Stygofauna of the Canary Islands, 3. The genus *Bogidiella* (Crustacea, Amphipoda)

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Three species (two new, one left unnamed) of the amphipod genus *Bogidiella*, found in anchihaline and fresh groundwaters of Fuerteventura and Lanzarote (Canary Islands), are described. One of the new species belongs to the subgenus *Xystriogidiella* (previously known from the Australian Great Barrier Reef), the other to the subgenus *Stygogidiella* (previously recorded from the Lesser Antilles and Greece). The zoogeographic implications of these taxonomic findings are briefly discussed. Bogidiellids were previously not known to exist in the Canary Islands.

Tres especies (dos nuevas, una dejado innombrada) del genero *Bogidiella*, encontradas en aguas subterraneás anchialinas y dulces de Fuerteventura y Lanzarote (Islas Canarias), son describidas. Una de las especies nuevas partenece al subgenero *Xystriogidiella* (antes conocido del Great Barrier Reef, Australia), la otro al subgenero *Stygogidiella* (antes encontrado en las Antillas Pequeñas y en Grieca). Les implicaciones zoogeográficas de estos datos taxonómicos son discutidas. Previamente, ninguno representante de la familia de las Bogidiellidae estuvo conocido de las Islas Cararias.

Key words: Crustacea, Amphipoda, *Bogidiella*, *Stygogidiella*, *Xystriogidiella*, Canary Islands, zoogeography.

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INTRODUCTION

The geological origin of the Canary Islands, more in particular of the eastern islands, called the Purparians, is still under debate: both a purely oceanic origin and a continental origin (fragments chipped off the African plate) have been supposed (review in Schmincke, 1976). Zoogeographic data may form helpful complements to this discussion (review in Evers et al., 1970).

Since groundwaters are known to harbour several old, sometimes relict-like organisms, a short stygofauna survey was undertaken of the three largest Purparian islands, Fuerteventura, Lanzarote and Graciosa (further details in Stock & Rondé-Broekhuizen, 1986). This paper is the third in a series describing the groundwater biotas of the Purparians, and it deals with the exclusively stygobiont amphipod genus *Bogidiella* Hertzog, 1933. The global distribution of this genus and of the remaining taxa of the family Bogidiellidae has been discussed by Stock (1981), and appears to indicate that the family is an old one, having reached the greater part of its geographic range already before the break-up of the continents. Today it is more or less worldwide (with the exception of the polar regions) and the different representatives have a large ecological range as well (marine, mixohaline and fresh waters of interstices, caves, wells, etc.).

TAXONOMY

In Stock's review of the family Bogidiellidae (1981), the genus *Bogidiella* was subdivided into seven subgenera, mostly characterized by the degree in which secon-

dary sexual features are expressed. Later, two subgenera were added, *Xystriogidiella* Stock, 1984, and *Hagidiella* Stock, 1985, bringing the total number of subgenera within *Bogidiella* to 9. Two of these are represented by a new species in the Canarian stygofauna: *Xystriogidiella* and *Stygogidiella* Stock, 1981.

MATERIALS AND METHODS

These are described in an earlier paper (Stock & Rondé-Broekhuizen, 1986). All samples have been deposited in the Zoölogisch Museum, Amsterdam (ZMA).

DESCRIPTION OF THE CANARIAN TAXA

Bogidiella (Xystriogidiella) spathulata n.sp.

Material. -

1 ♂ (holotype), 1 ♀ (allotype). Canary Islands, Fuerteventura, Stn. 85-301: in decayed open well N. of Gran Tarajal (coordinates, sheet 46-41/42, 1: 50,000, 59693 x 312245); water table at 11 m, water depth 1 m, water almost anoxic (smell of H_2S; salinity 13 ppt; 27 May 1985. (ZMA Amph. 108.073). - 2 ♀ ♀ (paratypes). Same island, Stn. 85-300: open well with windpump in village of Las Playas, less than 300 m from the sea (coordinates, sheet 46-41/42, 59987 x 312295); water table at 10 m, water depth 0.3 m; salinity 5 ppt; 27 May 1985. (ZMA Amph. 108.074).

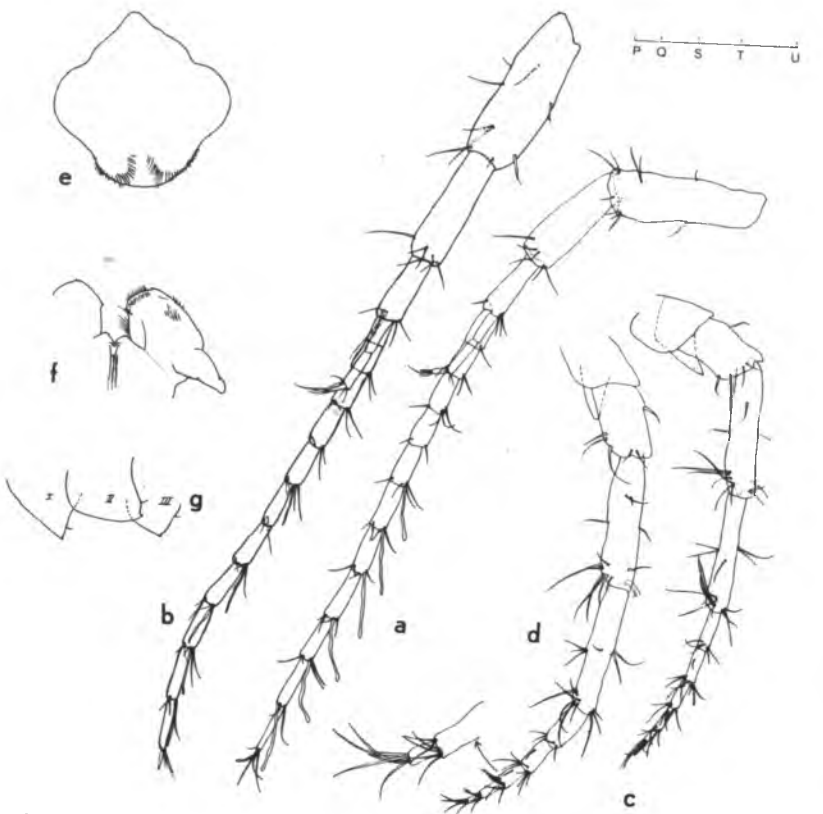

Fig. 1. - *Bogidiella (Xystriogidiella) spathulata* n.sp. (a) first antenna, ♂ (scale PS); (b) same, ♀ (PS); (c) second antenna, ♂ (PS): (d) same, ♀ (PS), distal segments more strongly enlarged (PU); (e) upper lip, ♂ (PU); (f) lower lip, ♀ (PT); (g) epimeral plates I-III, ♀ (PQ). Each scale unit (PG, PS....) represents 100 µm.

Accompanying fauna. -

In Station 301 only mosquito larvae were found in addition to the amphipods; in Stn. 300, Hydracarina and a new species of *Ingolfiella* (Amphipoda) were encountered.

Description. -

Length ♂ (holotype) 2.22 mm, ♀ (allotype) 2.64 mm, 2 ♀ paratypes 2.05 and 2.38 mm. Blind, unpigmented. Dorsum armed with a few short setules at the posterior margin of each somite.

First antenna (fig. 1a, b) slightly more than half as long as body. Peduncle segment 1 with 2 ventral spines; segm. 2 about 3/4 of length of segm. 1; segm. 3 slightly more than half as long as segm. 2. Accessory flagellum 3-segmented, 1.5 times as long as peduncle segm. 3. Flagellum 11-segmented; each segment slender; aesthetascs slightly longer than or as long as corresponding segment, on segments 5 to 10 (♂) or 5, 7, 8, 9 and 10 (♀).

Second antenna (fig. 1c, d) with

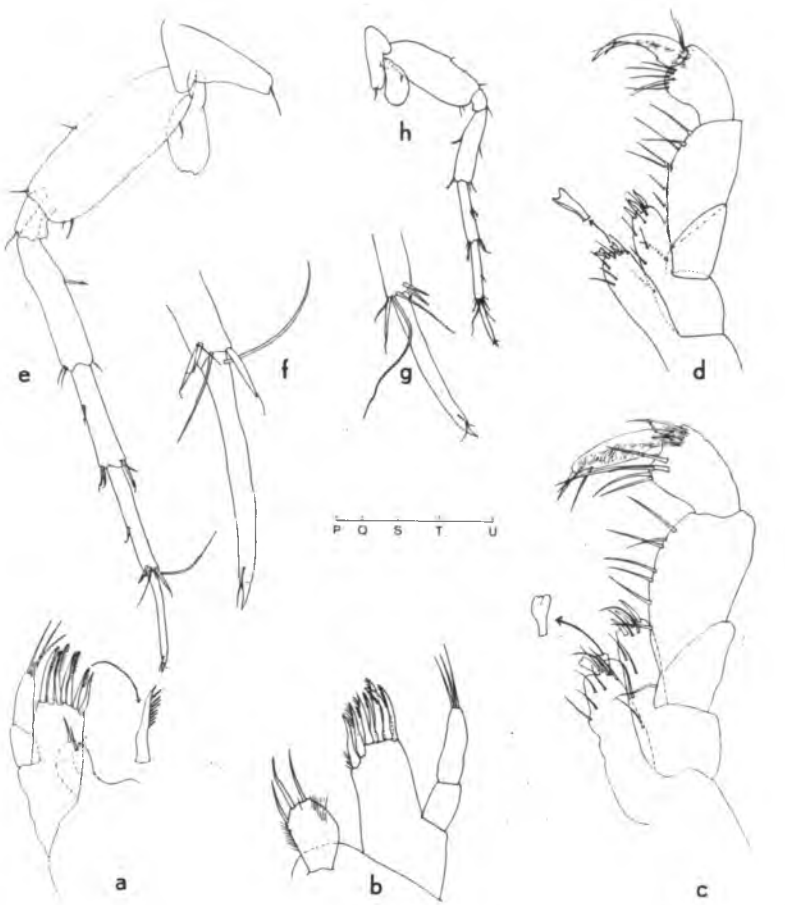

Fig. 2. - *Bogidiella (Xystriogidiella) spathulata* n.sp. (a) first maxilla,♂ (scale PU); (b) same, ♀ (PU); (c) maxilliped, ♂ (PU); (d) same, ♀ (PT); (e) sixth pereiopod, ♂ (PS); (f) claw of same (PU); (g) claw of sixth pereiopod, ♀ (PT); (h) sixth pereiopod, ♀ (PG). Each scale unit (PG, PS....) represents 100 µm.

tapering, straight, rather long and narrow gland cone; flagellum 5-segmented, short, aesthetascs on segm. 2 and 5 (♂).

Upper lip (fig. 1e) rounded-rectangular, distally with fine setules.

Mandible (fig. 3a, b, c) with 3-segmented palp; segm. 2 and 3 subequal; segm. 2 with 1 ventral seta, segm. 3 with dorsal row of minute cilia and a (sub)distal group of 4 setae; no setae on the rest of ventral margin. Pars incisiva asymmetrical in lacinia mobilis (right: bicuspidate, finely toothed, fig. 3b; left: unicuspidate with 6 coarse teeth, fig. 3c); incisor with 2 teeth; 3 flat spines adjoining lacinia; molar small, rounded, with 1 long seta implanted on widened socle.

Lower lip (fig. 1f) with small inner lobes.

First maxilla (fig. 2a, b) with 2-segmented palp (segm. 1 unarmed, segm. 2 with 3 distal setae). Outer lobe with 7 spines, the medial margin of which bearing 7-12 fine teeth, except for medialmost spine bearing no teeth. Inner lobe

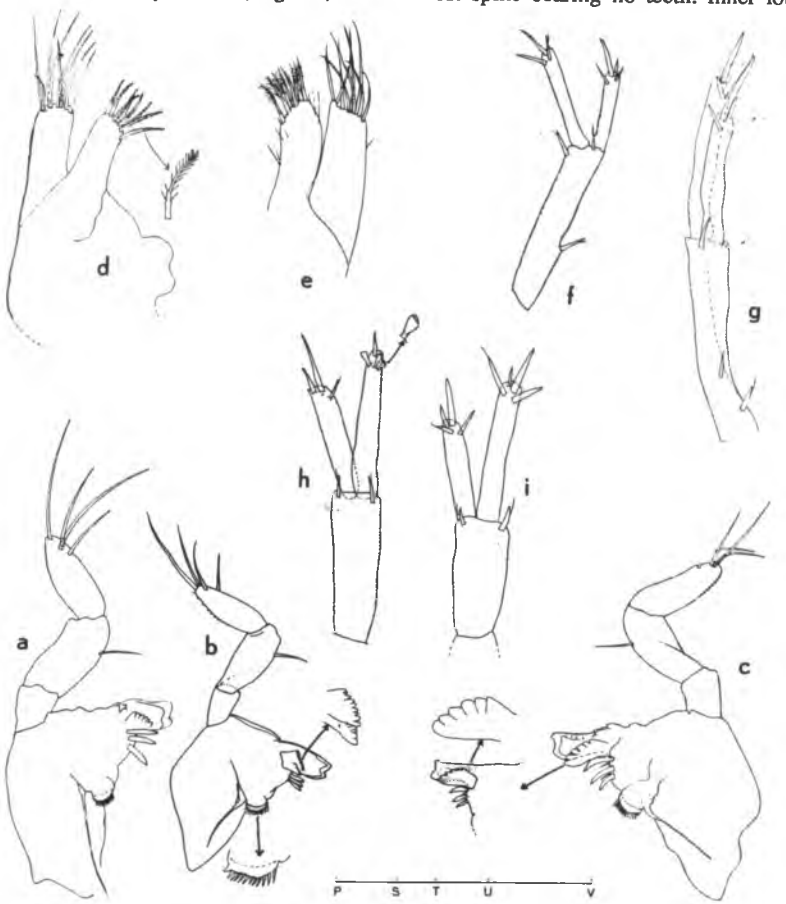

Fig. 3. - *Bogidiella (Xystriogidiella) spathulata* n.sp. (a) right mandible, ♂ (scale PU); (b) same, ♀ (PU); (c) left mandible, ♂ (PU); (d) second maxilla, ♂ (PU); (e) same, ♀ (PU); (f) uropod 1, ♂ (PS); (g) same, ♀ (PT); (h) second uropod, ♂ (PT); (i) same, ♀ (PT). Each scale unit (PS, PT....) represents 100 µm.

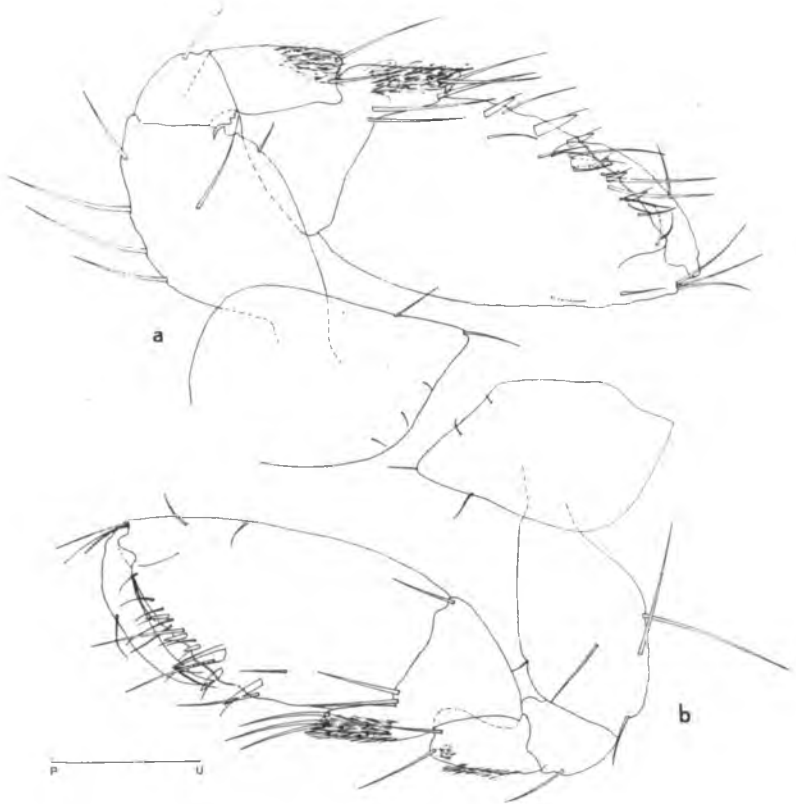

Fig. 4. - *Bogidiella (Xystriogidiella) spathulata* n.sp. (a) second gnathopod, ♀ (scale PU); (b) same, ♂ (PU). Scale represents 100 µm.

ovate, with 3 setae.

Second maxilla (fig. 3d, e) bilobed; outer lobe with 4+5 setae, inner lobe with 8 plumose setae.

Maxilliped (fig. 2c, d) with small outer and inner lobes, outer lobe with 3 simple spines, inner lobe with 2 bicuspidate spines. Palp segment 3 with distomedial lobe, distally armed with medium-sized setae; claw portion long and slender.

First gnathopod (fig. 4a, b) with small, trapezoidal coxal plate; basis with 2 or 3 long and 1 short setae on posterior margin; carpus with pointed distoposterior projection bearing 3 setae; propodus ovate; posterior margin with 1 (♂) or (♀) spines; palmar angle with 2 spines; palmar margin with a small number of setae and 3 spines only. Claw long, slender, curved. Palmar index 0.35 (♀) or 0.39 (♂).

Second gnathopod (fig. 5a, b) with rounded coxal plate; basis with 2 or 3 setae on posterior margin; carpus trapezoidal. Propodus narrower and more elongate than in P1; posterior margin with 1 (♂) or 2 (♀) isolated setae and a distalmost group of 3 setae); palmar angle with 2 spines; palmar margin with low number of setae and 3 spines only; claw short. Palmar index 0.37 (♂) or 0.32 (♀).

Third pereiopod poorly setose (fig. 6a, b); propodus with 2 or 3 setules on posterior margin, and 2 setae and 2 sigmoid spines on distal margin.

Fourth perciopod (fig. 6c, d) with

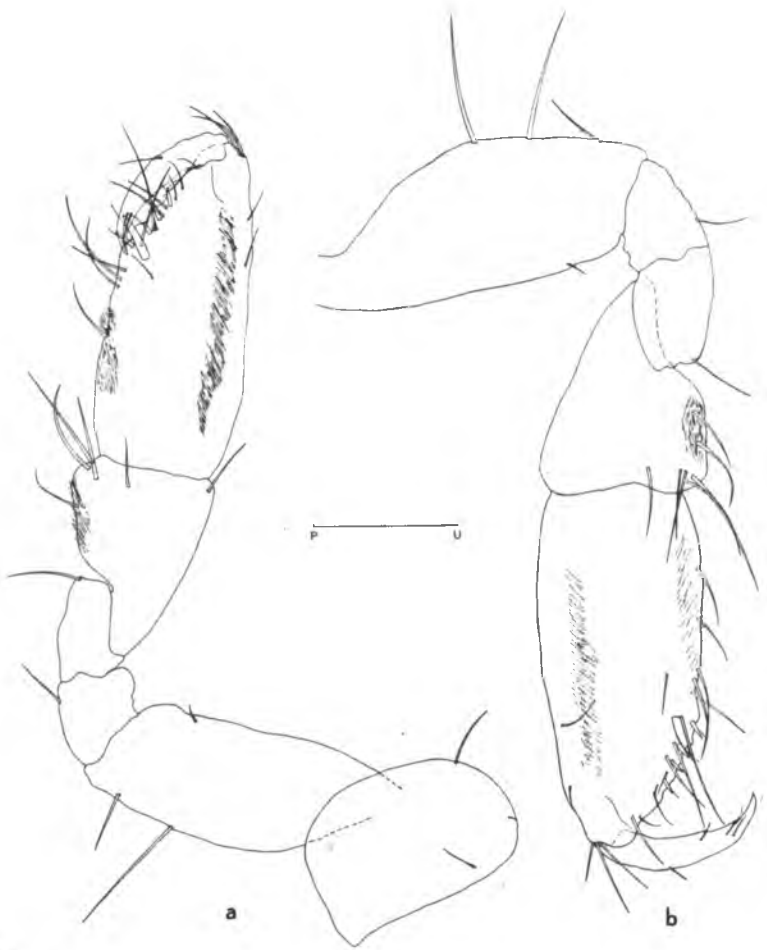

Fig. 5. - *Bogidiella (Xystriogidiella) spathulata* n.sp. (a) first gnathopod, ♀ (scale PU); (b) same, ♂ (PU). Scale represents 100 µm.

ovate, short-stalked coxal gill, but otherwise resembling P3.

Fifth pereiopod (fig. 6e, f) with distinctly stalked coxal gill; coxal plate with larger anterior lobe; claw long and slender.

Sixth pereiopod (fig. 2e, f) longer than P5; coxal gill ovate; coxal plate with small anterior lobe; claw very long. Both P5 and P6 scantily armed.

Seventh pereiopod (fig. 6g) without gill; coxal plate non-lobate; propodus with row of 5 long setae on anterior margin. (P7 of ♂ broken off, thus unknown.)

No lenticular organs on the pereiopods. Oostegites on P2 to P5, linear.

Epimeral plates 1 to 3 (fig. 1g) ending in minute posteroventral tooth; ventral margin unarmed.

Pleopods 1 to 3 (fig. 7a-h) uniramous in both sexes (endopodite absent). Pleopod 3 shorter than pleopods 1 and 2. Peduncles with 2 anchor- or hook-shaped

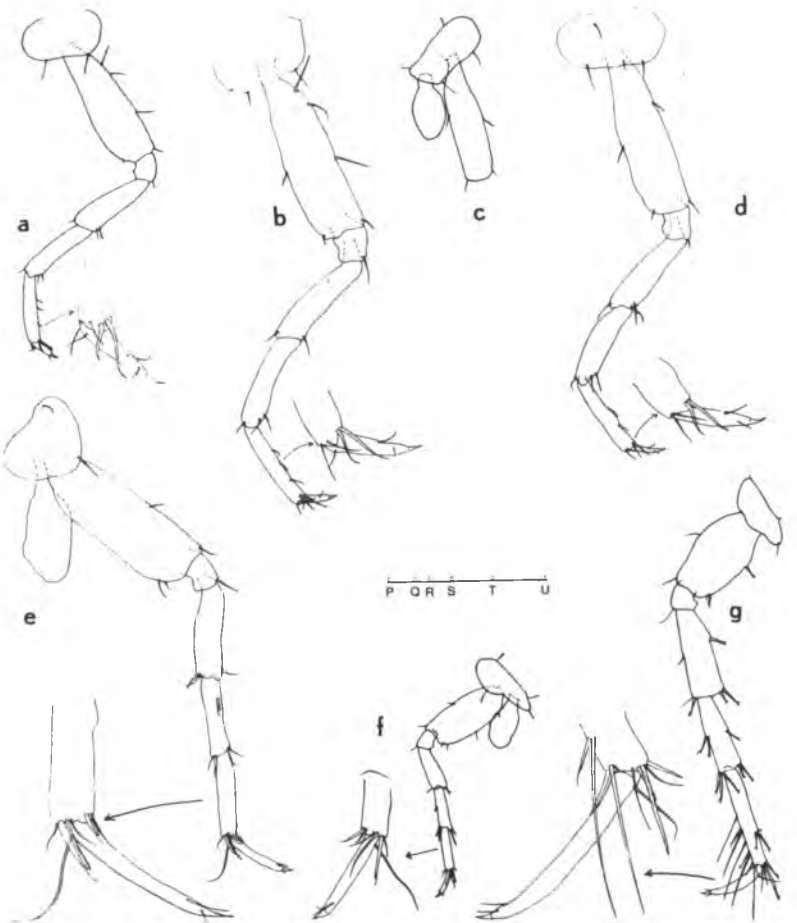

Fig. 6. - *Bogidiella (Xystriogidiella) spathulata* n.sp. (a) third pereiopod, ♀ (scale PR), claw more strongly enlarged (PU); (b) same, ♂ (PS, claw PU); (c) basal part of fourth pereiopod, ♀ (PR); (d) fourth pereiopod, ♂ (PS, claw PU); (e) fifth pereiopod, ♂ (PS, claw PU); (f) same, ♀ (PR, claw PT); (g) seventh pereiopod, ♀ (PQ, claw PT). Each scale unit (PR, PS....) represents 100 µm.

retinacula, each with 2 or 3 (pairs of) small teeth. The 3-segmented exopodite bears a lateral and a medial, long, feathered seta on each segment (pl. 1, 2, and 3 of ♀, pl. 1 and 3 of ♂). Pleopod 2 of ♂ (fig. 7d) with some modifications: medial margin of exopodite segm. 1 with 2 slight swellings; lateral element of segm. 2 transformed into a slightly outcurved, unadorned spine, with a strongly sclerotized basal part; this spine is only half as long as the corresponding medial seta.

Uropod 1 without sexual dimorphism (fig. 3f, g). Peduncle with strong proximoventral spine. Exopodite somewhat shorter than endopodite, with 4 and 3 distal spines, respectively.

Uropod 2 with sexually dimorphous endopodal armature. In ♀ (fig. 3i) the endopodite bears 4 normal distal spines (3

long, 1 shorter); in ♂, the 3 long spines have been replaced by strongly chitinized, brown, short, spatula-shaped elements (fig. 3h). Exopodite of both sexes is similar, slightly shorter than endopodite and armed with 3 normal spines.

Third uropod of ♀ (that of ♂ lost) with a small number of marginal spines on both rami (fig. 7i, j).

Telson wider than long, each disto-lateral corner with 2 spines; no lateral spines, but 2 small sensorial setules on either side. Small sexual difference in the mediodistal margin, which is slightly convex in ♀ (fig. 7l) and slightly concave in ♂ (fig. 7k).

Etymology. -

The proposed specific name, *spathulata* (Latin) alludes to the spatula-shaped elements on the endopodite of uropod 2 ♂.

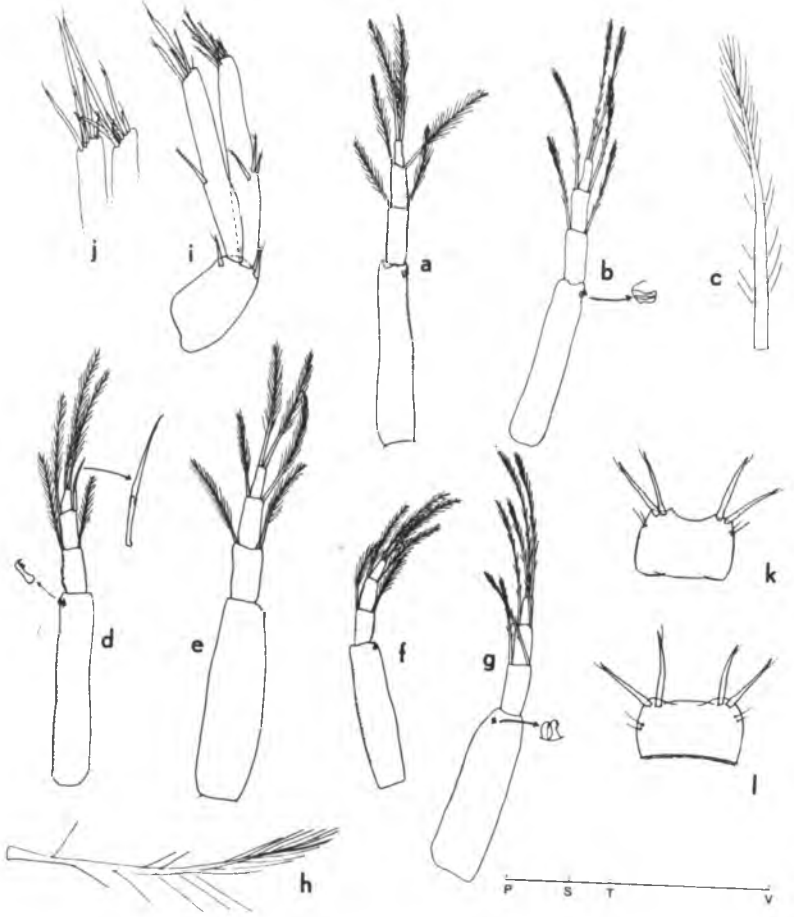

Fig. 7. - *Bogidiella (Xystriogidiella) spathulata* n.sp. (a) first pleopod, ♂ (scale PS); (b) same, ♀ (PS); (C) lateral seta of second exopodite segment of first pleopod, ♀ (PV); (d) second pleopod, ♂ (PS); (e) same, ♀ (PS); (f) third pleopod, ♂ (PS); (g) same, ♀ (PS); (h) lateral seta of second exopodite segment of third pleopod, ♀ (PV); (i) third uropod, ♀ (PS); (j) distal end of rami of same (PT); (k) telson; ♂ (PT); (l) same, ♀ (PT). Each scale unit (PS, PT....) represents 100 µm.

Remarks. -

By the presence of sexual dimorphism in uropod 2 and pleopod 2, this species classifies with the hitherto monotypic subgenus *Xystriogidiella* Stock, 1984. Its type-species, *B.(X.) capricornea* Stock, 1984, was found in intertidal sands of Heron Island (Great Barrier Reef). Notwithstanding the enormous distance between the Great Barrier Reef and the Canary Islands, the new species is very similar to *B. (X.) capricornea.* The most salient differences are found in the fine morphology of the elements of pleopod 2 and uropod 2 of the male, presumably used for sperm-transfer. In pleopod 2, the modified spine on segment 2 assumes the shape of a strongly incurved hook, with a short basal portion in *B. (X.) capricornea,* whereas in *B. (X.) spathulata* it is a feebly outcurved spine with a longer basal portion. In *B. (X.) capricornea* both exopodite segments 1 and 2 are slightly modified in shape; in *B. (X.) spathulata,* segment 1 only. The modified spines of uropod 2 are spatulate in the new species, sigmoid-spiniform in *B. (X.) capricornea.*

Additional differences can be found in the presence of rudimentary, unimerous pleopodal endopodites in *B. (X.) capricornea* (absent in *B. (X.) spathulata*), and in the presence of a lateral telson spine in *B. (X.) capricornea* (absent in *B. (X.) spathulata*).

Zoogeographic discussion. -

Rather unexpectedly, the new species is most closely related to a west-Pacific, marine species. The West Indian monotypic subgenus *Hagidiella* Stock, 1985, from oligohaline waters of Haiti, is closely related to *Xystriogidiella,* but differs in having modified elements on uropod 1 ♂ (not on uropod 2), and in having unmodified segments of the exopodite of pleopod 2 ♂ (*). Apart from the aforementioned diagnostic differences, *Hagidiella* differs from both *Xystriogidiella capricornea* and *X. spathulata* in several smaller details as well (lower lip with large inner lobes in *Hagidiella,* with small inner lobes in *Xystriogidiella;* accessory flagellum 2-segmented in *Hagidiella,* 3-segmented in *Xystriogidiella;* molar seta palp-like in *Hagidiella,* more setiform in *Xystriogidiella;* teeth on inner lobe of maxilliped simple in *Hagidiella,* bicuspidate in *Xystriogidiella;* carpal lobe of pereiopod 1 short and simply built in *Hagidiella,* long and complex in *Xystriogidiella*), which all appear to confirm the closer relationship of the Canarian species to the Pacific one, rather than to the Caribbean taxon. Both the Pacific and the Canarian taxa occur in high-salinity habitats, whereas the Caribbean taxon inhabits a low-salinity biotope.

The Pacific/Canarian disjunction appears to indicate once more that bogidiellids form an old group, since such disjunction can be explained only by distribution patterns of a Tethyan type. We suppose that in due time members of *Xystriogidiella* will be discovered from intermediate localities. Unfortunately, this analysis sheds no light at all on the question whether or not the eastern Canary Islands are of African continental or of Atlantic pelagic origin.

(*) The original diagnosis of *Hagidiella* is marred by some typographical errors, corrected in an Erratum (Stygologia, vol. 1 no. 3).

Bogidiella (Stygogidiella) uniramosa n.sp.

Material. -

1 ♂ (holotype). Canary Islands, Lanzarote, Stn. 85-100: anchihaline lava tunnel called Jameos del Agua (coordinates, sheet 48-35, 1: 50,000, 65285 x 322630); washed from sand and gravel on the most inland side of the great cave lake (Lago Mayor); depth 0-0.5 m (at low tide); conductivity 40.1 mS/cm; temp. 18.4°C; 21 May 1985 (ZMA Amph. 108.075). - 2 ♀ ♀ (paratypes). Lanzarote, Stn. 85-107: El Charco, in well with windpump used for irrigation of salt pits with seawater (now abandoned) (coordinates, sheet 48-35, 65115 x 321833); less than 10 m from the sea; water table at 2 m, water depth 0.3 m; partially filled with garbage and wood debris; conductivity 21.9 mS/cm; temp. 21.1°C; 22 May 1985 (ZMA Amph. 108.076). - 1 ♀ (damaged, probably this species). Lanzarote, "Plancius" Expedition Stn. 85-576: El Golfo, sea-side of sand and gravel bar separating the lagoon from the sea (coordinates, sheet 47-36, 61417 x 320605); biophreatical pump, ca. 0.5 m above low tide level: 100 l of water filtered; conductivity 32 mS/cm; 6 Jan. 1986

(ZMA Amph. 108.077). - 1 ♀ (damaged, probably this species). Lanzarote, "Plancius" Expedition Stn. 85-577: El Golfo, N. side of a fully land-locked anchihaline lagoon (coordinates, sheet 47-36, 61425 x 320605); in sand at low tide; biophreatical pump, 100 l of water filtered; almost entirely anoxic; conductivity 38.3 mS/cm; 6 Jan. 1986 (ZMA Amph. 108.078).

Accompanying fauna. -

The fauna of the Jameos del Agua is relatively well-studied (see review by Wilkens & Parzefall, 1974). Our sample 85-100 contained several species of Polychaeta, Sipunculida, Cyclopoidea, Harpacticoidea, Cladocera, *Heteromysis* (Mysidacea), *Liagoceradocus* (Amphipoda), and *Munidiopsis* (Anomura).

In sample 85-107, the bogidiellids were accompanied by *Liagoceradocus*, Cyclopoidea, and *Caecum* (Gastropoda).

In sample 85-576, accompanying taxa are *Caecum* (Gastropoda) and a blind paranthurid isopod; in sample 85-577, only some ostracods were found.

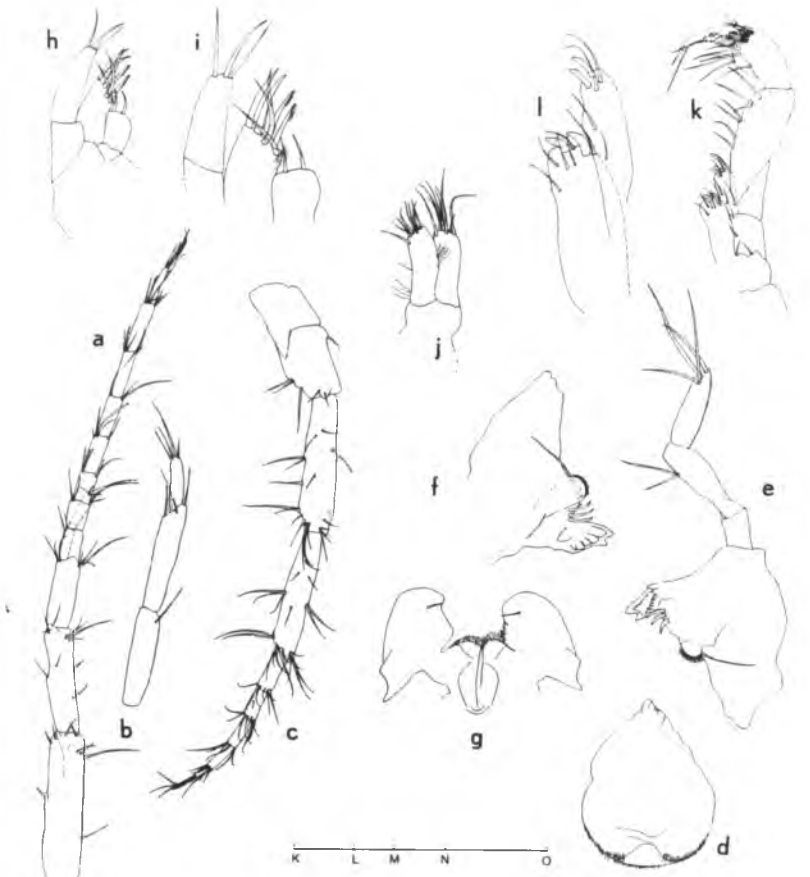

Fig. 8. - *Bogidiella (Stygogidiella) uniramosa* n.sp. (a) first antenna, ♀ (scale KL); (b) accessory flagellum of same 5KN); (c) second antenna, ♀ (KL); (d) upper lip, ♂ (KN); (e) left mandible, ♂ (f); (f) right mandible, ♂ (KN); (g) lower lip, ♂ (KN); (h) first maxilla, ♂ (KN); (i) distal part same (KD); (j) second maxilla, ♂ (KN) (k) maxilliped, ♂ (KM); (l) inner and outer lobes of same (KO). Each scale unit (KL,KN....) represents 100 µm.

Description. -

Body length 1.72 mm (♂) or 2.22 mm (♀); third, damaged specimen not measured or described. Blind, unpigmented. Each of the meso- and pleosomites with two pairs of dorsal setules, 1 pair near the anterior end, 1 pair at the posterior margin.

First antenna (fig. 8a): Peduncle segment 1 with 2 ventral spines; segm. 2 about 3/4 of length of segm. 1; segm. 3 more than half as long as segm. 2. Accessory flagellum (fig. 8b) 3-segmented, longer than peduncle segment 3. Flagellum 8-segmented, segm. 1 to 3 short, segm. 4 to 8 longer and more slender; narrow aesthetascs on segm. 3, 4, 6, 7, and 8.

Second antenna (fig. 8c) shorter than A1. Segments 4 and 5 elongate. Flagellum 5-segmented, longer than peduncle segm. 4. Gland cone triangular in outline. No aesthetascs.

Upper lip (fig. 8d) more or less bell-shaped, as illustrated.

Mandible (fig. 8e, f) with 3-segmented palp; palp segm. 2 with 2 ventral setae; segm. 3 with 4 (sub)distal setae and a dorsal row of cilia. Left lacinia mobilis (fig. 8e) with 8 fine teeth. Right

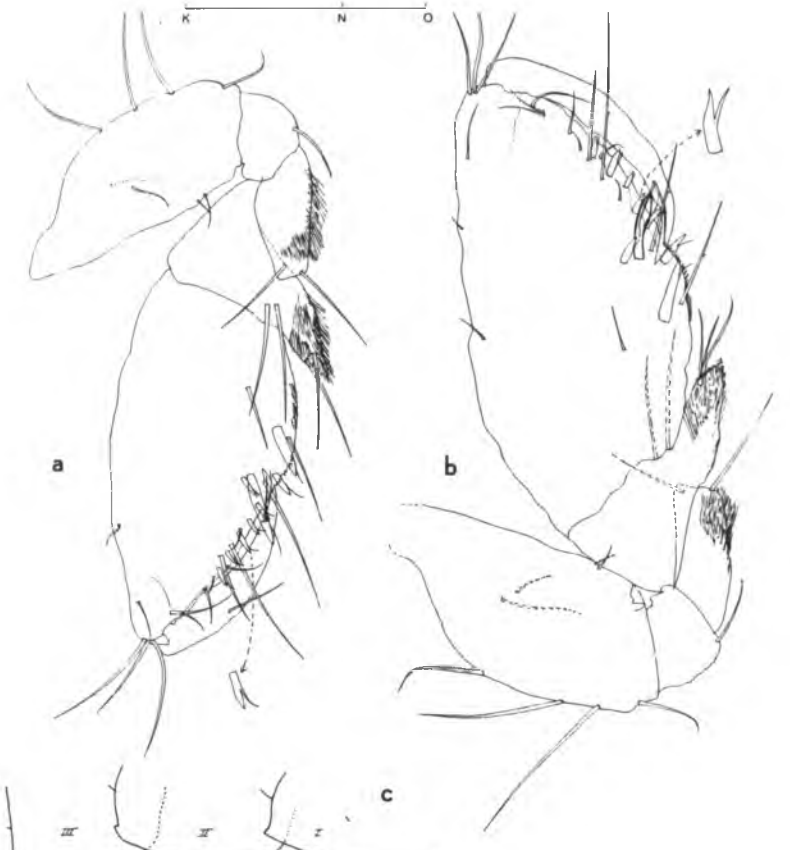

Fig. 9. - *Bogidiella (Stygogidiella) uniramosa* n.sp. (a) first gnathopod, ♂ (scale KN); (b) same, ♀ (KN); (c) epimeral plates 1 to 3, ♀ (NO). Each scale unit (KN, NO) represents 100 µm.

lacinia (fig. 8f) with 4 or 5 coarse teeth. Incisor with 2 large teeth; 3 flat spines adjoin the lacinia. Molar round and small, armed with 1 long seta on either side.

Lower lip (fig. 8g) with short, wide, gently curved inner lobes.

Maxilla 1 (fig. 8h, i) with 2-segmented palp, distal segment with 3 setae. Outer lobe with 7 spines, the 2 medialmost finely toothed (8-9 teeth). Inner lobe broadly ovate, with 2 distal setae.

Maxilla 2 (fig. 8j) bilobed, 9 distal setae on outer, 8 on inner lobe.

Maxilliped (fig. 8k, l) with small outer and inner lobes. Inner lobe with 2 bent, finger-like spines and small number of setae. Outer lobe also with 2 finger-like spines, but these are thinner and straighter than those of inner lobe. Palp segment 3 distomedially with 2 rows of 4 and 3 setae. Claw portion curved, long.

Coxal plates 1 to 7 as illustrated (fig. 12 g), hardly or not at all overlapping, wider than long.

First gnathopod (fig. 9a, b): Basis with 3 long and 1 short setae on posterior margin. Carpus subtriangular, with pointed distoposterior projection bearing 2 or 3 setae. Propodus ovate; posterior margin with 1 long seta and partly finely toothed. Two palmar angle spines and 2 accompanying spines. Palmar margin with 3 long setae, a small number of short setae, and 5-6 bifid spines. Dactylus long, slender, curved. Palmar inex 0.45-0.46 (♂, ♀).

Second gnathopod (fig. 10a, b): Basis with 4 (♂) or 2 (♀) long setae and 1 short seta on posterior margin. Carpus trapezoidal. Propodus smaller in size than that of P1, posterior margin with 4 (♂) or 6 (♀) setae. Palmar angle with 1 long seta and 2 bifid spines. Palmar index 0.40 (♂) or 0.38 (♀).

All pereiopods without lentiform organs.

Third pereiopod (fig. 11a) (missing in ♂): Basis with 5 setae on anterior margin and 4 on posterior margin. Carpus and propodus elongate, of about equal length; propdus narrower than carpus, with 2 setae on antrior and 4 setae on distal margin. Claw rather short.

Fourth pereiopod missing in ♂; that of ♀ (fig. 11b) shorter than P3, but otherwise very similar. Basis with 5 setae on both margins. Claw shorter and broader than in P3.

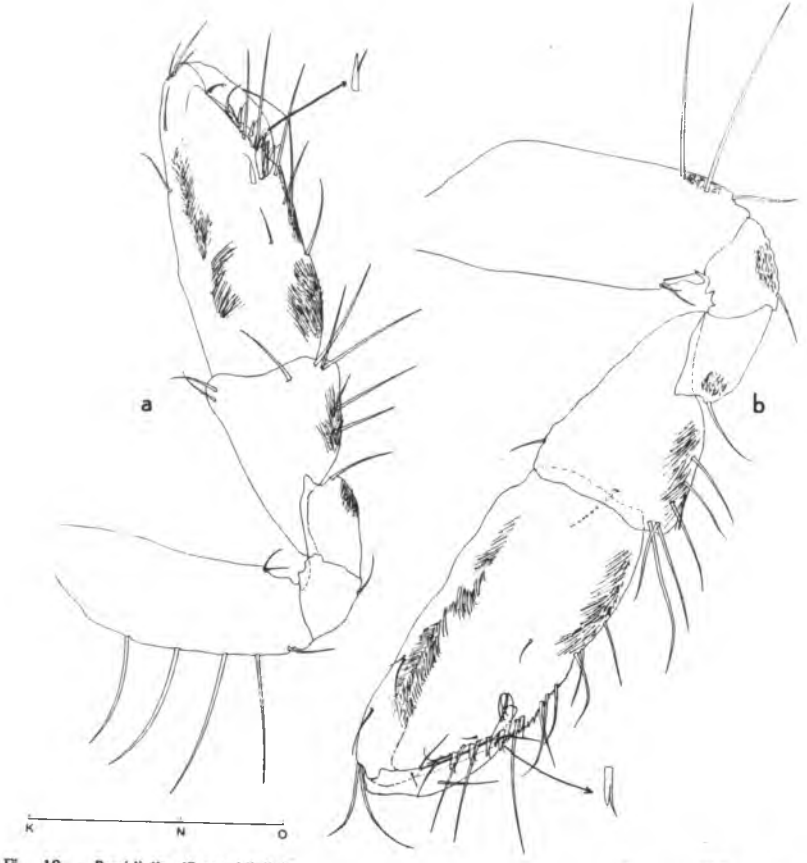

Fig. 10. - *Bogidiella (Stygogidiella) uniramosa* n.sp. (a) second gnathopod, ♂ (scale KN); (b) same, ♀ (KN). Scale represents 100 µm.

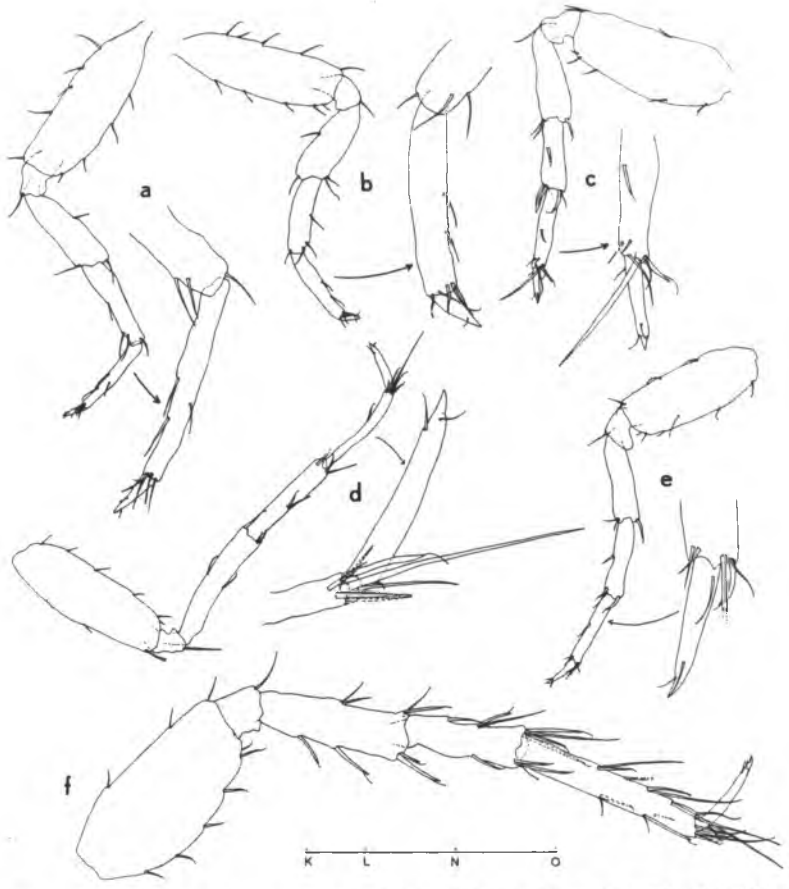

Fig. 11. - *Bogidiella (Stygogidiella) uniramosa* n.sp.(a) third pereiopod, ♀ (scale KL, claw KN); (b) fourth pereiopod, ♀ (KL, claw KN); (c) fifth pereiopod, ♀ (KL, claw KN); (d) sixth pereiopod, ♂ (KN; claw KO); (e) fifth pereiopod, ♂ (KL, claw KO); (f) seventh pereiopod, ♀ (KL). Each scale unit (KL, KN....) represents 100 µm.

Fifth pereiopod (fig. 11c, e) longer than P4, but still shorter than P3. Basis with 5 setae on posterior, and 1 or 2 on anterior margin. Propodus longer and more slender than carpus. Carpus with 1 spine on anterior margin and 2-3 spines on distal margin. Propodus with 1 spine on anterior margin and 1 spine and 5 setae (one very long and heavy) on distal margin. Claw elongate.

Sixth pereiopod lacking in ♀; that of ♂ (fig. 11d) longer and more slender than P5. Basis with 6 short setae on anterior margin, and 2 on posterior margin. Carpus and propodus about equal in length, but propodus narrower. Propodus with 1 anterior spine and 1 spine and 4 setae (1 long and heavy) on distal end. Claw rather long.

Seventh pereiopod missing in ♂; that of ♀ (fig. 11f) longer and stouter than P6. Basis with 6 spinules on posterior margin (including subdistal group of 2) and 3 setules on anterior margin. Merus more strongly armed than in P3-P7. Carpus much shorter than propodus; both strongly armed, as illustrated; anterior margin of propodus with 3 long setae and several spines. Dactylus very long and slender, not ciliated but for two distal setules.

Epimeral plates 1 to 3 ending in a small point; 1 setule on posterior margin of each plate; no ventral armature (fig. 9c).

Pleopods 1 to 3 (fig. 12) uniramous in both sexes (endopodites absent). Peduncles with 2 retinacula, each with 3 small teeth. Exopodites 3-segmented, each segment bearing 1 lateral and 1 medial long plumose seta (pl. 1-3 of ♀, and pl. 1 and 3 of ♂). Pleopod 3 shorter than pl. 1 and 2 (especially in ♂), Pleopod 2 ♂ (fig. 12d) showing slight modification; segm. 2 medially with 1 long plumose seta, but laterally with 1 curved spine which is ornamented with 3 proximolateral cilia and a row of distolateral denticles. This spine is much shorter than the corresponding seta on medial side.

First uropod (fig. 13a, b) without sexual dimorphism. Peduncle with proximoventral spine and 2 distal spines. Exopodite somewhat shorter than endopodite, with 4 (♂, ♀) and 4 (♂) or 3 (♀) spines, respectively. Both rami shorter

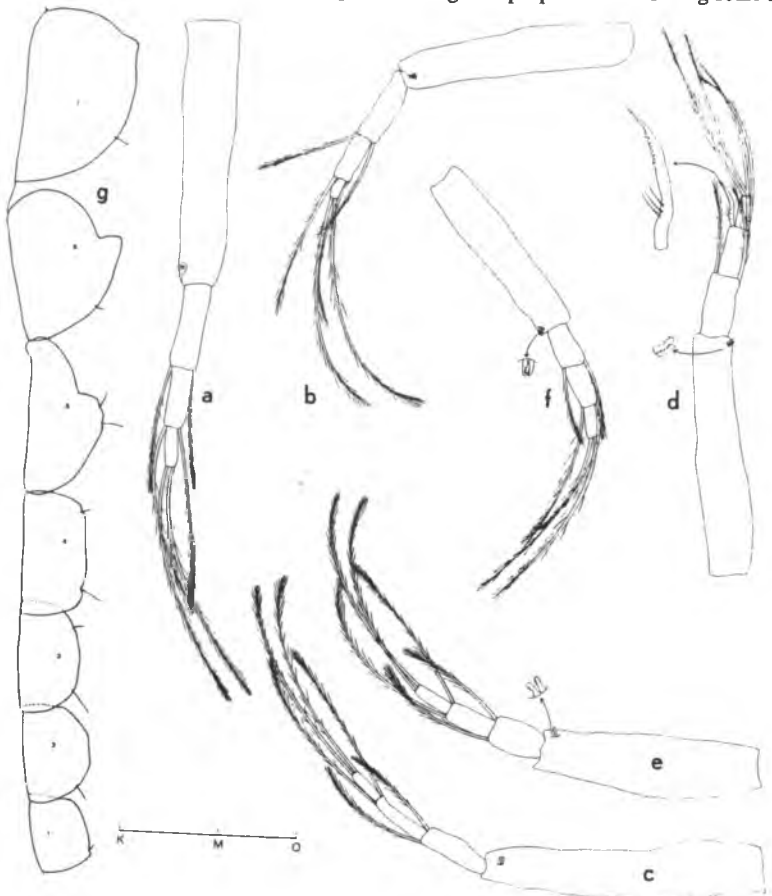

Fig. 12. - *Bogidiella (Stygogidiella) uniramosa* n.sp. (a) first pleopod, ♀ (scale KM); (b) same, ♂ (KM); (c) second pleopod, ♀ (KM); (d) same, ♂ (KM); (e) third pleopod, ♀ (KM); (f) same, ♂ (KM); (g) coxal plates 1 to 7, ♀ (MO). Each scale unit (KM, MO) represents 100 µm.

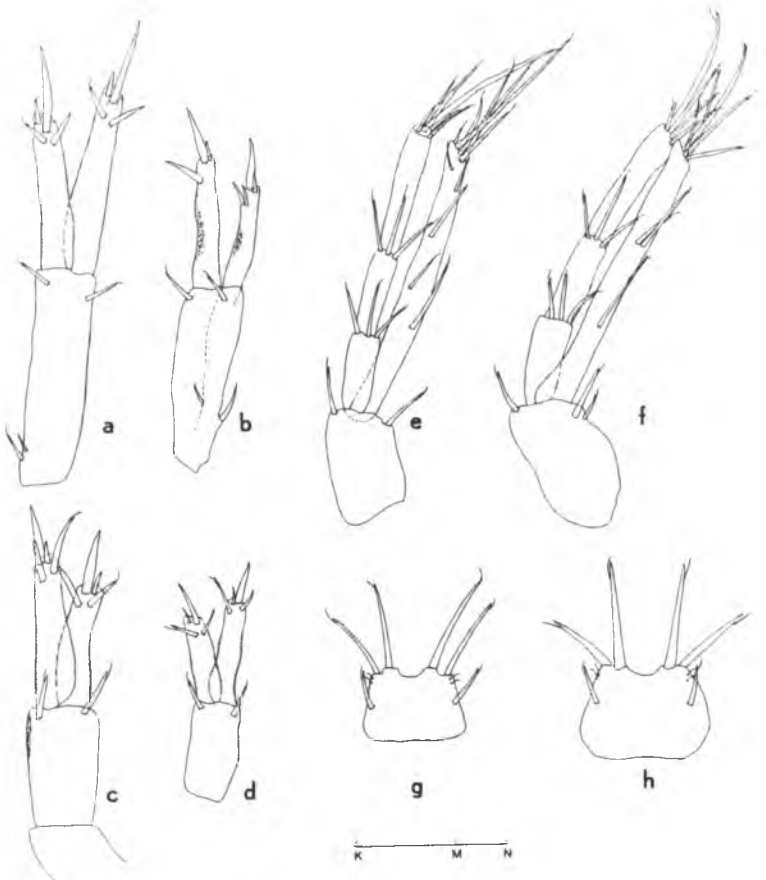

Fig. 13. - *Bogidiella (Stygogidiella) uniramosa* n.sp. (a) first uropod, ♂ (scale KN); (b) same, ♀ (KM); (c) second uropod, ♂ (KN); (d) same, ♀ (KM); (e) third uropod, ♂ (KM); (f) same, ♀ (KM); (g) telson, ♂ (KN); (h) same, ♀ (KN). Each scale unit (KM, KN) represents 100 µm.

than peduncle.

Second uropod (fig. 13c, d) much shorter than U1, without sexual dimorphism. Peduncle with 2 distal spines. Endopodite and exopodite both with 4 spines. Exopodite somewhat shorter than endopodite, both rami longer than peduncle.

Uropod 3 (fig. 13e, f) larger than either U1 or U2, without important sexual dimorphism. Peduncle with 2 (♂) or 3 (♀) distal spines. Exopodite and endopodite about equal in length. Endopodite with 5 (♂) or 3 (♀) spines. Exopodite with 2 groups, of 3 spines each. Distal margin of both rami with 6 (♂) or 5 (♀) spines; one spine on each ramus very long.

Telson (fig. 13g, h) wider than long, with 1 lateral spine, 2 sensorial setae, and 2 long distal spines on either side. Mediodistal margin quite concave. No sexual dimorphism of any importance.

Etymology. -

The proposed specific name, *uniramosa*, refers to the absence of an endopodite in pleopods 1 to 3.

Remarks. -

This species belongs to the subgenus *Stygogidiella* Stock, 1981, because of the presence of a modified element on the second male pleopod (presumably for sperm transfer) and the absence of sexual dimorphism in the uropods.

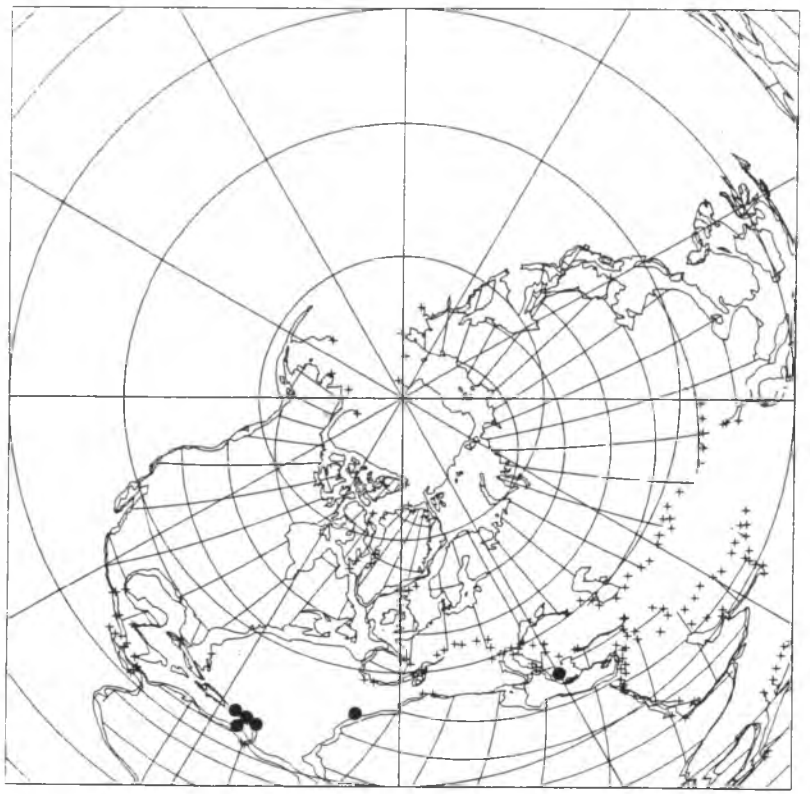

Fig. 14. - The actual distribution of members of the subgenus *Stygogidiella* (dots) projected on a reconstruction of the situation prevailing in the earliest Cenomanian (Mid-Cretaceous) (basic map, in North polar Lambert equal-area projection, after Smith *et al.* 1981; copyright Cambridge University Press). Note that the Canarian localities lie much closer to the Caribbean ones than their present-day geographical separation suggests.

Stygogidiella contains two certain species (*bredini* Shoemaker, 1959, and *virginalis* Stock, 1981) both from the northern Lesser Antilles, and 3 taxa probably belonging to this subgenus (one from the southern Lesser Antilles, 1 from Puerto Rico, and one from Greece, cf. Stock, 1981). The Canarian species differs from all of these by the absence of an endopodite in the pleopods. It differs moreover from all species of this subgenus, exept for *B. perla* Stock, 1981, in the poorly developed armature on merus, carpus and propodus of P5 to P7, and in the presence of lateral spines on the telson. *B. perla* is easily distinguished by the presence of lentiform organs in P3 to P7.

Zoogeographic discussion. -

The occurrence of a *Stygogidiella* on the island of Lanzarote (Canary Islands) is not as surprising as it seems. Affinities between the Canary Islands and the West Indies in Stock & Rondé-Broekhuizen, 1986), and have been explained in that paper by assuming that such taxa evolved from marine ancestors in a geological period when the distance between Europe, Africa and the West Indies was still relatively small, a situation prevailing in the Mid- and Late-Cretaceous (fig. 14).

Bogidiella sp.

Two specimens of *Bogidiella* s.l. were discovered in inland wells of Fuerteventura; unfortunately both specimens were damaged, and both are females, hence their subgeneric status cannot be ascertained. It sems not devoid of interest, however, to provide some notes on these specimens, since they are the only bogidiellids from inland (in contrast to anchihaline) waters known so far from the Canary Islands. From a biogeographic and cladistic point of view, discovery of the males would be of paramount importance.

Material. -

1 ♀, Fuerteventura, Stn. 85-286: well with windpump in the western part of the village of Antigua (coordinates, sheet 46-39, 1: 50,000, (9642 x 314420); more than 10 km from the sea; altitude ca. 290 m; very clean water used for irrigation; salinity 6.5 ppt; 27 May 1985. 5ZMA Amph. 108.078). - 1 ♀, Fuerteventura, Stn. 85-280: open well in Barranco (= torrent) del Crangejo, ca. 500 m from the sea (coordinates, same sheet as above, 58760 x 314910); altitude ca. 40 m; broken windpump; water table at 4 m, water depth 5 m; very clean; salinity 8 ppt; 26 May 1985 (ZMA Amph. 108.079).

Accompanying fauna. -

In Stn. 286 no other fauna was encountered; in Stn. 280, the amphipod was accompanied by *Pygocrangonyx* (Amphipoda), Hydrobiidae (Gastropoda), Hydracarina, and Ostracoda.

Descriptive notes. -

Body length 2.29 mm (Stn. 286) or 2.67 mm (Stn. 280). Dorsum armed with a few setules at posterior margin of each somite. Appendages (Stn. 286) as follows: A1 (fig. 15a) with 2-segmented accessory flagellum, reaching distal end of flagellum segm. 2 and about as long as peduncle segm. 3; flagellum 8-segmented, aesthetascs on segm. 4, 5, 6, and 7. A2 missing. Md as illustrated (fig. 15b, c). Mx 1 (fig. 15d), outer lobe with 7 distal sppines, medialmost unadorned, others with 6-12 fine teeth on medial margin. Mx 2 and Mxp as illustrated (figs. 15e, f, g).

Gn 1, basis with 1 long and 1 short seta on posterior margin, propodus ovate, palmer index 0.38 (fig. 15h). Gn 2 (fig. 16a), basis armed as in Gn 1, palmar index 0.34. P3 - P6 (figs. 16b-d, 17a) without lenticular organ; P7 missing. Pleopods 1 (fig. 17b), 2 (fig. 17c), and 3 without endopodite; 2 retinacula, each with 2 or 3 (pairs of) small teeth; exopodite 3-segmented. U 1 penduncle with strong proximoventral spine (fig. 16e); U 2 as illustrated (fig. 16f); U 3 missing. Telson damaged (fig. 16g), mediodistal margin probably slightly concave, each distolateral corner with 2 long spines.

The specimen from Stn. 280 has elongate and narrow oostegites. A 1 (fig.

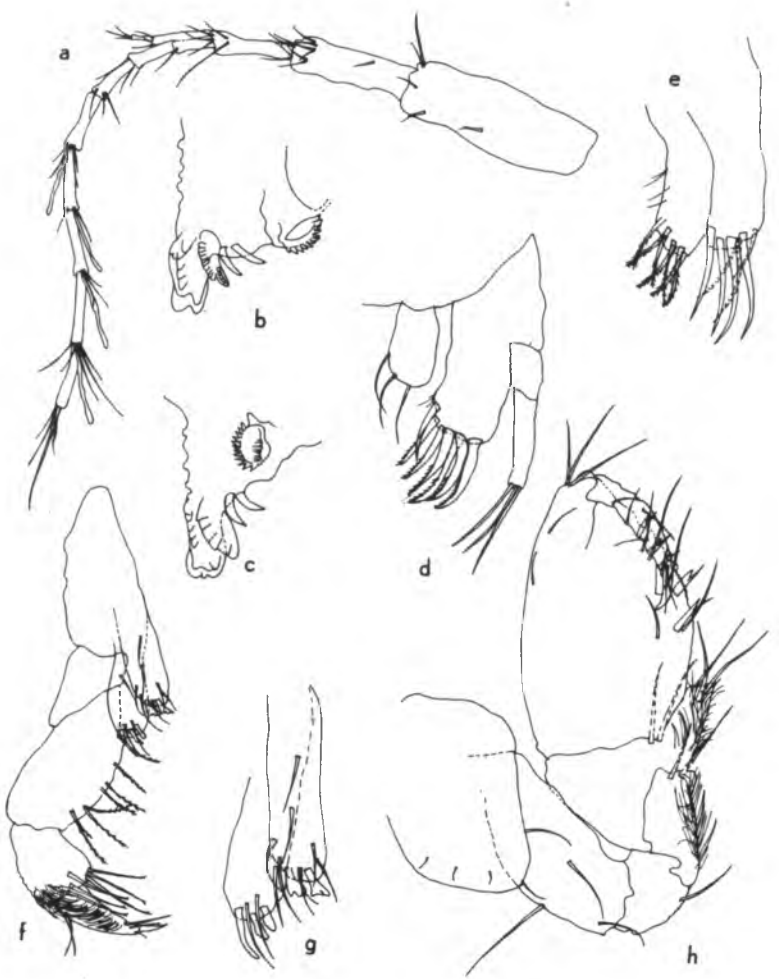

Fig. 15. - *Bogidiella* (s.l.) sp., ♀, from Stn. 85-286. (a) first antenna (scale HI); (b) right corpus mandibulae (HK); (c) left corpus mandibulae (HK); (d) first maxilla (HK); (e) second maxilla (HK); (f) maxilliped (HJ); (g) inner and outer lobe of maxilliped (HK); (h) first gnathopod (HJ). Each scale unit (HI, HJ, HK) represent 100 µm; scales on fig. 17.

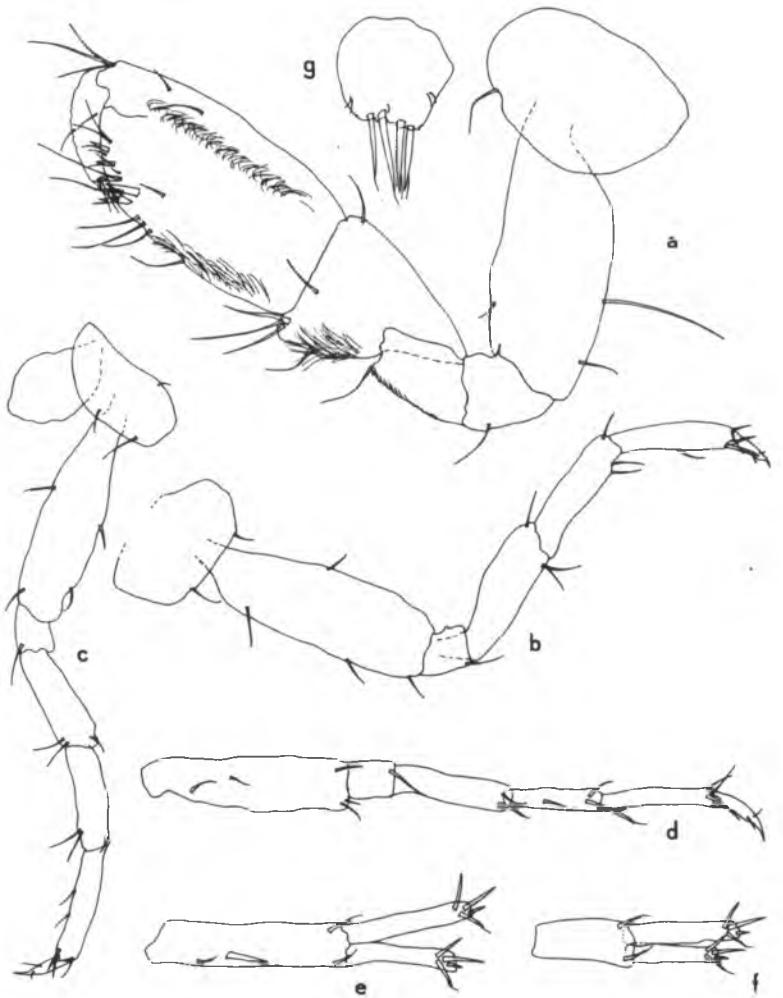

Fig. 16. - *Bogidiella* (s.l.) sp., ♀ from Stn. 85-286. (a) second gnathopod (scale HJ); (b) third pereiopod (HI); (c) fourth pereiopod (HI); (d) fifth pereiopod (HI); (e) first uropod (HI); (f) second uropod (HI); (g) telson, damaged (HJ). Each scale unit (HI, HJ) represents 100 µm; scales on fig. 17.

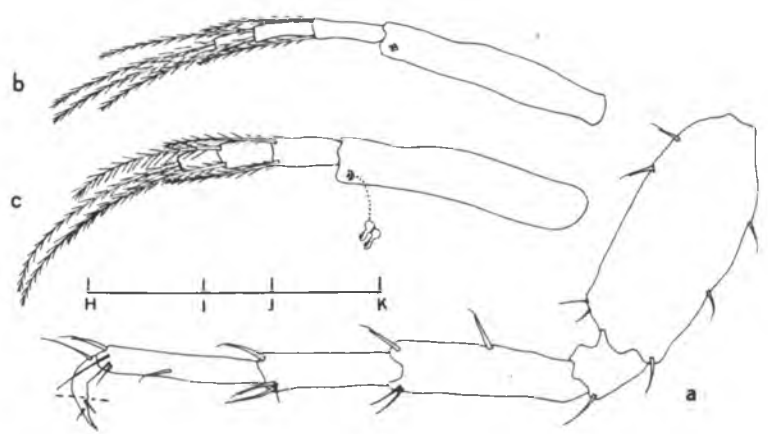

Fig. 17. - *Bogidiella* (s.l.) sp., ♀ from Stn. 85-286. (a) sixth pereiopod, claw damaged (scale HI); (b) first pleopod (HI); (c) second pleopod (HI). The scale unit (HI) represents 100 µm.

18a) with 3-segmented accessory flagellum, overreaching flagellum segm. 21 but shorter than peduncle segm. 3; the latter slightly longer than in the specimen of Stn. 286; flagellum 9-segmented, aesthetascs on segm. 4, 5, 6, 7, and 8. A 2 (fig. 18b) with 5-segmented flagellum. Mx 1, outer lobe with 7 spines, 3 probably unadorned, others with 6-7 fine teeth on medial margin (fig. 18e). Gn 2, P5 and P6 missing. P7 (fig. 19d) shorter than P3 or P4, propodus with 3 long setae and 2 spines on anterior margin. U 3 (fig. 19g) as illustrated. Telson (fig. 19h) wider than long; mediodistal margin slightly concave. Remaining appendages more or less similar to those of the other specimen.

The present two specimens cannot be attributed to any particular subgenus or species, though they resemble mostly the anchihaline taxon from Fuerteventura, *B. spathulata*. From the latter they differ by having fewer long setae on the basis of the gnathopods, whereas the ♀ from Stn. 286 possesses a 2-segmented (instead of 3-segmented) accessory flagellum in A 1, which makes it even uncertain if the specimens from Stns. 280 and 286 belong to the same species. A definite conclusion can only be reached when more material from inland localities in Fuerteventura becomes available.

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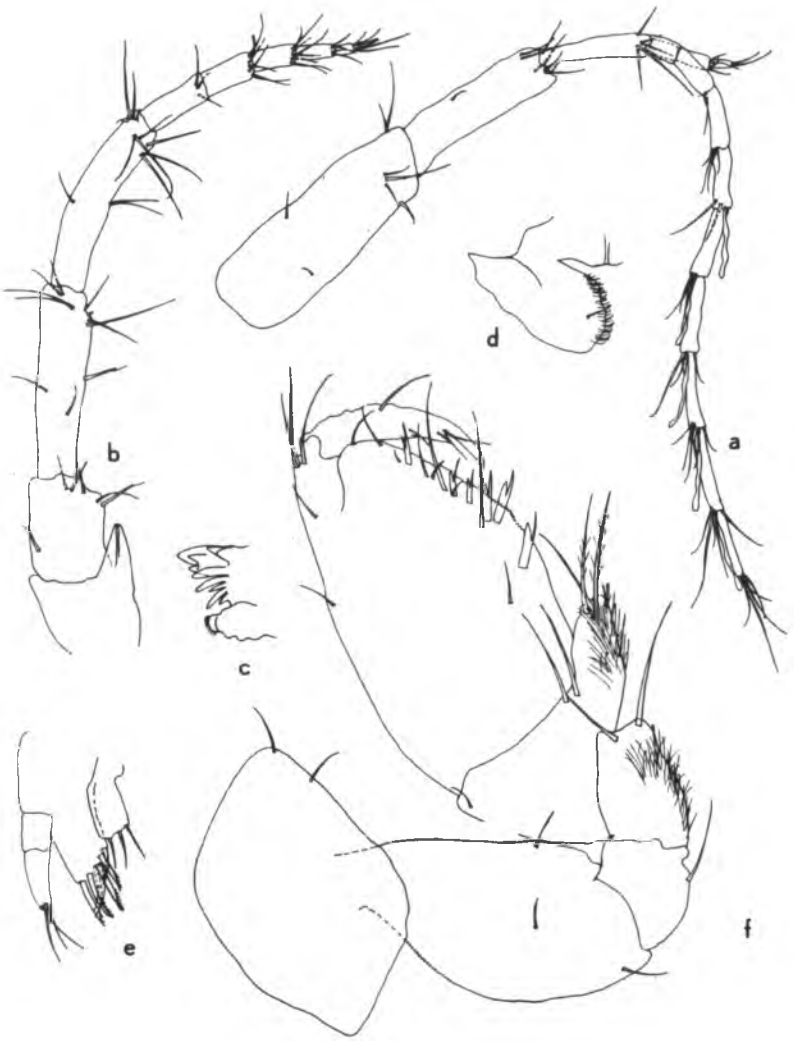

Fig. 18. - *Bogidiella* (s.l.) sp., ♀ from Stn. 85-280. (a) first antenna (scale HI); (b) second antenna (HI); (c) corpus mandibulae (HJ); (d) lower lip (HJ); (e) first maxilla (HJ); (f) first gnathopod (HJ). Each scale unit (HI, HJ) represents 100 µm; scales on fig. 17.

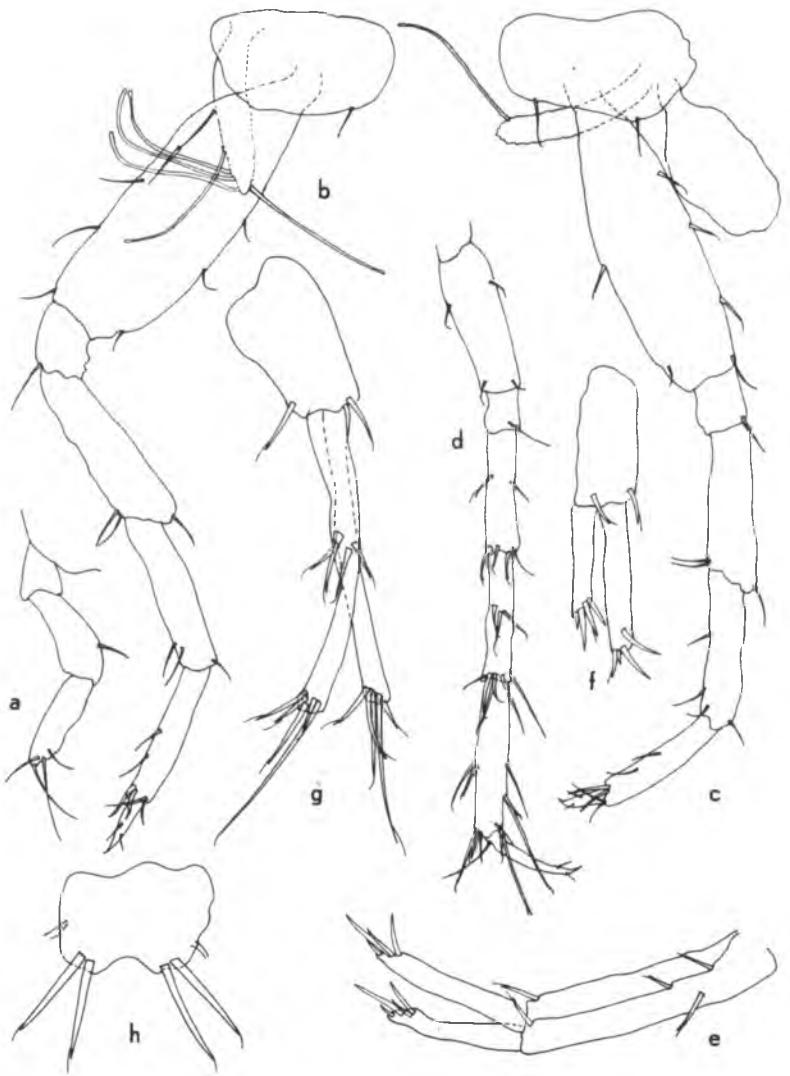

Fig. 19. - *Bogidiella* (s.l.) sp., ♀ from Stn. 85-280. (a) mandibular palp (scale HJ); (b) third pereiopod (HI); (c) fourth pereiopod (HI); (d) seventh pereiopod (HI); (e) first uropod (HI); (f) second uropod (HI); (g) third uropod (HI); (h) telson (HJ). Each scale unit (HI, HJ) represents 100 µm; scales on fig. 17.

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