. *Ingolfiella (Antilleella) unguiculata* n. sp., female holotype. a) left mandible; b) maxilla 1; c) maxilla 2; d) maxilliped. All to scale B.

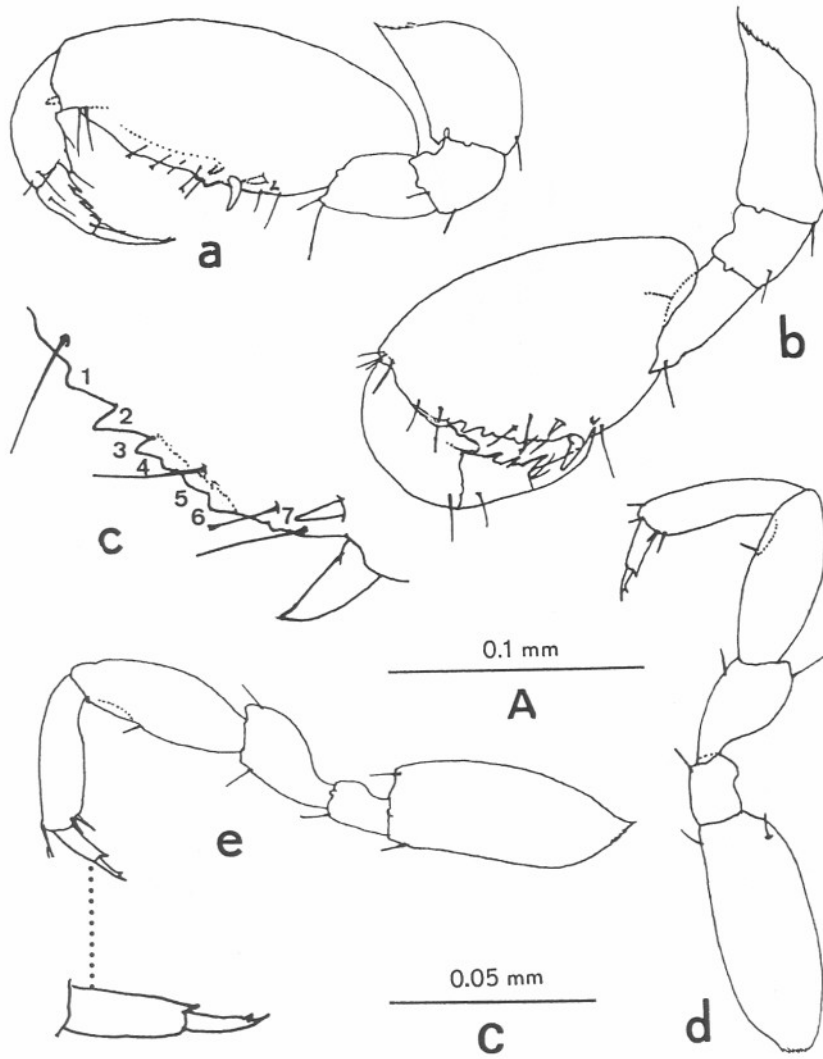


Fig. 3. *Ingolfiella (Antilleella) unguiculata* n. sp., female holotype. a) gnathopod 1 (scale A); b) gnathopod 2 (A); c) palmar margin (with teeth 1 to 7) of gnathopod 2, more strongly enlarged; d) pereopod 3 (A); e) pereopod 4 (A).

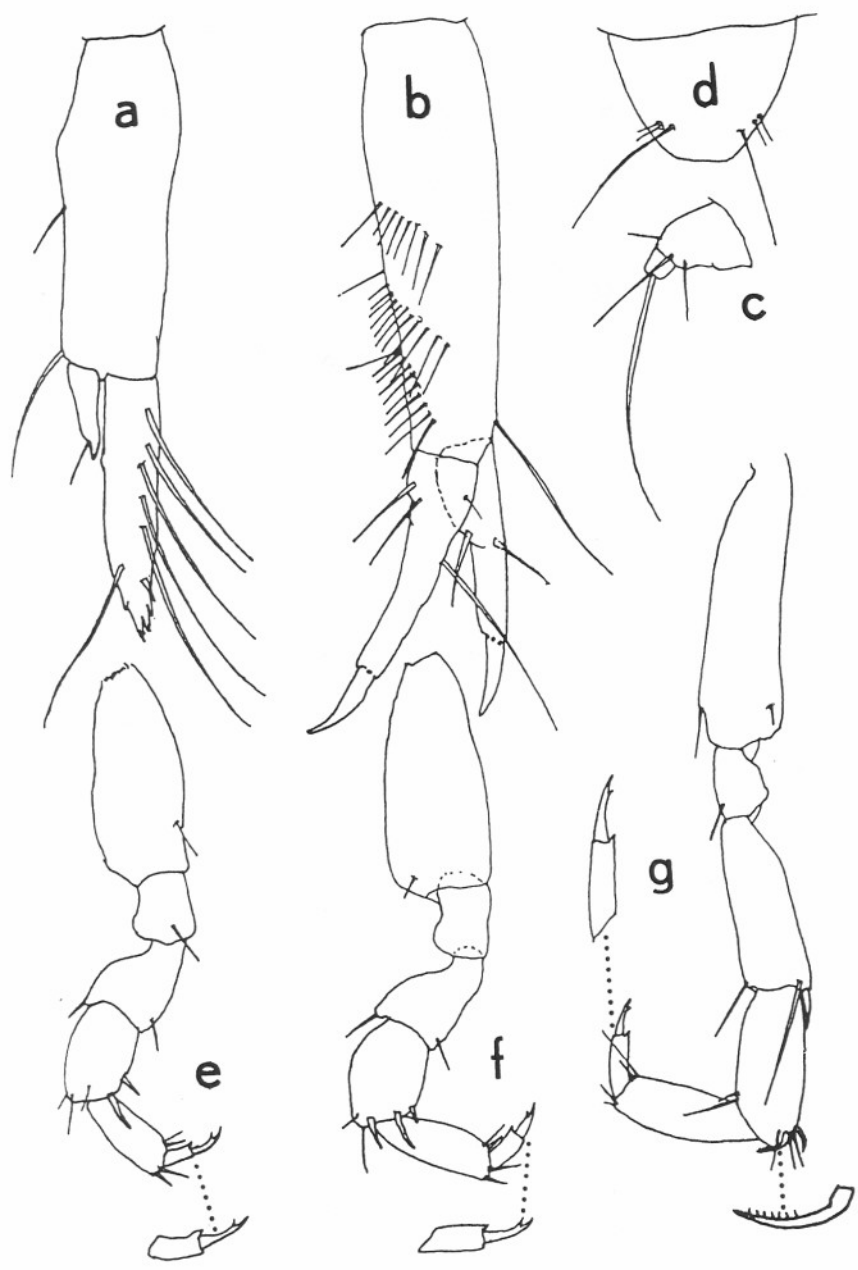


Fig. 4. *Ingolfiella (Antilleella) unguiculata* n. sp., female holotype. a) uropod 1 (scale C); b) uropod 2 (C); c) uropod 3 (C); d) telson, dorsal (C); e) pereiopod 5 (A); f) pereiopod 6 (A); g) pereiopod 7(A). Scales on fig. 3.

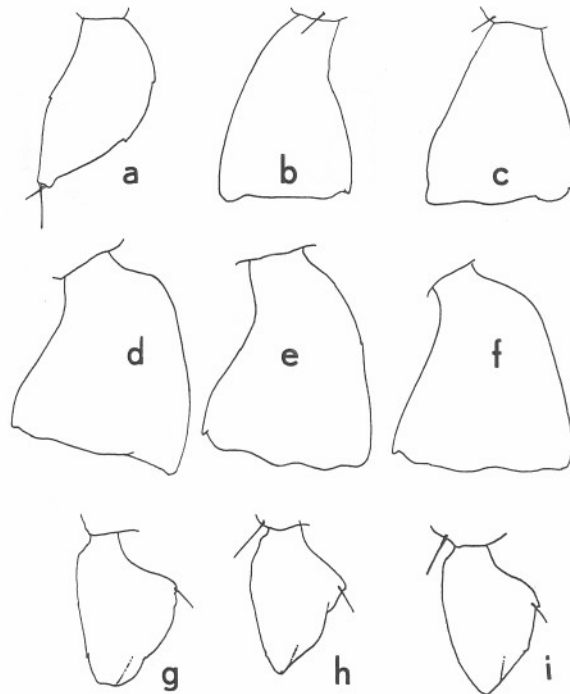


Fig. 5. *Ingolffiella (Antilleella) unguiculata* n. sp. a) pleopod 1, male; b) pleopod 2, male; c) pleopod 3, male (in a, b, and c: ectal margin on left side); d) pleopod 1, female; e) pleopod 2, female; f) pleopod 3, female (in d, e, and f: ectal margin on right side); g) pleopod 1, female juv.; h) pleopod 2, female juv.; i) pleopod 3, female juv. (in g, h, and i: ectal margin on left side). All figures to scale C; scale on fig. 3.

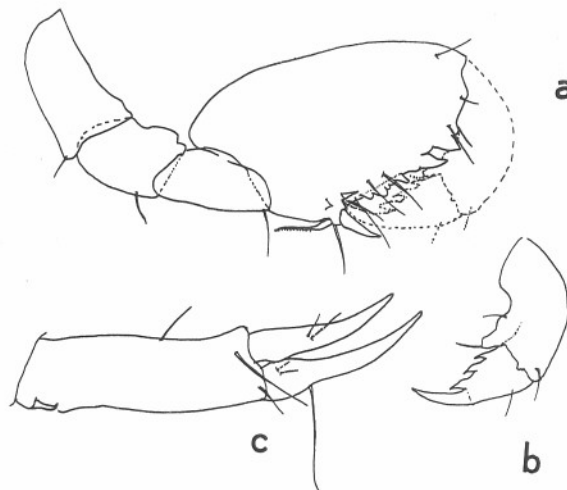


Fig. 6. *Ingolffiella (Antilleella) unguiculata* n. sp., male allotype. a) gnathopod 2; b) claw of gnathopod 2; c) uropod 2 (transverse medial rows of setae omitted). All to scale A; scale on fig. 3.

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REFERENCES

- BOU, C.I.:
1975. Les méthodes de récolte dans les eaux souterraines interstitielles. *Annls. Spéléol.*, **29**: 611-619.
- KARAMAN, S.L.:
1959. Ueber die Ingolfielliden Jugoslawiens. *Biol. Glasnik*, **12**: 63-80.
- RONDÉ-BROEKHUIZEN, B.L.M. & J.H. STOCK:
1987. Stygofauna of the Canary Islands, 2: A new ingolfiellid (Crustacea, Amphipoda) with West Indian affinities from the Canary Islands. *Arch. Hydrobiol.*, **110** (3): 441-450.
- RUFFO, S. & A. VIGNA TAGLIANTI:
1989. Description of a new cavernicolous Ingolfiella species from Sardinia, with remarks on the systematics of the genus. *Annali Mus. civ. Stor. nat. Genova*, **87**: 237-261.
- STOCK, J.H.:
1976. A new member of the crustacean suborder Ingolfiellidea from Bonaire. *Stud. Fauna Curaçao*, **50**: 56-78.
1977. The zoogeography of the crustacean suborder Ingolfiellidea with descriptions of new West Indian taxa. *Stud. Fauna Curaçao*, **55**: 131-146.
1979. New data on taxonomy and zoogeography of ingolfiellid Crustacea. *Bijdr. Dierk.*, **49** (1): 81-96.
- VONK, R. & E. SÁNCHEZ:
1991. Stygofauna of the Canary Islands, 20: A new marine interstitial ingolfiellid (Crustacea, Amphipoda, Ingolfiellidea) from Tenerife and Hierro. *Hydrobiologia*, **223**: 293-299.