A REMARKABLE NEW GENUS OF CAVERNICOLOUS BOGIDIELLIDAE (CRUSTACEA, AMPHIPODA) FROM THAILAND

by

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SUMMARY

A new genus and species of Bogidiellidae, *Aequigidiella aquilifera*, is described from two caves in Thailand. The new taxon presents a remarkable morphology (large coxal plates; biramous pleopods, with segmented endopodites; elongate, uncleft telson) reminiscent of certain New World taxa, but unparalleled in the Old World.

INTRODUCTION

The specimens on which the present paper is based were collected by L. DEHARVENG and D. RIGAL during one of the biospeleological expeditions to south-eastern Asia ('Thai-Maros Expeditions'), carried out by an active team of French speleologists (Fédération Pyrénéenne de Spéléologie). We are indebted to Dr. LOUIS DEHARVENG, Toulouse, for entrusting us the material.

Aequigidiella n. gen.

Diagnosis

Bogidiellidae s.l. characterized by the biramous and aequiramous pleopods, without sexual dimorphism; strongly sexually dimorphic second uropods and elongate, uncleft telson; large, overlapping coxal plates 1 to 6, plate 5 being the largest; mouthparts *Bogidiella*-like, plesiomorphic; propodi of gnathopods 1 and 2 similar in size and shape; palmar margin very oblique and long. Remaining characters as described below for the type and unique species, *Aequigidiella aquilifera* n. sp.

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Affinities

The new genus bears a certain resemblance to *Artesia* HOLSINGER, 1980, from Texas, especially in the size and shape of the coxal plates, the biramous and aequiramous pleopods, and in the shape of the propodus of gnathopods 1 and 2. However, it differs from *Artesia* in numerous details, such as the uncleft telson, the plesiomorphic mouthparts, the size of coxal plate 7 (which is not smaller than plate 6), and the apomorphic second male pleopod.

The only other bogidiellids with aequiramous pleopods are the Texan genus *Parabogidiella* HOLSINGER, 1980, and the Brazilian *Spelaeogammarus* DA SILVA BRUM, 1973. The first has small, *Bogidiella*-like coxal plates, apomorphic mouthparts, and an incised telson. The genus from Brazil agrees with *Aequigidiella* in having large coxal plates and plesiomorphic mouthparts, but it has an incised telson, dissimilar propodi in gnathopod 1 (palmar margin oblique and long) and gnathopod 2 (palmar margin transverse and short), widened (natatory) rami in the third uropod, and unisegmented (though elongate) pleopodal endopodites.

The great elongation of the telson in *Aequigidiella* is likewise a surprising character, never observed in other Old World genera of this family, but recorded from certain South American taxa, like *Mesochthongidiella* GROSSO & FERNANDEZ, 1985.

To our surprise, *Aequigidiella aquilifera* n. gen., n. sp., differs widely from the only other bogidiellid described from Thailand, *Bogidiella (Bogidiella) thai* BOTOSANEANU & NOTENBOOM, 1988.

In overviewing the general relationships of the new genus, it seems to bridge the gap between the families Artesiidae HOLSINGER, 1980 and Bogidiellidae HERTZOG, 1936, supporting the opinion expressed by STOCK, 1981, that these two families should be united.

Derivatio nominis

The generic name is a contraction of *aequi* (Latin, equal) and *Bogidiella*, alluding to the aequiramous pleopods. The specific name, *aquilifera* (Latin, bearer of the standard) alludes to the flag-like structures of the modified second male uropod.

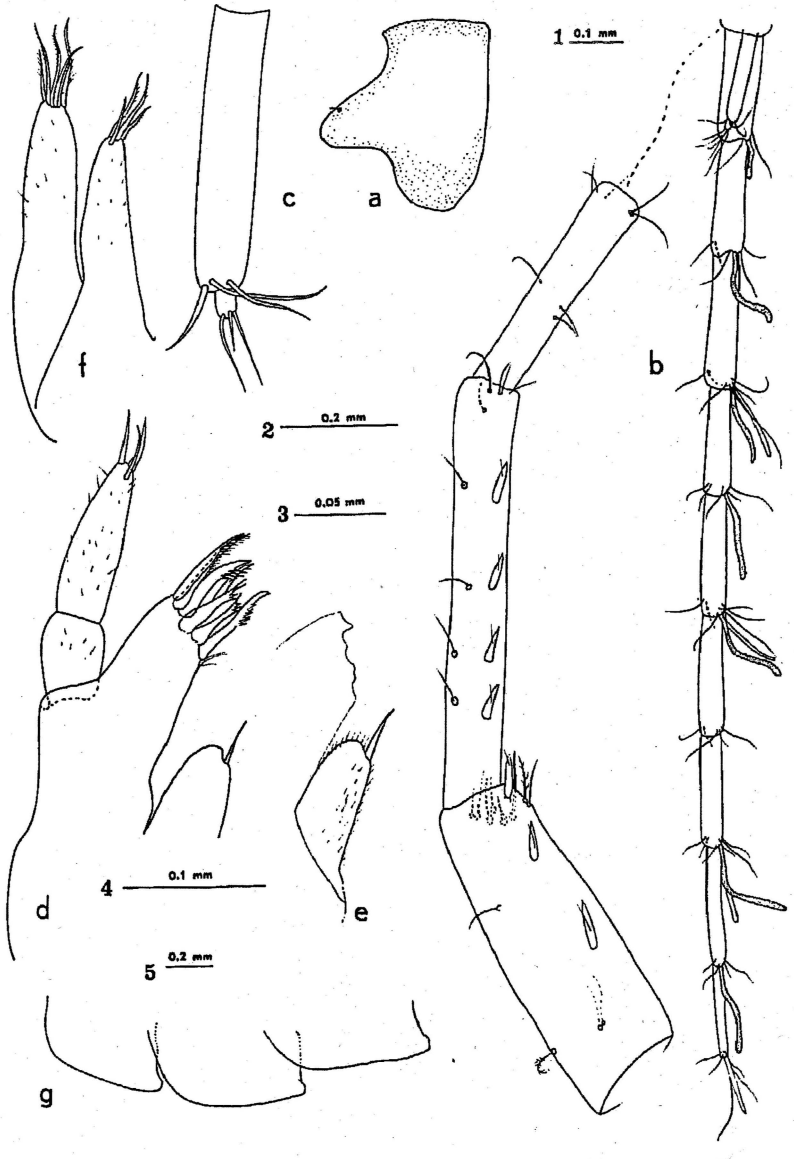

Fig. 1. *Aequigidiella aquilifera* n. gen., n. sp. a, head, ♀, from the left (scale 1); b, first antenna, ♂ (scale 2); c, accessory flagellum, ♂ (scale 3); d, first maxilla, ♂ (scale 4); e, inner lobe of first maxilla, ♀ (scale 4); f, second maxilla, ♂ (scale 4); g, epimeral plates I–III, from the left (scale 5).

Aequigidiella aquilifera n. sp.

Material. – 1 male (holotype), 1 female (allotype), 4 females (paratypes). Thai 87 – KK2: Khon Kaen province, north of Chum Phae, tham (= cave) 'Kubio', 19 June 1987, leg. D. RIGAL & L. DEHARVENG. Zoölogisch Museum Amsterdam (ZMA) Amph. 108.365.

2 females (see Remarks). Thai 87 – CYM24: Chaiyaphum province, Nong Bua Daeng district, tham Keaw, 15 June 1987, leg. L. DERHARVENG & D. RIGAL. ZMA Amph. 108.366.

Description, based on specimens from KK2

Body length 4 mm (male) or 4–4.5 mm (female). Body shape not unlike *Artesia* (see HOLSINGER, 1980, fig. 19); dorsum of pereionites unarmed; dorsum of pleonites and uronite 1 with 1 pair of setules; uronite 2 with 1 pair of spines; uronite 3 naked.

Head with strongly produced lateral lobe; inferior antennal sinus rounded and distinct (Fig. 1a). Coxal plates 1–4 overlapping, plate 1 as long as wide, plates 2–7 wider than long (Fig. 3a). Epimeral plates unarmed, with slightly produced posteroventral corner, tip of each corner truncate (Fig. 1g).

First antenna (Fig. 1b) with elongate peduncle, segment 2 the longest, segment 3 the shortest; row of 3 and 4 spines on ventral side of segments 1 and 2, respectively. Accessory flagellum (Fig. 1c) 2-segmented, distal segment small, knob-like. Flagellum 9- to 11-segmented, segments slender; each segment (except 4th from tip) with robust, stalked aesthetask; distal aesthetasks almost as long as corresponding segment; elements with an obtuse tip, and unstalked, may represent aesthetasks of a different type. They are present on segments 3, 5, 7, and 9 in the male illustrated in Fig. 1b, but on different segments in paratypic females (4, 6, 8, 10; 5, 7, 9, 11, or 2, 4, 5, 9, 11).

Second antenna (Fig. 4a): Peduncle segment 1 bulbous; long gland cone; segments 4 and 5 very slender; segment 4 with several spines; segment 5 with 2 ventral spines. Flagellum 5-segmented; one unstalked aesthetask on segments 1, 2, and 5 (Fig. 3b).

Upper lip (Fig. 2g) trapezoidal, unarmed.

Mandible palp 3-segmented (Fig. 2d); segment 2 with 1–2 midventral setae; segment 3 with 3 (sub)terminal setae. Incisor very heavy, composed of two prongs. Left lacinia mobilis 5-dentate (Fig. 2e); right one triangular, thin, with some 13 fine teeth (Fig. 2f). Between lacinia and molar 6 (left) or 7 (right) strong setae. Molar small, both left and right with long molar seta.

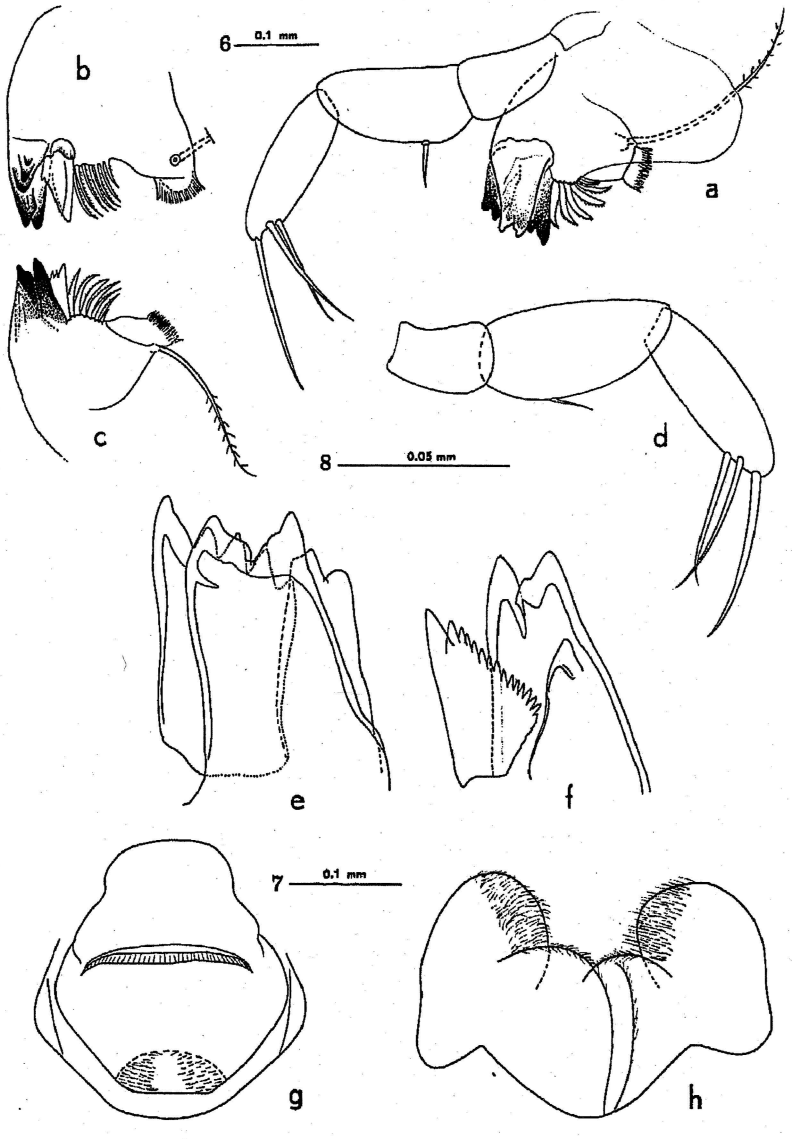

Fig. 2. *Aequigidiella aquilifera* n. gen., n. sp. a, left mandible, ♀ (scale 6); b, right corpus mandibulae, ♂ (scale 6); c, same of ♀ (scale 6); d, mandible palp, ♂ (scale 7); e, left pars incisiva and lacinia mobilis, ♂ (scale 8); f, same, right (scale 8); g, upper lip, ♂ (scale 7); h, lower lip, ♀ (scale 7).

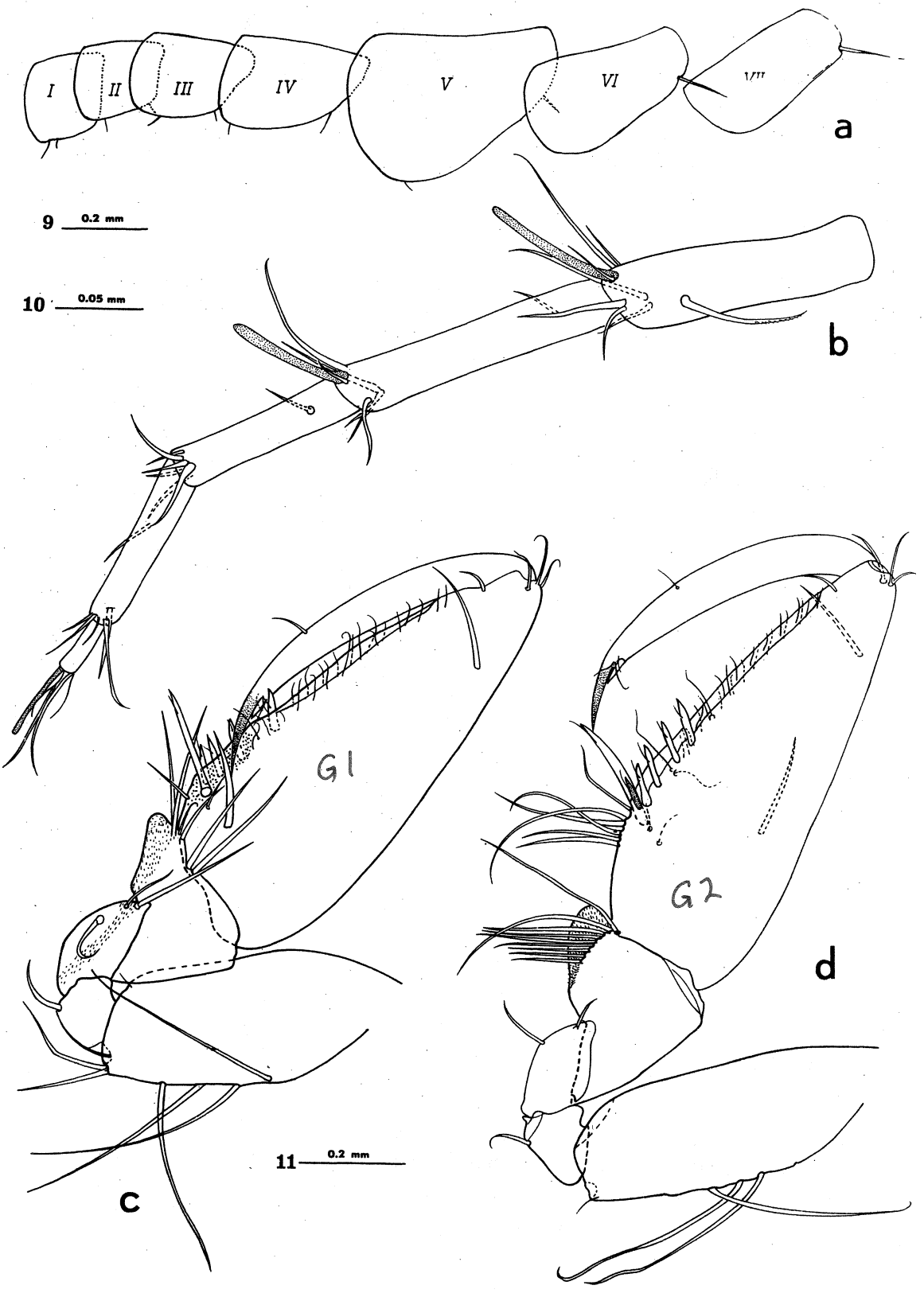

Fig. 3. *Aequigidiella aquilifera* n. gen., n. sp. a, coxal plates I–VII, ♀, in situ (scale 9); b, flagellum second antenna, ♂ (scale 10); c, first gnathopod, ♂ (scale 11); d, second gnathopod, ♂ (scale 11).

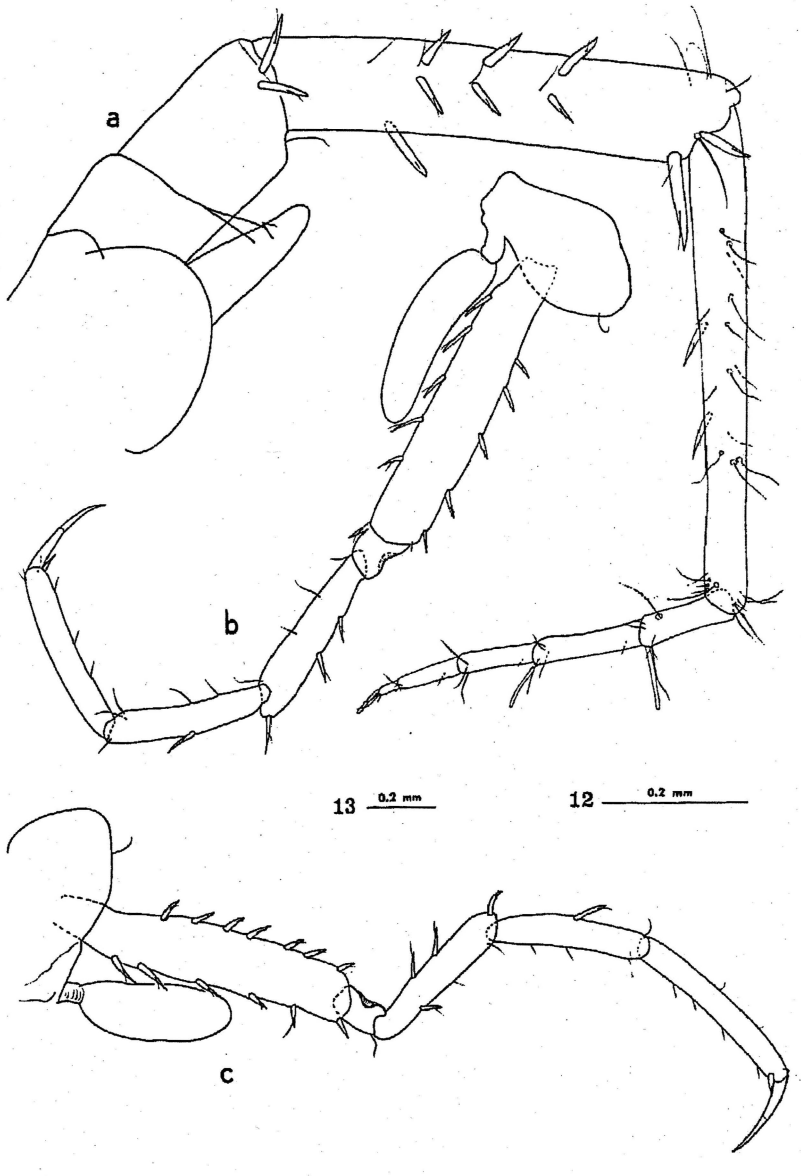

Fig. 4. *Aequigidiella aquilifera* n. gen., n. sp. a, second antenna, ♂ (scale 12); b, third pereiopod, ♂ (scale 13); c, fourth pereiopod, ♂ (scale 13).

Lower lip (Fig. 2h) with wide inner lobes.

First maxilla (Fig. 1d, e) with symmetrical, 2-segmented palp, distally armed with 3 short setae. Outer lobe with 7 spines; number of denticles on the medial margin of these spines, from lateral to medial, 6, 4, 3, 4, 2, 2, 5 (male) or 5, 3, 3, 5, 2, 1, 6 (female). Inner lobe small, rounded, with 1 distal setule.

Second maxilla (Fig. 1f) with slender lobes; outer lobe with 5, inner lobe with 4 short distal setae.

Maxilliped (Fig. 8e): Inner lobe slender, with 2 distal setae, and 1 (♀, Fig. 8h) or 2 (♂, Fig. 8g) distal bifid spines. Outer lobe (Fig. 8f) with 1 medial and 3 distal setae, and 2 distal spines. Palp segment 2 with convex inner margin; claw slender.

Gnathopods without sexual dimorphism. First gnathopod (Fig. 3c): Basis with 4 or 5 posterior and 2 distal setae. Carpus with shallow excavation on posterodistal projection. Propodus with very long, oblique palm; 2 long palmar angle spines, implanted not far from the base (!) of the segment; palmar margin with row of 4 proximal spines, and more distal rows of numerous setules, inbedded in a hyaline fringe.

Second gnathopod (Fig. 3d): Basis with 5 setae on posterior margin. Carpus not pointed, with 9 or 10 setae, submarginally implanted at the basis of a hyaline lobe. Propodus almost as large as and rather similar in shape to, that of Gn.1; 1 long palmar angle spine; palmar margin very long, armed with 5 to 7 proximal spines and a more distal row of setules.

Coxal gills elongate, sausage-shaped, with short stalk, on P3 through P6. Oostegites on P3 through P5, linear, unarmed (diapause state).

Third pereiopod (Fig. 4b): Basis armed with row of strong spines on anterior and posterior margins. Dactylus and unguis long and slender. Fourth pereiopod (Fig. 4c) similar to third.

Pereiopods 5 to 7 lost in the single available male. In female, fifth pereiopod (Fig. 5a) shorter than P6; P6 only sligthly shorter than P7. P5–P7 basis very elongate; with spines on both margins of all segments, even the propodus of P7; claw thin, slender (Figs. 5b–c), with 1 plumose subbasal seta. No lenticular organs.

Pleopods (Figs. 6, 7a–b) of equal length; both rami subequal; number of segments of inner and outer ramus and number of setae variable. Outer ramus 3-segmented, or by total or partial subdivision of basal segment 4-segmented. Inner ramus 2- or 3-segmented; mid-lateral seta of basal

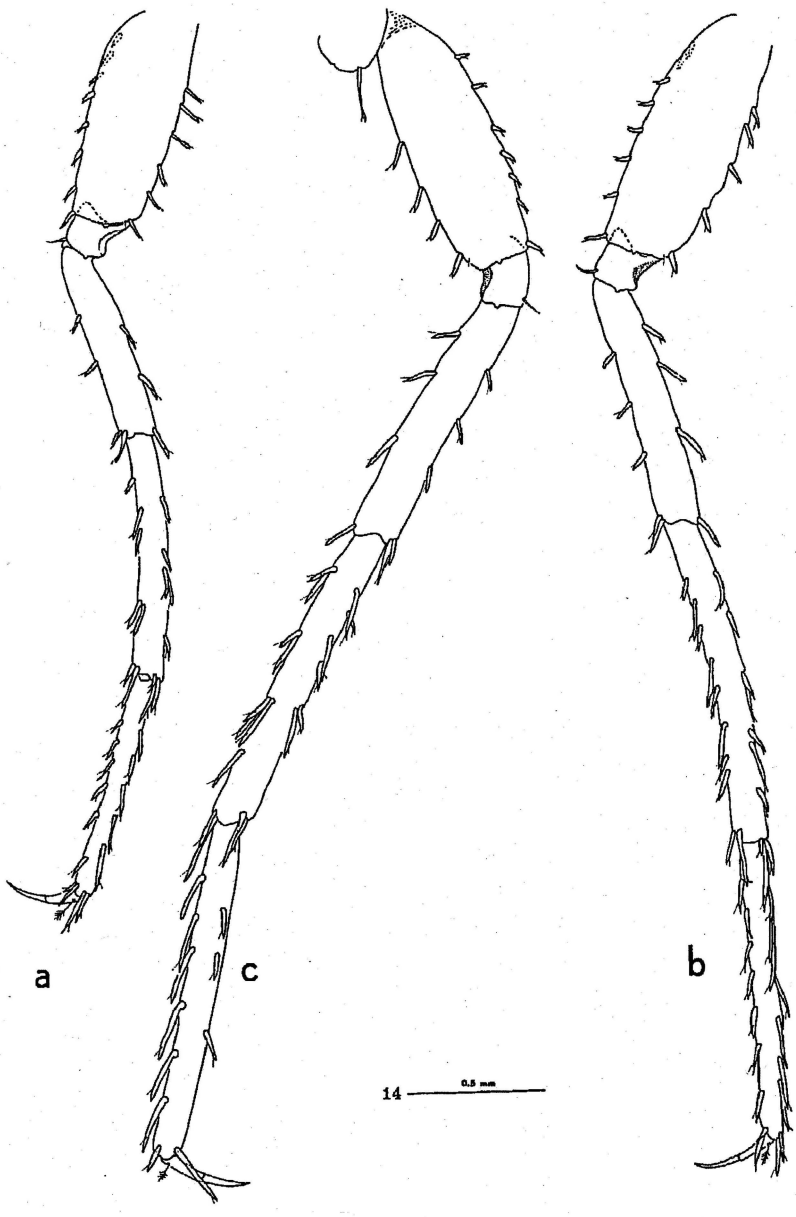

Fig. 5. *Aequigidiella aquilifera* n. gen., n. sp. a, fifth pereiopod, ♀; b, sixth pereiopod, ♀; c, seventh pereiopod, ♀ (all scale 14).

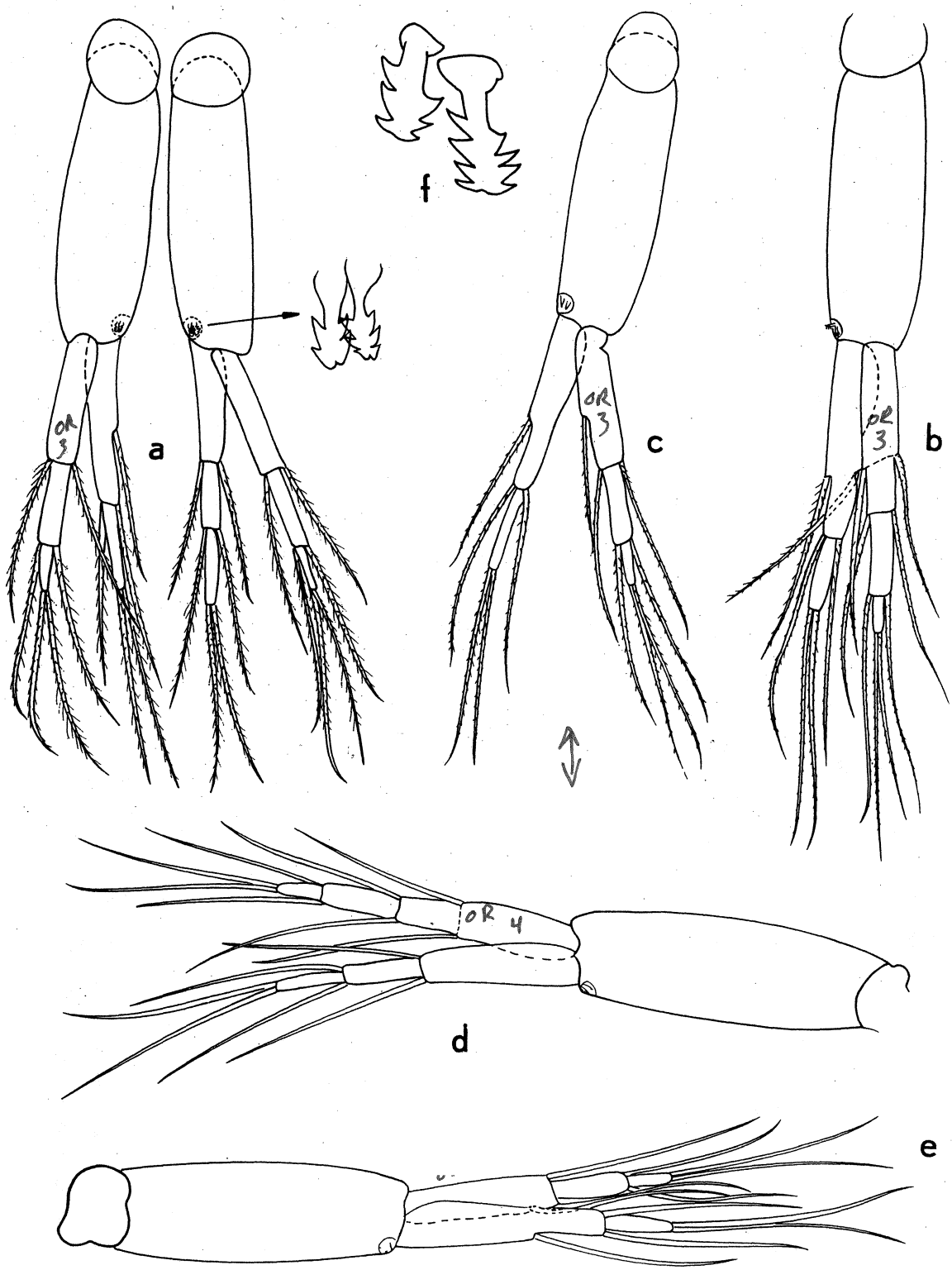

Fig. 6. *Aequigidiella aquilifera* n. gen., n. sp. a, first pleopod, ♂ (scale 13); b, first pleopod, ♀ (scale 13); c, second pleopod, ♂ (scale 13); d, e, second pleopods, ♀, plumosity of setae omitted (scale 13); f, retinacula of second pleopod, ♀ (scale 8).

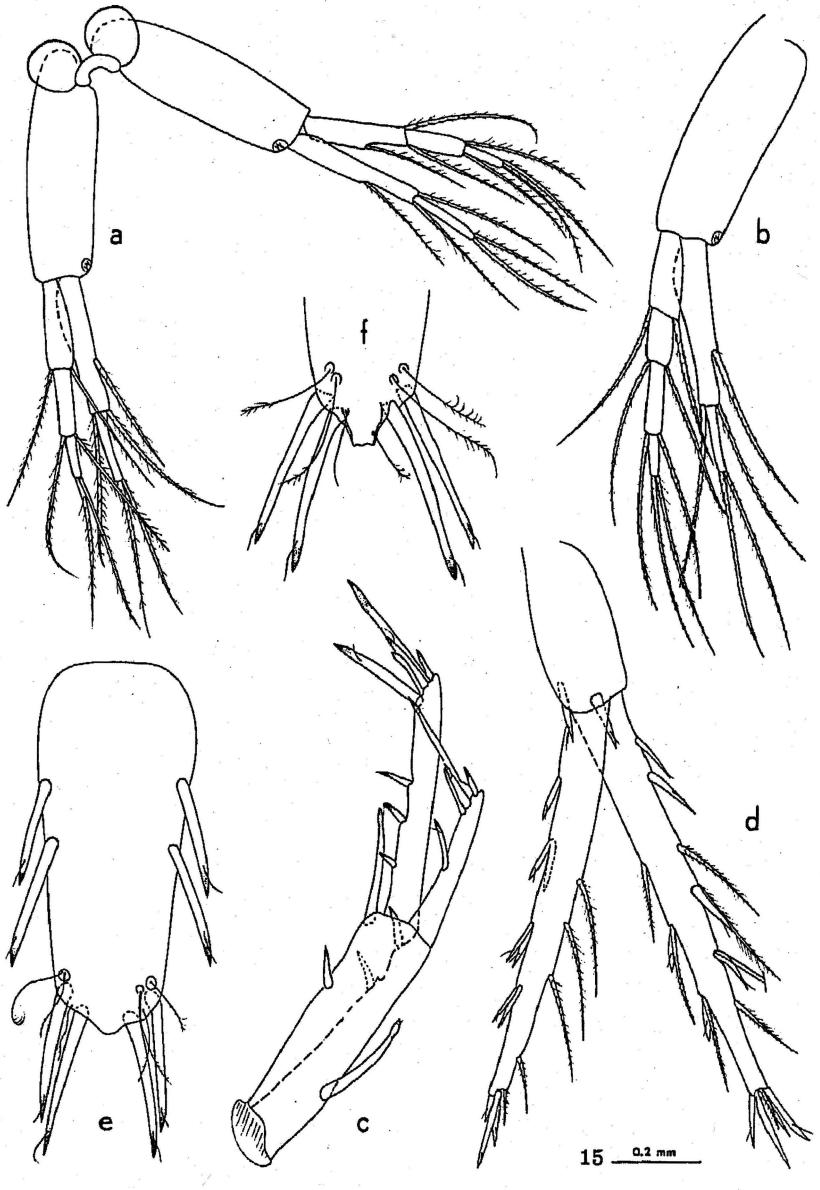

Fig. 7. *Aequigidiella aquilifera* n. gen., n. sp. a, third pleopod, ♂ (scale 13); b, third pleopod, ♀ (scale 13); c, first uropod, ♂ (scale 15); d, third uropod, ♂ (scale 15); e, telson, ♂ (scale 6); f, tip of telson, ♀ (scale 6).

segment present or absent. Two anchor-shaped retinacula on pedunculus, armed with 3 or 4 hooks on either margin (Fig. 6a, f). All setae on rami long and feathered; no clothespeg spines. No sexual dimorphism.

First uropod (Fig. 7c) with strong proximoventral peduncular spine. Number of dorsal peduncular spines variable: 2–4 laterodorsally, 2–3 mediodorsally. Outer ramus much shorter than inner one, with 1 dorsal and 3–4 distal spines. Inner ramus with 3–4 dorsal and 5 distal spines. No sexual dimorphism.

Second uropod (Fig. 8a, d): Peduncle short with 1 spine only. Outer ramus shorter than inner one, with strong sexual dimorphism. In female (Fig. 8d) it is of the ordinary, slightly tapering shape, with 1 or 2 dorsal spines and 4 distal spines. In male (Fig. 8a), the ramus is somewhat swollen in the centre; it lacks dorsal elements; the lateral tip of the ramus is produced into a finger-shaped hyaline lobe (*l* in Fig. 8b), which opposes an obtuse, flat laterodistal element with a vaguely crenulate tip (*c* in Fig. 8b); the strongly modified, longest distal element is flattened, twisted and ending into 2 flag-like lobes, curving upward in their distal part (*f1* and *f2* in Fig. 8c).

Third uropod (Fig. 7d) biramous, rami of equal length, 1-segmented. Outer ramus with only spines on lateral margin, only plumose setae on medial margin; distally with 3 or 4 spines and 1 setule. Inner ramus with varying numbers of spines and plumose setae on both lateral and medial margins; tip with 4 spines and 1 setule.

Telson (Fig. 7e–f) entire, not markedly sexually dimorphic, elongate, more than twice as long as wide, slightly tapering; lateral margin with 2 strong spines, distal margin with 2 pairs of strong spines and 2 setules; pair of sensory setules near base of outermost distal spine. Tip of telson ending in obtuse point; no cleft at all.

Remarks

The two females from tham Keaw (Station CYM24) are provisionally attributed to the same species as the types from tham 'Kubio' (Station KK2). In absence of males, we find it impossible to decide conclusively if the material from these two caves is identical. The tham Keaw specimens tend to be slightly more spinous than the types, but are otherwise very similar to females from the type-locality.

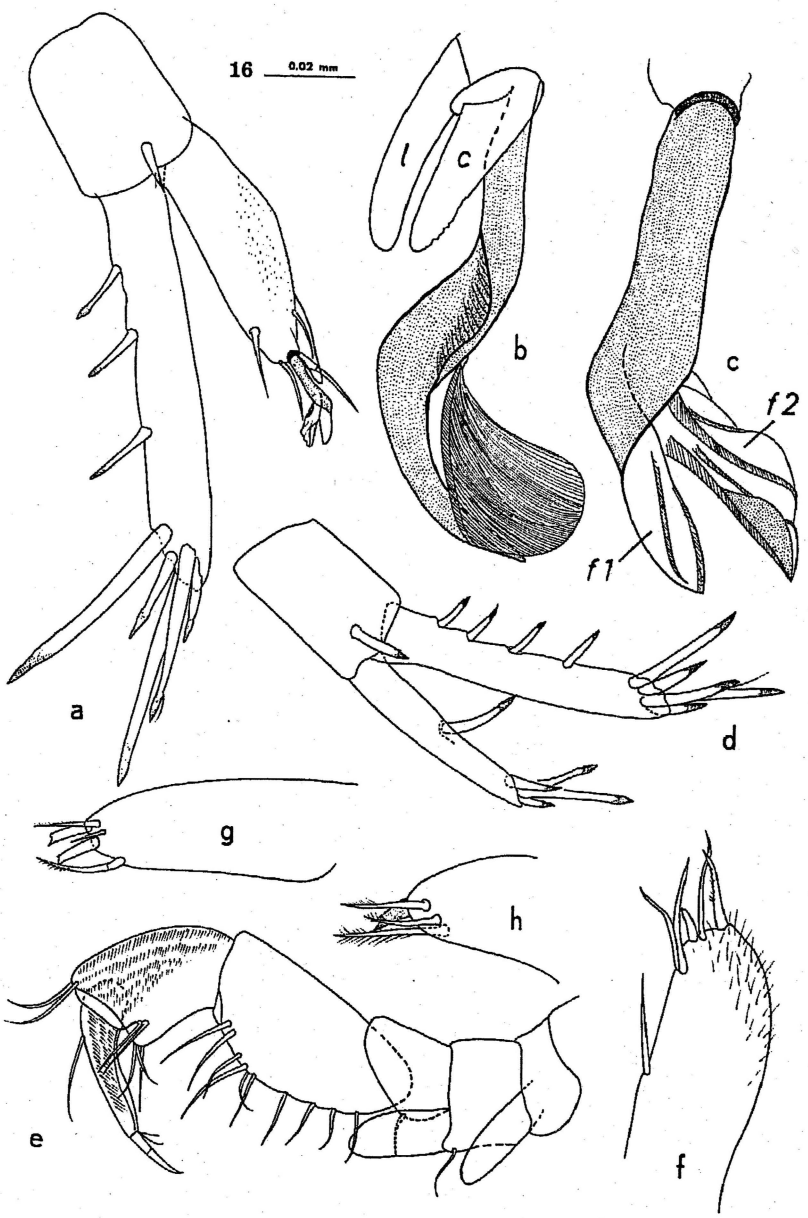

Fig. 8. *Aequigidiella aquilifera* n. gen., n. sp. a, second uropod, ♂ (scale 6); b, c, transformed distal element of left and right second uropod, ♂ (scale 16); d, second uropod, ♀ (scale 2); e, maxilliped, ♂ (scale 12); f, outer lobe of maxilliped, ♂ (scale 3); g, inner lobe of maxilliped, ♂ (scale 3); h, same of ♀ (scale 3).

REFERENCES

BOTOSANEANU, L. & NOTENBOOM, J., 1988. Un Amphipode stygobie de la Thaïlande. *Annls. Limnol. 24* (1): 51-59

BRUM, I.N. DA SILVA, 1976. Spelaeogammarus bahiensis g.n. sp. n. de anfipodo cavernicola do Brasil. *Atas Soc. Biol. Rio de Janeiro 17*(3): 125–128.

GROSSO, L. E. & FERNANDES, H.R., 1985. Une nueva Bogidiella (Amphipoda Bogidiellidae) hiporreica de la provincia de Tucumán (Argentina). *Neotrópica 31* (86): 201–209.

HOLSINGER, J. R., in J. R. Holsinger & G. Longley, 1980. The subterranean amphipod crustacean fauna of an artesian well in Texas. *Smiths. Contr. Zool. 308*: 1–62.

STOCK, J. H., 1981. The taxonomy and zoogeography of the family Bogidiellidae (Crustacea, Amphipoda), with emphasis on the West Indian taxa. *Bijdr. Dierk. 51* (2): 345–374.

NUUANU CURVATA N. SP. AND *MELITA LEIOTELSON N. SP.* (CRUSTACEA, AMPHIPODA) FROM BEACH INTERSTITIA ON CURAÇAO

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SUMMARY

Two new amphipod species were found in coarse sand interstices of beaches, mainly on the heavily exposed northcoast of Curaçao (Netherlands Antilles). They still possess small eyes but are not found in marine surface waters. Both species are described and remarks are made about their taxonomic position.

RÉSUMÉ

On décrit deux espèces nouvelles d'Amphipodes, d'un milieu interstitiel marin très exposé de quelques plages au Nord de Curaçao (Antilles Néerlandaises). Elles possèdent encore des petits yeux, mais n'ont pas été recueillies dans les eaux marines de surface.

Genus **Nuuanu** Barnard, 1970

KARAMAN & BARNARD (1979) combined the genera *Gammarella* Bate, 1857, *Nuuanu* Barnard, 1970, and *Cottesloe* Barnard, 1974 into one genus: *Gammarella*. They remarked that no discontiguity existed between the three genera.

However, the differences within the enlarged genus between *Nuuanu amikai* BARNARD, 1970 on the one hand, and *Gammarella fucicola* (LEACH, 1814) on the other, are too large to make the use of such a genus workable. Therefore the genus *Nuuanu* is retained.

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