

AMSTERDAM EXPEDITIONS TO THE WEST INDIAN ISLANDS,
Report 53*

PSAMMOGAMMARUS LONGIDACTYLUS N. SP., A NEW CAVE
AMPHIPOD (CRUSTACEA) AND OTHER STYGOBIONT
AMPHIPODS FROM BONAIRE

BY

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SUMMARY

Psammogammarus longidactylus, a new species from an anchihaline cave in the island of Bonaire (Netherlands Antilles) is described. It resembles very closely *Psammogammarus longiramus* found in a similar habitat on a Red Sea island.

Psammogammarus caesicolus Stock, 1980 and *Saliweckelia emarginata* Stock, 1977 are recorded for the first time from Bonaire.

RÉSUMÉ

On décrit *Psammogammarus longidactylus*, espèce nouvelle d'Amphipodes, d'une grotte anchihaline de l'île Bonaire (Antilles Néerlandaises). L'espèce est fort proche de *P. longiramus*, d'un habitat similaire d'une île de la Mer Rouge. Les Amphipodes *Psammogammarus caesicolus* Stock, 1980, et *Saliweckelia emarginata* Stock, 1977, sont pour la première fois mentionnés de Bonaire.

INTRODUCTION

Members of the genus *Psammogammarus* S. Karaman, 1955 are characteristic for anchihaline inland, and for marine interstitial habitats. The new species described in the present paper was found in an anchihaline collapse cavern in Bonaire (Netherlands Antilles). It occurs in relatively salty waters, not far from the coast (ca. 550 m), where it was observed both free-swimming and under stones.

Its capacity to swim around, its general morphology, and its habitat resemble the situation found in *Psammogammarus longiramus* (Stock & Nijssen, 1965), known from a land-locked salty waterhole on the Red Sea island of Entedebir (Ethiopia).

*) Report 52 has been published in *Bijdragen tot de Dierkunde*, vol. 57 no. 1.

Records of other stygobiont Amphipoda in Bonaire are provided as well: *Psammogammarus caesicolus* Stock, 1980, *Saliweckelia emarginata* Stock, 1977 and *S. holsingeri* Stock, 1977. The first two are new to the island, being previously known from Curaçao only.

In total 129 groundwater samples from Bonaire have been examined. It is noteworthy that members of the genus *Metaniphargus*, the most common hypogean amphipod in Curaçao and Aruba, are completely absent in Bonaire.

Psammogammarus longidactylus n. sp.

Diagnosis. — Maximum length slightly more than 4 mm. Uropod 3 with large inner ramus, exceeding article 1 of outer ramus. Dorsal margin of inner ramus of uropods 1 and 2 rugose. Coxal plate 5 with large anterior lobe. Pereopods 5-7 and dactyli very long and slender.

Material examined. —

Bonaire: 1♂ holotype (fig. 2), 18 paratypes (both sexes), Amsterdam Expeditions to the West Indian Islands Sta. 84-214, Estate Bolivia, karst collapse cave near "Spelonk" (12°13'23"N 68°13'12"W). Animals caught with a handnet in semi-dark, water-filled tunnels radiating from a central basin which is fully exposed to daylight; chlorinity 19657 mg/l; April 10, 1984, leg. J. H. Stock & J. J. Vermeulen (Zoologisch Museum Amsterdam, coll. no. ZMA Amph. 108.270a-b).

Four specimens, damaged, Sta. 80-39, same locality; chlorinity 14060 mg/l; May 29, 1980, leg. L. Botosaneanu & J. Notenboom (ZMA coll. no. Amph. 108.271).

Accompanying fauna in this cave consisted of Diptera, Oligochaeta, Acari, Gastropoda, Ostracoda, Cyclopidae, *Macrobrachium* (*Macrura*).

Description. —

Largest male 3.1 mm, largest female 4.2 mm. Life colour greyish white. Some females carry 1 egg.

Body slender, laterally compressed; pleon segments with 2-3 very small dorsal setules.

Coxal plates 1-4 longer than wide, with some overlap, distal margin rounded, with a few setules; coxal plate 1 (fig. 2d) slightly anterodistally expanded; plate 5 strongly anterolobate (fig. 5d); plates 6 and 7 rather small (fig. 5a, b).

Epimeral plates 1-3 (fig. 5f) with acute posterodistal corners.

Head (fig. 3b) without inferior antennal sinus. No eyes or rudiments of eyes.

Antennae 1 and 2 (fig. 3b) of normal length, slightly setose. Antenna 1 about twice as long as 2; accessory flagellum 2-articulate; peduncle article 2 longer than 1, with two distal groups of setae; flagellum 14- to 17-articulate, most articles with 1 very narrow and long aesthetasc. Antenna 2 peduncle articles 4 and 5 subequal; flagellum moderately setose, 6-articulate.

Upper lip (fig. 4f) trapezoid.

Pars molaris (fig. 3c, 3d) small, not triturative, molar setae present on both sides; corpus mandibulae with a row of 8-9 barded spines; left lacinia mobilis

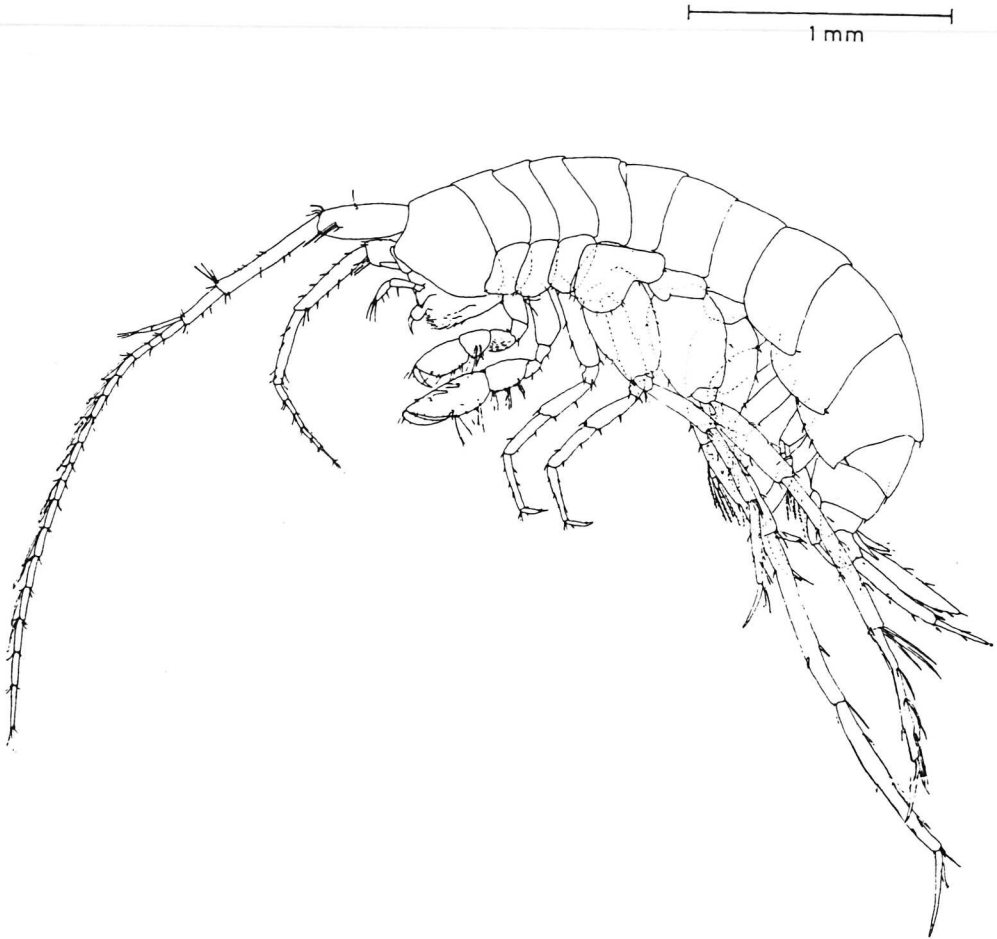


Fig. 1. *Psammogammarus longidactylus* n. sp.

with 4 teeth, right lacinia mobilis forked and finely serrate; palp 3-articulate, article 2 slightly longer than 3, article 3 with 3 terminal and 3 ventral setae.

Lower lip (fig. 3e) with distinct inner and outer lobes, setulose.

Maxilla 1 (fig. 3a): Palp 2-articulate, symmetrical, armed with 7 terminal spines and 1 seta; outer lobe with 9 multidenticulate spines; inner lobe triangular, broad, with up to 14 setae.

Maxilla 2 (fig. 3f): Inner lobe with long transversal row of about 12 setae and about 10 distal setae; outer lobe with about 10 distal setae.

Maxilliped (fig. 5e): Distal palp segment large; dactylus slender, long; outer lobe with 6 distal spines, 4 of them barbed; inner lobe with 3 spines and some setae.

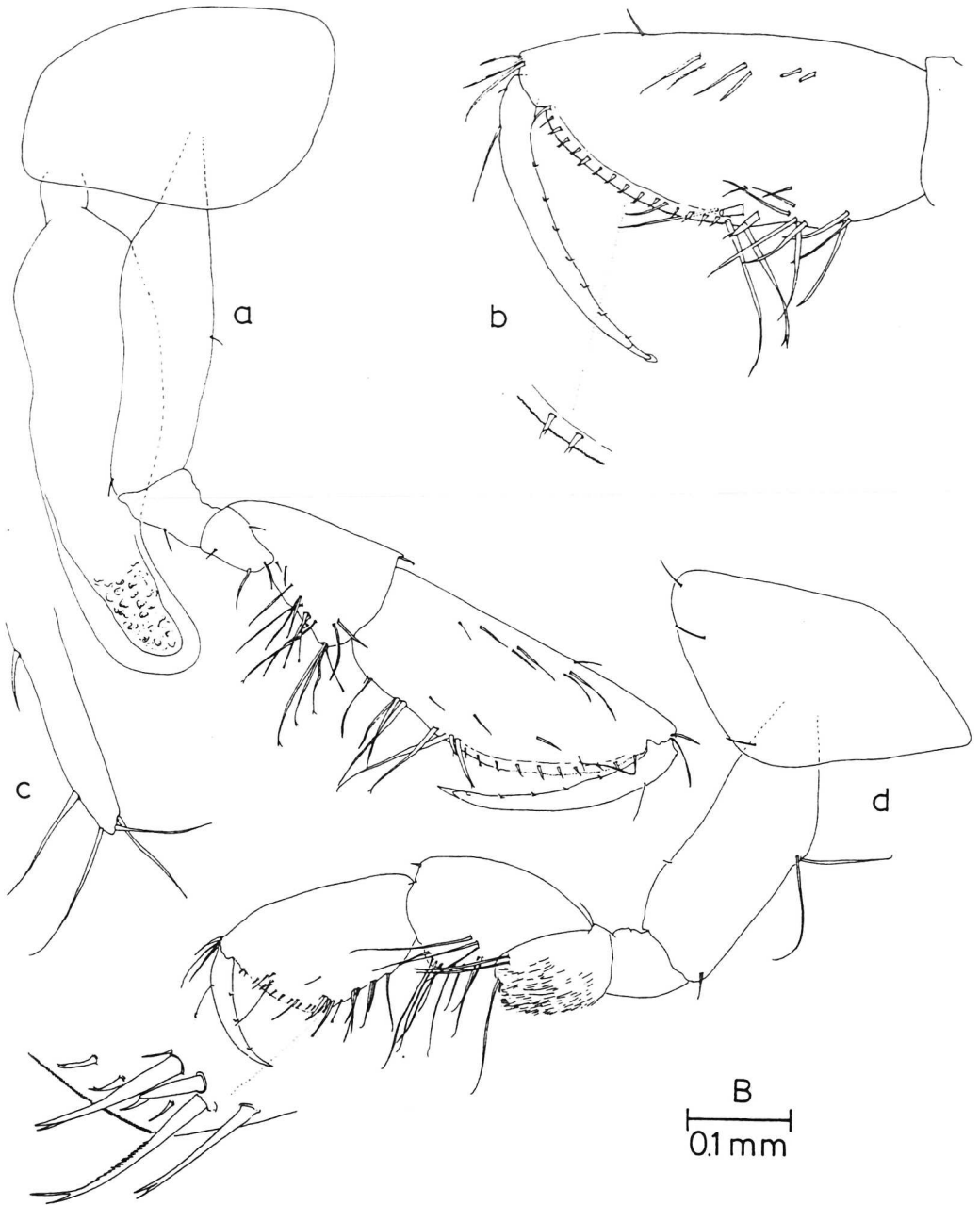


Fig. 2. *Psammogammarus longidactylus* n. sp., ♂ holotype, ♀ paratype: a, second gnathopod, ♂ (scale B); b, second gnathopod, ♀ (B); c, oostegite of fourth pereopod, ♀ (B); d, first gnathopod, ♂ (B).

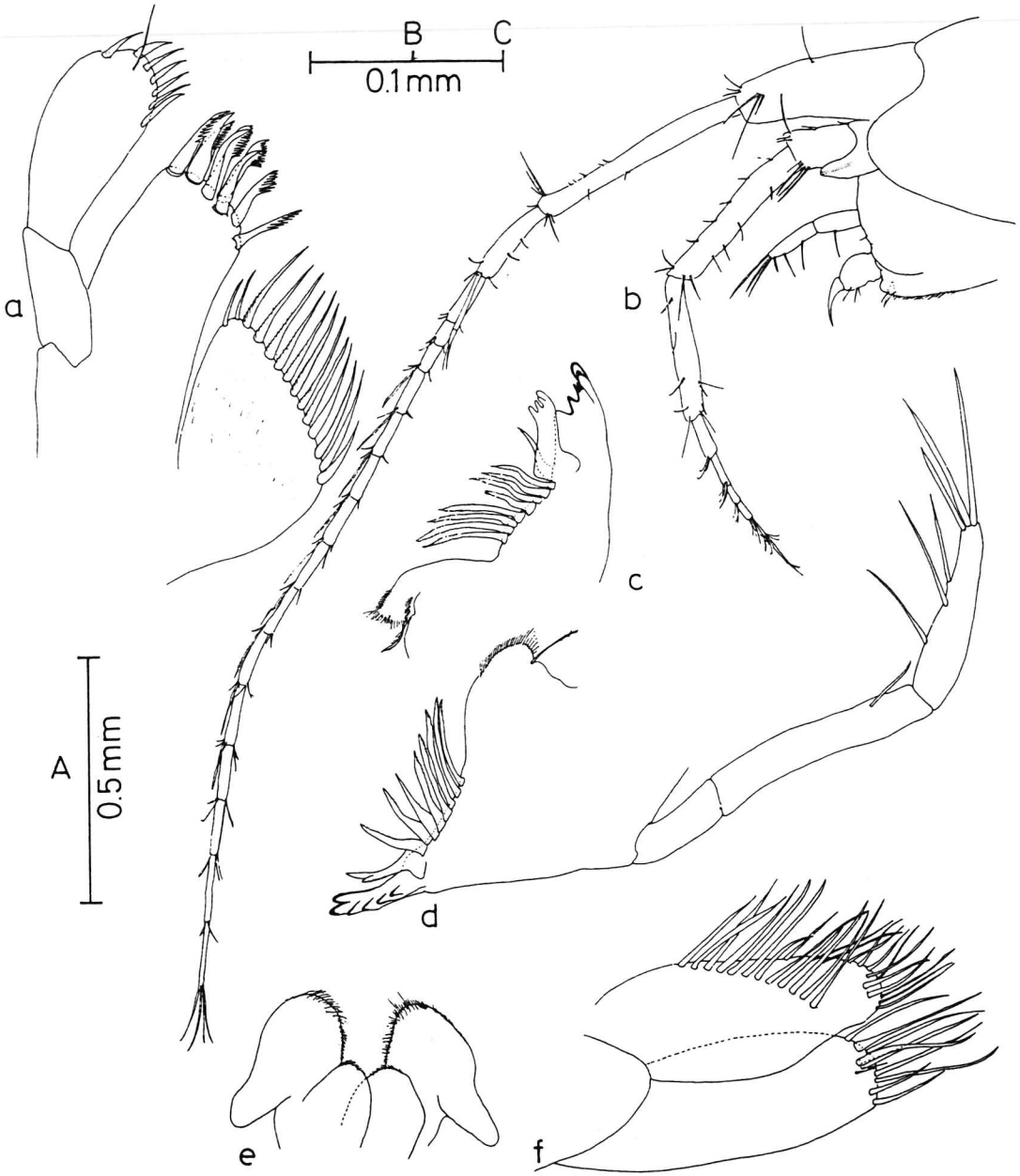


Fig. 3. *Psammogammarus longidactylus* n. sp., ♂ holotype, ♀ paratype: a, left first maxilla, ♀ (scale C); b, cephalic lobe and antennae, ♂ (A); c, left masticatory part of mandible, (C); d, right mandible with palp, ♂ (C); e, lower lip, ♂ (B); f, second maxilla, ♂ (C).

Gnathopod 1 (fig. 2d) generally similar in both sexes; basis elongate; merus strongly rugose; carpus about equal in size to propodus, posterior margin convex with several long setae; propodus longer than wide, palm convex, moderately oblique; 3 palmar angle spines, palmar margin minutely serrate, with a row of small bifid spinules implanted at small distance from margin; dactylus with a plumose setule on anterior margin.

Gnathopod 2 (fig. 2a,b) larger than 1; merus not rugose; carpus smaller than propodus with irregular groups of setae on posterior margin; propodus elongate oval, palm delimited by obtuse angle and 2 palmar angle spines, of which 1 short and 1 long, and 2 setae of which at least 1 bifid, palmar margin minutely serrate, hyaline, with a regular row of bifid spinules; dactylus with 1 setule on anterior margin. In female more spinules on palmar margin (but this may well be due to size difference).

Pereopods 3-4 (fig. 5g) similar; articles poorly setose; dactylus straight with setule on anterior margin; coxal plate 4 non-emarginate.

Pereopod 5 (fig. 5b) shorter than 6; basis not strongly lobate; propodus with several groups of spines on posterior margin; dactylus long and straight, unguis small.

Pereopods 6-7 (fig. 5c,a) extremely long, 6 slightly shorter than 7; basis weakly lobate (P6) or non-lobate (P7); carpus and propodus about equal in length, in P6 with groups of long setae on posterior margin; dactylus straight and long with very small unguis and setule on posterior margin.

Pleopods (fig. 4a) biramous, normally segmented, not transformed; 2 anchor-shaped retinacula per pleopod.

Uropod 1 (fig. 4d) with 1 basofacial spine; no interramal spine; outer ramus as long as inner ramus, with a few distomarginal spines and a group of apical spines, dorsal margin of inner ramus finely rugose.

Uropod 2 (fig. 4e): Inner ramus with 2, outer ramus with 1, marginal spines; dorsal margin of inner ramus finely rugose; outer ramus shorter than inner ramus.

Uropod 3 (fig. 4b) projecting strongly beyond the others; inner ramus long, flattened, slightly longer than article 1 of outer ramus; outer ramus 2-articulate, article 2 slightly more than half as long as article 1; margins with low number of spines; peduncle with few spines.

Telson (fig. 4c) long, flattened, deeply emarginate, apices irregular, each lobe having 2 lateral and 2 apical spines and 2 plumose dorsal setae.

Coxal gills (fig. 2a, 5g) on coxae 2-6; elongate on coxa 2, subrounded on coxa 3 to 6, all on a small stalk.

Oostegites (fig. 2c) linear, on gnathopod 2 and pereopods 3 to 5, with 4 long apical setae, in some cases 1 marginal setule.

No secondary sexual differences observed

Derivatio nominis. — The epithet *longidactylus* refers to the remarkably long claws on pereopods 5-7.

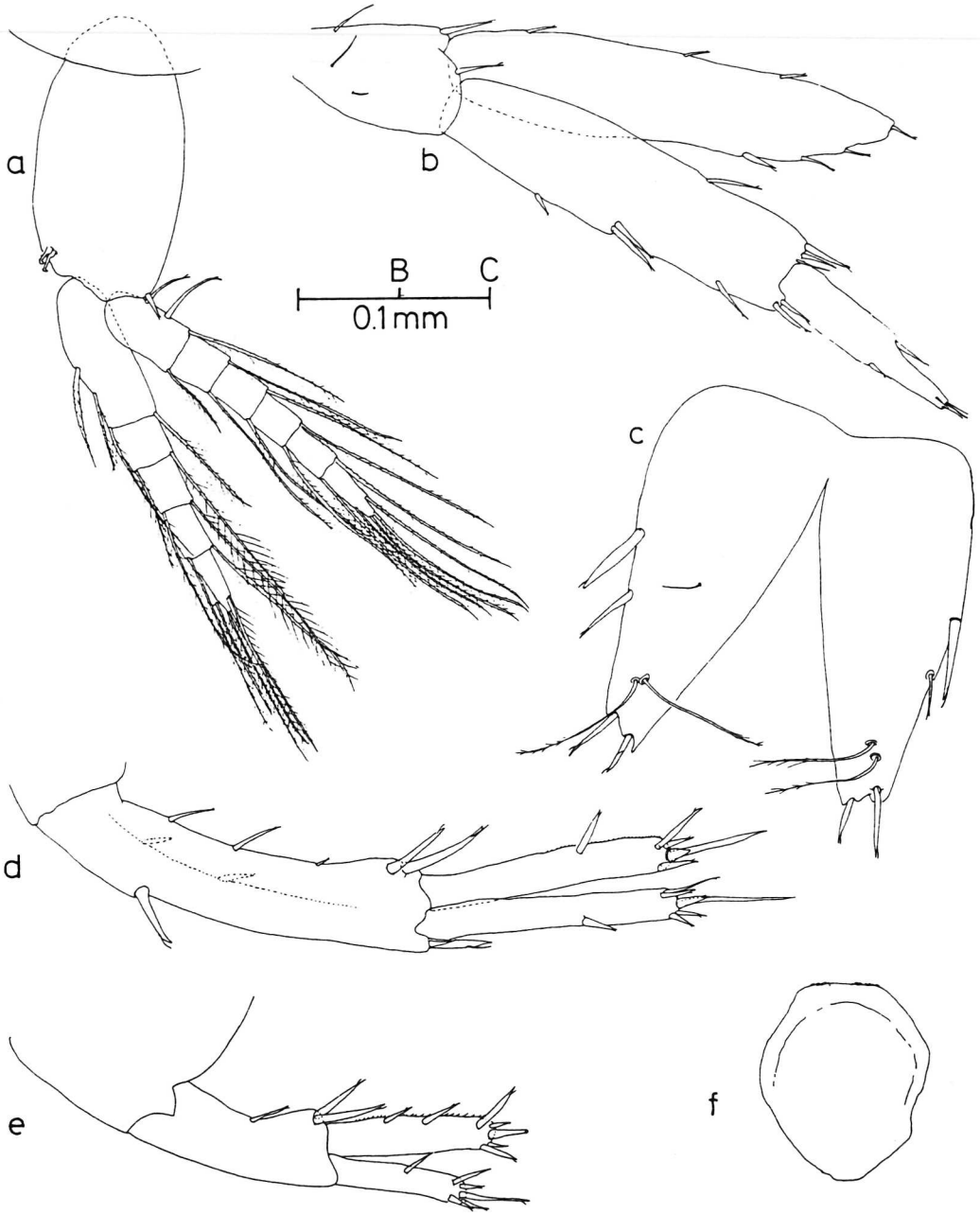


Fig. 4. *Psammogammarus longidactylus* n. sp., ♂ holotype: a, third pleopod, (scale B); b, third uropod, (B); c, telson (C); d, first uropod, (B); e, second uropod, (B); f, upper lip, ♂ (B).

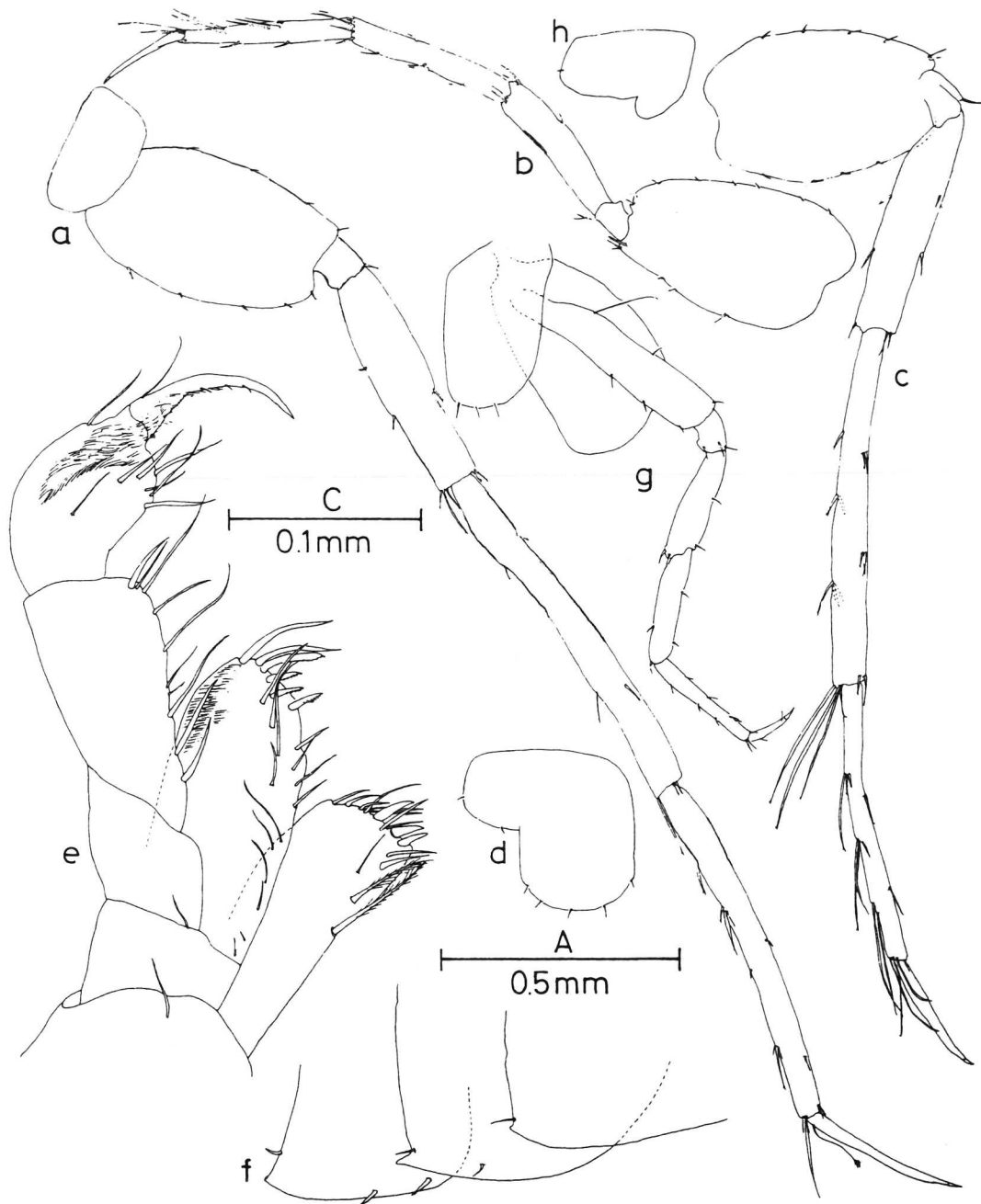


Fig. 5. *Psammogammarus longidactylus* n. sp., ♂ holotype, ♂, ♀ paratypes: a, seventh pereopod, ♂ (scale A); b, fifth pereopod, ♂ (A); c, sixth pereopod, ♂ (A); d, coxal plate of fifth pereopod, ♂ (A); e, maxilliped, ♂ (C); f, epimers I-III, from the right, ♂ (A); g, fourth pereopod, ♂ (A); h, coxal plate of sixth pereopod, ♂ (A).

Distinction. —

The new species resembles *Psammogammarus longiramus* (Stock & Nijssen, 1965) very closely. Differences are of the following nature: (1) telson deeply emarginate but not entirely cleft as in *longiramus*; (2) article 2 of outer ramus of uropod 3 longer in *longiramus*; (3) coxal plates 5-6 without produced lobes in *longiramus*; (4) setae of inner lobe of maxilla 1 with setules toward the tip in *longiramus*; (5) dactyli of pereopods 5-7 more strongly elongate in *longidactylus*; (6) palm Gn. 2 longer in *longidactylus*; (7) telson lobes with medial armature in *longiramus*; (8) setae/spines more numerous and longer on merus, carpus and propodus of P6-7 of *longiramus*.

Other West Indian members of *Psammogammarus*: *Ps. caesicolus* Stock, 1980 from Curaçao and Bonaire, and *Psammogammarus scopulorum* Stock, 1983 from Los Roques, differ from *Ps. longidactylus* in the following respects: (1) They both have fewer setae on the inner lobe of maxilla 1 and 2 than *longidactylus*; (2) *Ps. caesicolus* has shorter and *Ps. scopulorum* much shorter pereopods 5-7 than *longidactylus*; (3) uropod 3 in both species with a longer outer ramus article 2 than *longidactylus*; (4) accessory flagellum longer in *longidactylus*.

Ps. caesicolus and *Ps. scopulorum* live in a habitat different from that of *Ps. longidactylus*, i.e. the interstitial waters of gravel and coral debris near the sea. The Californian *Ps. garthi* (Barnard, 1952) and *Ps. gracilis* (Ruffo & Schiecke, 1976) from Malta are both interstitial marine species.

Their uropod 3 is less adapted to a natatory function than in *Ps. longidactylus* and *Ps. longiramus*.

Remarks. —

Karaman (1984) erected the genus *Confodiopisa* in which *Psammogammarus caesicolus* Stock, 1980, *Psammogammarus scopulorum* Stock, 1983 and *Eriopisa garthi* Barnard, 1952 were brought together. This was done because of the triangular labrum and the absence of lateral spines on the outer lobe of the maxilliped.

In our opinion these minor — and in the case of the maxilliped poorly defined — differences are unsuitable for distinction on the generic level. In this paper the definition of the genus *Psammogammarus* by Stock, 1980 has been followed.

OTHER STYGOBIONT AMPHIPODA, RECENTLY FOUND ON BONAIRE (see map, fig. 6).

Two species, known from Curaçao, have been found in the interstices of coral rubble in several coastal areas of Bonaire, viz. *Psammogammarus caesicolus* Stock, 1980 and *Saliweckelia emarginata* Stock, 1977. Furthermore new records of *Saliweckelia holsingeri* Stock, 1977, a species previously recorded from Bonaire, are presented. The three species were found in the following stations:

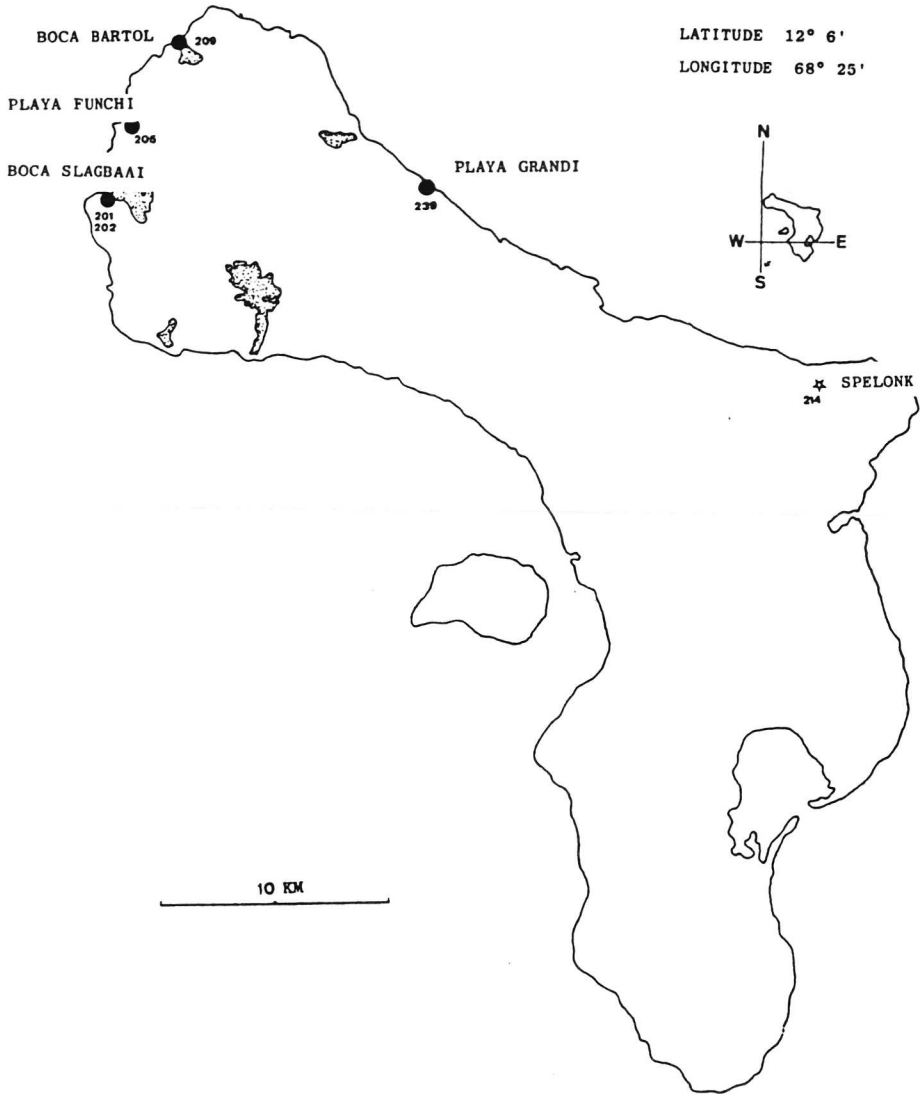


Fig. 6. Distribution of stygobiont Amphipoda in Bonaire: *Psammogammarus longidactylus* (asterisk); other species discussed in the text (dots).

84-209, Salinja Bartol ($12^{\circ}28'01''N$, $68^{\circ}23'46''W$) BR * depth below surface 50 cm in coral rubble. Chlorinity 33327 mg/l; June 9, 1984; 62 specimens of *Ps. caesicolus* (ZMA Amph. 108.272) and ca. 600 specimens of *Saliweckelia holsingeri* (ZMA Amph. 108.276).

84-205, Playa Funchi ($12^{\circ}17'08''N$, $68^{\circ}24'41''W$), seepage of seawater behind wall of coral rubble, grey sand, BR depth below surface 50 cm. Chlorinity 26104 mg/l; June 9, 1984; ca. 50 specimens of *Ps. caesicolus* (ZMA Amph. 108.273) and 11 specimens of *S. emarginata* (ZMA Amph. 108.278).

* BR = Bou-Rouch biophreatical pump.

84-201, Slagbaai (12°16'01"N, 68°24'41"W), seepage of seawater in coral rubble and sand, BR depth below surface 50 cm. Chlorinity 25471 mg/l; June 8, 1984; 5 specimens of *S. holsingeri* (ZMA Amph. 108.277).

84-202, 1.50 m more inland of previous station, BR depth below surface 50 cm. Chlorinity 25987 mg/l; June 8, 1984; 1 specimen of *Ps. caesicolus* (ZMA Amph. 108.274).

84-239, Playa Grandi (12°16'28"N, 68°24'41"W), coarse sand near waterline, BR in brownish underlayer. Chlorinity 28832 mg/l; June 12, 1984; 2 specimens of *Ps. caesicolus* (ZMA Amph. 108.275).

ACKNOWLEDGEMENTS

The fieldwork of the West Indian program has been supported by grants of the Netherlands Foundation for the Advancement of Tropical Research (WOTRO), The Hague; the Treub Maatschappij, Utrecht, the Fonds Landbouw Hogeschool Wageningen, the Amsterdamse Universiteitsvereniging, Amsterdam, and the Netherlands Commission for the Biological Stations, Texel.

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Received: 16 June 1987