STUDIES ON THE FAUNA OF CURAÇAO, ARUBA, BONAIRE AND THE VENEZUELAN ISLANDS: No. 11.

AMPHIPODS FROM CURAÇAO, BONAIRE, ARUBA AND MARGARITA

by

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The material on which the present paper is based was collected in fresh- and brackish-water habitats on the islands of the Leeward Group, West Indies, in 1936 and 1937. For completeness sake specimens from brackish water and from some isolated salt-water habitats — already studied by the author (K. STEPHENSEN, 1933a and 1933b) — were included. It seems highly probable that the greater part of the species treated below are also represented in the litoral fauna of the open sea.

The occurrence of the species on the various islands may be summarized as follows (see also Table 1.)

1. **Lysianassa(?) bonairensis**
   Bonaire: One specimen in a well with a little stagnant water, in coral-limestone near Kralendijk (Pos Baca).
   Not found elsewhere.

2. **Lysianassa hummelincki**
   Curaçao: A single specimen from an isolated marine pool near Willemstad.
   Not found elsewhere.

3. **Lysianassa falcata.**
   Curaçao: Two specimens from two isolated marine pools near Willemstad.
   Not found elsewhere.

[1]) KNUD STEPHENSEN, assistant-curator at the Zoological Museum at Copenhagen, was born in Copenhagen, Nov. 29, 1882, and died in the same town, March 13, 1947 — three weeks after finishing the present paper. The introduction has been added by the editor, who deeply regrets the death of this ardent and sympathetic carcinologist.

4. **Quadrivisio lutzi .**
   Bonaire: One specimen in a well with a little stagnant water, in coral-limestone on Boven-Bolivia.
   Aruba: Many specimens in the well of Fontein, situated in coral-limestone and in the rivulet originating from a pond which is fed by said well. Also found in British Guiana and Brazil.

5. **Metanipharĝus curasavicus**
   Curaçao: Many specimens in the springs of Hato (Bak Ariba, Boca di Leeuw, Cajoeda, Wandongo) and San Pedro, all of them connected with cavern water.
   Aruba: Several specimens in a well with stagnant water in coral-limestone near Rooi Lamoenchi and under debris in the small spring in Rooi Prins, not connected with limestone.
   Bonaire: A few specimens in sea-water, percolating through a wall of coral-rag near Oranjepan.
   Also found on St. Croix (Virgin Islands).

6. **Parhyale inyacka.**
   Bonaire: Many specimens in sea-water, percolating through a wall of coral-rag and in salt-water from springs near the lagoon of Gotó.
   Also found on St. Thomas (Virgin Islands) and Lanzarote (Canaries), in Senegal and on Inyacka Island (Delagoa Bay, E. Africa).

7. **Talorchestia marĝaritae**
   Margarita: Several specimens in a gutter with a little fresh water and in moistened soil at Porlamar.
   Not found elsewhere.

8. **Grandidierella bonnieroides**
   Bonaire: Two specimens from two wells on Lima with cavern water (Pos di Pepe and Pos Guajaká). Very many specimens in an isolated marine pool at Paloe Lechi; a few specimens in a shallow saltlake near Plenchi; many specimens in sea-water, percolating through coral rag at Slagbaai.
   Curaçao: Several specimens in isolated marine pools near Willemstad. Very probably also found on Haiti and at Tortugas, Fla.

A more extensive description of the fresh- and brackish-water habitats may be found in the first and fourth paper of this series (Vol. 1 p. 26–28, tab. V b; Vol. 2 p. 2–21).

The material has been presented to the „Universitetets zoologiske Museum", København, the „Rijksmuseum van Natuurlijke Historie", Leiden, the „Zoölogisch Laboratorium", Utrecht, and the „Curaçaosch Museum" at Curaçao.

TABLE 1.

Distribution of Amphipoda on the islands of the Leeward Group with regard to the salinity

Species	Water (in mg Cl/l)				
	fresh 0–100	oligohaline 100–1000	mesohaline 1000–10000	polyhaline 10000–17000	salt 17000–up
1. *Lysianassa(?) bonairensis*	—	—	1500–3000? Bonaire	—	—
2. *Lysianassa hummelincki*	—	—	—	—	23160 Curaçao
3. *Lysianassa falcata*	—	—	—	—	22000–23160 Curaçao
4. *Quadrivisio lutzi*	—	210–960 Aruba	3000–6000 Bonaire	—	—
5. *Metaniphargus curasavicus*	—	200–460 Curaçao	720–1300 Aruba	—	25000–27000 Bonaire
6. *Parhyale inyacka*	—	—	—	—	20000?–50000?
7. *Talorchestia margaritae*	70–100?	—	—	—	—
8. *Grandidierella bonnieroides*	—	480–500? Bonaire	—	—	21480–23160 Curaçao 20500–35000? Bonaire

LYSIANASSIDAE

Lysianassa H. Milne-Edwards

Lysianassa(?) bonairensis K. Stephensen

Lysianassa(?) *bonairensis* K. STEPHENSEN, 1933a, p. 416–420, fig. 1–2 [Pos Baca near Kralendijk, Bonaire; type-locality].

BONAIRE: Station 53b, Pos Baca, 17.V.1930, salinity estimated at 1500–3000 mg Cl pro l, 1 ♂.

Distribution. Bonaire. Not found elsewhere.

Lysianassa hummelincki K. Stephensen

Lysianassa hummelincki K. STEPHENSEN, 1933b, p. 438–440, fig. 1 [Rif near Willemstad, Curaçao: type-locality].

CURAÇAO: Marine pool in the Rif near Willemstad, 1.VIII.1932, 23160 mg Cl/l, 1 ovigerous ♀ (REALINO leg.).

Distribution. Curaçao. Not found elsewhere.

Lysianassa falcata K. Stephensen

Lysianassa falcata K. STEPHENSEN, 1933b, p. 440–441, fig. 2 [Rif near Willemstad, Curaçao: type-locality].

CURAÇAO: Marine pool in the Rif near Willemstad, 1.VIII.1932, 23160 mg Cl/l, 1 specimen 3 mm (REALINO leg.); ibidem, 1.VIII.1932, 22010 mg Cl/l, 1 ♂(?) 3,5 mm (REALINO leg.).

Distribution. Curaçao. Not found elsewhere.

GAMMARIDAE

Quadrivisio Stebbing

Quadrivisio STEBBING, 1907, p. 160; K. STEPHENSEN, 1933a, p. 420.
Pseudoceradocus SHOEMAKER, 1933a, p. 11.

Quadrivisio lutzi (Shoemaker)

Pseudoceradocus lutzi SHOEMAKER, 1933a (21.III.), p. 12, fig. 6–7 [Georgetown, British Guiana: type-locality].
Quadrivisio occidentalis K. STEPHENSEN, 1933a (11.IX.; 8.IX. reprint), p. 421–425 fig. 3–5 [Bonaire, Aruba].
Quadrivisio lutzi, SCHELLENBERG, 1938b, p. 208 [Brazil, fresh water].

BONAIRE: Stat. 49a, Pos Boven Bolivia, 23.XI.1930, est. 3000–6000 mg Cl/l, 1 ♂ 10 mm, 1 abdomen. ARUBA: Stat. 92, Pos di Fontein, 23.XII.1936, about 960 mg Cl/l, about 12 spec. up to 6 mm; Stat. 93a, Bron di Fontein, 2.VII.1930, 210 mg Cl/l, 1 ♂ about 7 mm; 4.VII.1930, 1 ♂ 5 ♀ incl. 3 ovig., abt. 10 juv.; 17.VI.1930, 1 juv. (MACGILLAVRY coll.); Stat. 93, Bron di Fontein, 23.XII.1936, 962 mg Cl/l, numerous spec., up to 7 mm.

Distribution. Brazil, fresh water (SCHELLENBERG, 1938b), British Guiana, Georgetown (SHOEMAKER, 1933a); Bonaire, Aruba.

All the specimens from 1930 and 1936 are rather small; the greater part up to 6–7 mm; the maximum length of the species is 10 mm (♂, K. STEPHENSEN, 1933a) or 11 mm (♂, SHOEMAKER, 1933a). The eyes are distinct in alle forms (figured by K. STEPHENSEN, 1933a, fig. 3 and 5).

Metaniphargus K. Stephensen

Metaniphargus K. STEPHENSEN, 1933a, p. 426.

Metaniphargus curasavicus K. Stephensen

Metaniphargus curasavicus K. STEPHENSEN, 1933a, p. 426–434, fig. 6–8 [Bak Ariba, Hato, Curaçao: type-locality]; K. STEPHENSEN, 1933b, p. 441 [Pekelmeer, Bonaire].

Metaniphargus beattyi SHOEMAKER, 1942, p. 24–27, fig. 9.

BONAIRE: Pekelmeer, N. of Oranjepan, 7.IX.1930, sea-water percolating through wall of coral-rag, 25000–27000 mg Cl/l, a few small specimens. CURAÇAO: Boca Spelonk di Bak Ariba, Hato, VI.1931, same locality as Stat. 71, about 340 mg Cl/l, 4 spec. (♂?) (VAN DEN BERGH leg.); Stat. 71, Boca Spelonk di Bak Ariba, 13.X.1936, 300 mg Cl/l, many spec.; Stat. 72, Boca di Leeuw, Hato, 13.X.1936, 200 mg Cl/l, several spec.; Stat. 74, Bron Cajoeda, Hato, 1.X.1936, 310 mg Cl/l, 2 spec.; Stat. 76, Bron Wandongo, Hato, 6.X.1936, 230 mg Cl/l, a few spec.; Stat. 76A, Bron Wandongo, 6.X.1936, 230 mg Cl/l, a few spec.; Stat. 79, Bron San Pedro, South, 22.X.1936, 350 mg Cl/l, many spec.; Stat. 80, Bron San Pedro, North, 22.X.1936, 360 mg Cl/l, many spec. ARUBA: Stat. 94, Pos Grandi, Rooi Lamoenchi, 12.II.1937, 960 mg Cl/l, numerous spec.; Stat. 95, Pos West of Rooi Lamoenchi, 11.II.1937, 720 mg Cl/l, many spec.; Stat. 104, Bron di Rooi Prins, 9.I.1937, 1300 mg Cl/l, few spec.

The specimens are up to 5 (or 6) mm in length. Ovigerous females were found in the Boca di Leeuw (Stat. 72; 13.X.) and the southern spring of San Pedro (Stat. 79; 22.X.). A single female from the former locality had 6 enormous eggs in the brood pouch; the diameter of these eggs equals the length of the mesosome segments.

In 1942 SHOEMAKER established a new species, *M. beattyi*, from St. Croix, Virgin Islands. It is extremely close to *M. curasavicus*, but differs by a few characters from my description. After comparing the type-specimen of *M. curasavicus* both with the new material and with SHOEMAKER's description I have arrived at the result that the disagreements are mainly due to errors in my description of 1933.

Antenna 1, flagellum (in the material of 1936–'37) has up to about 30 joints (K. STEPHENSEN, 1933a: 20; SHOEMAKER, 1942: about 26). Antenna 2, flagellum (new material) has about 10 joints (K. STEPHENSEN, 1933a: 9; SHOEMAKER, 1942: 11). Maxilla 1, inner plate broad, with 15 plumose setae (*M. beattyi* SHOEMAKER, 1942) or with up to about 20 setae (new material). In 1933 I described it as narrow, with 3 apical setae; the preparation was, no doubt, seen in horizontal view, for in the other maxilla 1 of the same specimen it is broad (vertical view), corresponding with SHOEMAKER's fig. 9d, and with about 12 spines or setae. Maxillipeds: in specimens belonging to the material of 1936–'37 the nail on fourth joint of the palp is present, but I have not been able to find the row of very fine setules mentioned by SHOEMAKER. In pereiopod 1 (gnathopod 1) SHOEMAKER mentions a long, curved serrate spine on the fourth joint (in *M. beattyi*); the same spine (together with a similar spine on third joint) is present both in my type-specimen (1933a, fig. 6: P. 1) and in the material of 1936–'37, but I have not been able to state the serration. On the other hand the palm (both in my type-specimen and in the material of 1936–'37) is transverse as in SHOEMAKER's, fig. 9g, not oblique as in my fig. 6: P. 1. Now I find, from comparison with other material, that my drawing was not quite correct, for because of the extreme pellucidity of the preparation it is very difficult to state the true shape of the palm. Perei pods 5–7 and uropod 3 are (in the new material) sometimes a little longer than shown in my fig. 8 of 1933.

Distribution. Aruba, Curaçao, Bonaire; St. Croix (Virgin Islands), Frederiksted, from slightly brackish water in a deep well (*M. beattyi* SHOEMAKER, 1942).

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TALITRIDAE

Parhyale Stebbing

Parhyale inyacka (Barnard)

Hyale inyacka BARNARD, 1916, p. 233, tab. 28 fig. 4 (pereiopod 7); K. STEPHENSEN, 1933b, p. 441–446, fig. 3–4 [Bonaire, salt water].
Parhyale inyacka (Barnard) BARNARD 1940, p. 472.
Other literature: see below.

BONAIRE: Goto, lagoon, 26.VIII.1930, rivulet near Rooi Riscado, among *Enteromorpha* and *Cladophora*, est. 20000–30000 mg Cl/l, about 10 spec. incl. 1 ♂ ad.; Goto, lagoon, 26.VIII.1930, percolating sea-water, on the E. coast near the wall of coral-rag, est. 30000–35000 mg Cl/l, about 20 spec. incl. ♂ ad. and ♀ ovig.; Goto, lagoon, 26.VIII.1930, sea-water, percolating through wall of coral-rag, est. 30000–50000 mg Cl/l, 2 small spec.; Goto, lagoon, 30.VIII.1932, sea-water, percolating through wall of coral-rag, 33100 mg Cl/l, 1 ♀ juv. (SCHOTBORGH leg.).

In 1936 FAGE & MONOD pointed out that *Hyale inyacka* had an inner ramus in uropod 3 and that therefore this species belonged to the genus *Parhyale* which was affirmed by BARNARD, 1940, after re-examination of his original specimen.

FAGE & MONOD, 1936, also were of opinion that *Hyale inyacka* Barnard and *Parhyale fasciger* Stebbing are synonyms: „il n'existe aucune différence appréciable".

Nevertheless the individual authors seem to be of rather different opinions regarding this problem; therefore I have again gone through the literature and examined all the specimens at my disposal. In my description (1933b) of the specimens from Bonaire I mentioned the presence of spines on the hind margin of the sixth joint of pereiopods 6–7; the same character is present also in BARNARD's specimen (BARNARD, 1916, tab. 28 fig. 4). For comparison I have examined STEBBING's type-material (STEBBING, 1897, p. 26) of *Parhyale fasciger* (about 20 specimens) from St. Thomas, which is in the possession of the Zoological Museum, Copenhagen, and here the hind margin of said joints proved to be naked. (This character was not mentioned by STEBBING and is not shown in his figures).

This presence or non-presence of spines on the hind margin of 6th joint in pereiopods 6–7 would seem to be a good specific character.

Below I give a chronological list of the literature, with this character („naked" or „spines present") mentioned.

Parhyale fasciger STEBBING, 1897, p. 26, figs. [1]) — naked — Virgin Islands, St. Thomas; Antigua.

[1]) BARNARD (1940, p. 473) writes that „Stebbing's figure of the 2nd gnathopod, ♀, [of *Parhyale fasciger*] however, is quite different from that of the type of *inyacka* (and from Stephensen's 1933 figure)". A re-examination, by the present author, of STEBBING's types shows that his figure of gnathopod 2 ♀ is not correct; it has the same shape as in my figure of *P. inyacka* (1933b, fig. 3. P. 2 ♀).

Parhyale fasciger, STEBBING, 1906, p. 556 (no new records).
**Hyale inyacka* BARNARD, 1916, p. 233, tab. 28 fig. 4 — spines present — E. Africa about 26° S: Inyacka Island, Delagoa Bay.
**Hyale inyacka*, CHEVREUX, 1925, p. 370, fig. — spines present — Senegal.
Parhyale fasciger, SCHELLENBERG, 1925, p. 162 — spines not mentioned — Cameroons.
Hyale inyacka, K. STEPHENSEN, 1927, p. 590 — spines not mentioned — Cameroons.
**Hyale inyacka*, K. STEPHENSEN, 1933b, p. 441, figs. — spines present — Bonaire.
**Parhyale fasciger*, FAGE & MONOD, 1934, p. 56 and 1936, p. 105, figs. — spines present — Canaries: Lanzarote, subterranean lake.
Parhyale fasciger, SCHELLENBERG, 1938, p. 215 — spines not mentioned — Brazil.
Parhyale fasciger, SCHELLENBERG, 1939, p. 128 — spines not mentioned — Congo.
Parhyale inyacka, BARNARD, 1940, p. 472 (no new records).

According to the above all citations marked with an * represent *Parhyale inyacka* (Barnard).

In addition to STEBBING's type-material of *P. fasciger* and the material of *P. inyacka* from Bonaire described by the present author in 1933, we possess in the Zoological Museum, Copenhagen, the following material, identified with *P. fasciger* by STEBBING in 1898, but hitherto not published. All these species have, however, spines on the hind margin of 6th joint of pereiopods 6–7 and thus belong to *P. inyacka*. The localities are as follows:

*Virgin Islands: St. Thomas, east end, MEINERT 1.II.1892.

*Virgin Islands: St. Thomas, the lagoon, LEVINSEN 1896.

(*North Sea: Doggerbank, ØRSTED, numerous specimens. — The identification of this sample is certain, but the locality cannot be correct).

Distribution. According to the above *P. inyacka* has been found at the following localities: St. Thomas (material Zool. Mus. Copenhagen); Bonaire (K. STEPHENSEN, 1933b); Lanzarote, Canaries (FAGE & MONOD, 1934 and 1936); Senegal (CHEVREUX, 1925); Inyacka Island, Delagoa Bay, E. Africa about 26° S (type-locality; BARNARD, 1916).

P. fasciger has been recorded with certainty only from: St. Thomas, Virgin Islands (type-locality; STEBBING, 1897).

The identity of the specimens from Antigua (STEBBING, 1897), Brazil (SCHELLENBERG, 1938), Cameroons (SCHELLENBERG, 1925; K. STEPHENSEN, 1927) and Congo (SCHELLENBERG, 1939) is uncertain, as the special character of pereiopods 6–7 is not mentioned.

A third, very different and much larger species of *Parhyale* (*P. kurilensis* IWASA, 1934; ♂ 43 mm, ♀ 36 mm) is known from the Kurile Islands.

Talorchestia Dana

Talorchestia, STEBBING, 1906, p. 543; BARNARD, 1940, p. 468 (lit.).
Other literature: see below.

Talorchestia margaritae spec. nov.

[Fig. 1—2; table 2]

MARGARITA: Porlamar, patio of Hotel Central, 25.V.1936, under stones in a gutter with little water, about 60 meters from the sandy sea shore, about

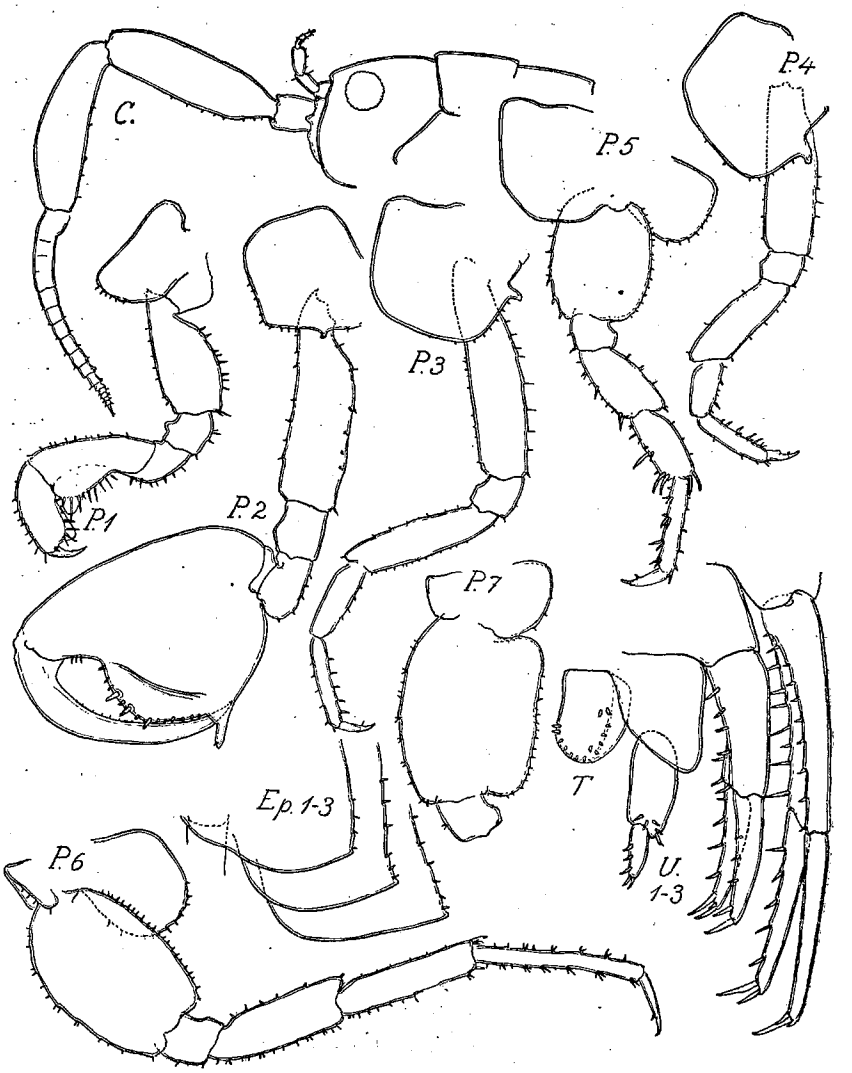

Fig. 1. *Talorchestia margaritae*, type ♂, from Porlamar, MARGARITA.

70–100 mg Cl/l, 3 ♂♂, 1 ♀ (types); Stat. 155, Porlamar, patio of Hotel Central, 25.V.1936, under flowerpot in moistened soil, about 60 meters from the sandy sea shore, 2 specimens. — Type material in Leiden (3 spec.) and Copenhagen (1 spec.); paratypes in the same.

Description of male, about 12 mm (fig. 1).

Head a trifle shorter than the two mesosome segments combined. Eyes black, large, round or a trifle oblong, their diameter about 1/3 the length of head; separated dorsally by a distance at least half as long as the diameter. Dorsal side of body quite smooth.

Antenna 1 short, covers about the first fourth of penultimate joint of penduncle of antenna 2; first joint about as long as it is broad, the next two joints half as long; flagellum about as long as third joint of peduncle and consists of 4 short joints. Antenna 2 about as long as head with mesosome. The two distal joints of peduncle rather stout and subequal in length. Flagellum about 1 1/3 the length of ultimate joint of peduncle; in the proximal third the articulation is very indistinct; the distal two thirds di.ided into about 13 joints. Oral parts were not dissected.

Pereiopod 1 (gnathopod 1) has a few spines along anterior part of the side plate; second joint is rather broad and somewhat spinose; fifth joint is in length subequal to second joint and has a rather prominent oval hind lobe; sixth joint in length only 2/3 of fifth, with the edges nearly parallel; palm transverse; finger a trifle longer than palm. Pereiopod 2 (gnathopod 2) very stout and very characteristic. Side plate spinose along lower part of hind margin and posterior half of under margin and with a tooth at the middle of hind margin (a similar tooth is also present on sideplates 3–4). Second joint not specially broadened and with the margins nearly parallel. Sixth joint extremely robust, subtriangular, length 1 1/2 times the breadth (excl. the pollex defining palm); palm a trifle longer than hind margin, convex, rounded triangular, with spines along margin, but concave in distal part (near finger hinge) and defined by a prominent pollex or tooth at proximal end; finger long, stout, evenly curved. Pereiopod 3, nothing specially to remark. Pereiopod 4 a trifle shorter than pereiopod 3, because of the somewhat shorter second and fifth joints. Pereiopod 5 somewhat shorter than pereiopod 4; sideplate in depth equal to no. 4. Second joint oval, along hind margin with about 16 minute spines, each of them corresponding to a shallow serration. Pereiopods 6–7 alike, 1 1/2 times as long as pereiopod 5. Second joint in pereiopod 6 somewhat oval, with hind margin somewhat evenly curved, and with lower hind corner rounded rectangular; hind margin with about 22 shallow serrations and spines. Second joint in pereiopod 7 broader than in pereiopod 6, with both upper and lower hind corners rounded rectangular; hind margin rather straight or a trifle concave with about 18 shallow serrations and spines. None of the joints is specially broadened (except second joint).

Metasome segment 1 has lower hind corner rectangular and 4 shallow serrations and spines along lower part of hind margin. Metasome segment 2 has lower hind corner a trifle protruding, and 6 serrations and spines; it is a little concave above the corner. Metasome segment 3 not essentially different from 2, but hind margin not concave. Pleopods 1–3 long, normal, with well developed rami with natatory setae.

Uropod 1, outer ramus a trifle longer than peduncle, but somewhat shorter than inner ramus. Outer ramus with 3 apical spines, but without marginal spines; inner ramus with 2 apical spines and 5 marginal spines. Uropod 2, peduncle and the two

rami subequal in length. Either of the rami has apical spines and 3–4 marginal spines. Uropod 3, ramus only about half as long as peduncle which has 5 apical spines; ramus with 3 marginal and 2 apical spines.

Telson oblong, probably without any notch in hind margin, and about 6 pairs of marginal spines.

Description of female, about 10 mm (fig. 2).

Head and eyes not essentially different from male; but the eyes are dorsally separated by a distance not fully half as long as the diameter. Antenna 1 not essentially

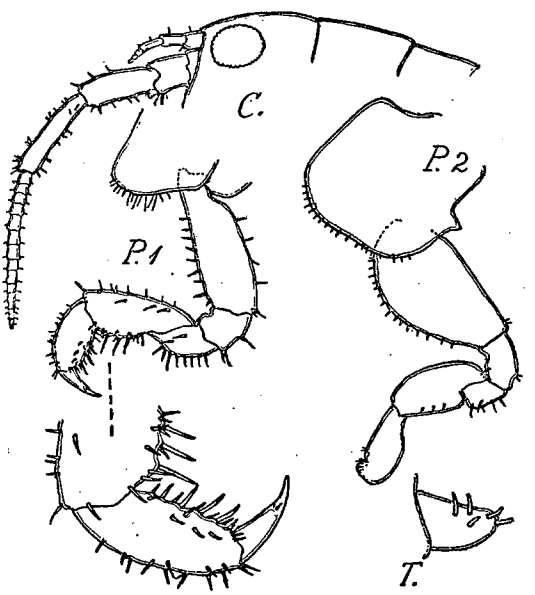

Fig. 2. *Talorchestia margaritae*, type ♀, from Porlamar, MARGARITA.

different from male, but because of the much shorter antenna 2 it reaches nearly to the middle of penultimate joint of peduncle of antenna 2. Antenna 2 short, as long as head with 3 first mesosome segments. The two distal joints of peduncle together as long as head with $1^1/_2$ mesosome segments; penultimate joint a trifle shorter but stouter than ultimate joint. Flagellum as long as the two distal joints of peduncle together and comprising of 16 well defined joints. Pereiopod 1 (gnathopod 1), second joint much narrower than in male. Sixth joint about twice as long as it is broad, with no trace of palm; finger half as long as sixth joint. Pereiopod 2, (gnathopod 2), second joint with fore margin strongly convex. No lobes on hind margin of fourth and fifth joints; fifth joint apically tapering; sixth joint of the usual shape. All other limbs not different from male. The spines on telson longer than in male.

This species is easily recognizable by the hand in pereiopod 2 of the male, and it belongs to the group without marginal spines on outer ramus of uropod 1, but with

marginal spines on outer ramus of uropod 2. It is very different from the three species hitherto known from the Atlantic coasts of America.

On the species of the genus *Talorchestia*. A certain number of species have been referred to this genus but should be transferred to the genus *Orchestia* (viz. *T. japonica* Tatt., *T. malayensis* Tatt. and *T. scutigerila* Dana), and still more species belong probably to the said genus, as their females are not known (*T. darwini* Fr. Müller, *T. sinensis* Chilton, *T. tridentata* Stebbing).

At present the genus comprises probably 35 species, but several descriptions are not satisfactory, often even without figures. Usually the dorsal side is quite smooth, but two species have dorsal teeth or spines: the male of *T. quadrispinosa* Barnard has two dorsal spines on metasome segments 1 and 2, and *T. tricornuta* Shoemaker has one pair of teeth on metasome segment 2 and a single tooth on segment 3.

The majority of the species (24) inhabit the shores of the Indo-Pacific Ocean (excl. S. Africa), and 17 out of this number are terrestrial (K. STEPHENSEN, 1935a); the following authors have published faunas of restricted areas: Japan (DERJAVIN, 1938; IWASA, 1939), New Zealand (CHILTON, 1917), Australia (SHEARD, 1937), Red Sea (MACCAGNO, 1936).

From South Africa 4 species are known (BARNARD, 1940), and only 7 from the Atlantic Ocean (excl. S. Africa), but 1 (viz. *T. brito*) has been recorded both from West Europe and the Mediterranean (CHEVREUX & FAGE, 1925, p. 279) and from Japan (IWASA, 1939, p. 273, figs.; K. STEPHENSEN, 1945, p. 65, figs.). Of these 7 Atlantic species 4 are known from the eastern side, viz. *T. brito* Stebbing (W. Europe, Mediterranean), *T. deshayesi* (Audouin) (W. Europe, Mediterranean), *T. skoogi* Stebbing (Angola), and *T. tricornuta* Shoemaker (Congo, Angola), while only 3 are known from the American side.

These East American species are:

T. darwini (Fr. Müller) STEBBING, 1906, p. 545 (Brazil).

T. fritzi STEBBING, 1903, p. 925, figs. (Costa Rica); SCHELLENBERG, 1938, p. 211, fig. (Brazil).

T. longicornis (Say) [= *T. megalophthalma* (Bate), fide SMALLWOOD, 1903], SHOEMAKER, 1930, p. 337 (119) (Eastern North America, from Gulf of St. Lawrence to Beaufort, N. Carolina). Also: St. Joseph Island, Texas, J. W. HEDGPETH leg. 29.IV. 1946 (specimens in Zool. Mus. Copenhagen).

Only *T. longicornis* is widely distributed; *T. fritzi* has been recorded only twice, and *T. darwini* only once and even in a rather unsatisfactory manner; possibly it does not belong to the genus *Talorchestia*, for the female is not known. *T. longicornis* and *T. fritzi* have no pollex on the hand of pereiopod 2 (gnathopod 2) ♂; *T. darwini* has an enormous, sometimes even bifid, pollex.

Affinities of *T. margaritae*. The male of *T. margaritae* differs very much from the three American species mentioned above; the hand of pereiopod 2 (gnathopod 2) ♂ is very different from that of the three species, and the outer ramus of uropod 1 has no marginal spines, while there are about 4 marginal spines on the outer ramus of uropod 2. Regarding the armature of the rami named it agrees with *T. fritzi* (which has, however, only two marginal spines on outer ramus of uropod 2); *T. longicornis* has no less than about 10 marginal spines on outer ramus of uropod 1 (and 5 on outer ramus of uropod 2), while this character is not recorded for *T. darwini*.

According to the table given below only two species have, like *T. margaritae*, marginal spines on outer ramus of uropod 2, but not on uropod 1 (viz. *T. fritzi* and *T. kempi*), but even if we take into consideration also those species, for which this character has not been described, we should find, that the hand of pereiopod 2 ♂ is of quite another shape. A certain number of species (*T. antennulata, capensis, darwini, deshayesi, patersoni, quoyana, skoogi, telluris, tricornuta, tridentata* and possibly *T. zachsi*) have a marked pollex, but of a shape very differe .t from that of the species from Margarita, and their arrangements (presence or non-presence) of marginal spines on the outer rami of uropod 1–2 are deviating of that in this last named species. Therefore *T. margaritae* is, no doubt, duly to be considered a nova species.

AMPHITHOIDAE

Species indeterm.

CURAÇAO: Marine pool in the Rifwal near Willemstad, 1.VIII.1932, 23160 mg Cl/l, a few ♀♀ or juv. (REALINO leg.).

COROPHIIDAE

Grandidierella Coutière

Remarks on the genus and the species: see below.

Grandidierella bonnieroides spec. nov.
[Fig. 3]

Grandidierella megnae (Giles), K. STEPHENSEN, 1933a, p. 434 (Bonaire, brackish water); K. STEPHENSEN, 1933b, p. 446 (Bonaire and Curaçao, salt water).

BONAIRE: Stat. s.n., Pos di Pepe, Lima, 29.VIII.1930, est. abt. 500 mg Cl/l, 1 ♂, 3 mm, not quite adult; Stat. s.n., Pos Guajaká, Lima, 29.VIII.1930, 480 mg Cl/l, 1 ovig. ♀, abt. 6 mm; Salinja Paloe Lechi, 22.VIII.1930, among algae in a clayish water pool inside a narrow, much porous wall of coral-rag, 20500–20700 mg Cl/l, numerous spec. (40–50 cm³), incl. ♂♂ and ovigerous ♀♀; 29.VIII.1930, numerous specimens, incl. ♂♂ and ovig. ♀♀; Salinja Paloe Lechi, 29.VIII.1932, same locality, 20640 mg Cl/l, a few very small spec (SCHOTBORGH leg.); Salinja Plenchi, Zuidpunt, 3.VII.1930, SW. coast of a very shallow salt-water lake on a very low, calcareous plateau, behind a porous wall of coral-rag, abt. 25000–35000 mg Cl/l, a few very small spec.; Salinja Slagbaai, 8.XI. 1930, behind a much porous wall of coral-rag, 24000–27000 mg Cl/l, several spec. CURAÇAO: Marine pools in the Rifwal near Willemstad, 1.VIII.1932, 21480, 22010 and 23160 mg Cl/l, several spec., incl. ♂♂ and ovig. ♀♀ (REALINO) leg.).

Description of male, 6 mm, from Salinja Paloe Lechi, Bonaire, 22.VIII. 1930 (fig. 3).

TABLE 2.

Talorchestia, list of species

Species and literature	Marginal spines on outer ramus		Distribution
	urop. 1	urop. 2	
affinis MACCAGNO, 1936, p. 181, no fig.	?	?	Red Sea
ancheidos BARNARD, 1940, p. 470 (lit.), figs.	0	?	S. Africa
antennulata CHEVREUX, 1915, p. 4, figs.	0	0	Nova Caledonia, Loyalty Isl.
australis BARNARD, 1940, p. 470 (lit.), figs.	?	?	S. Africa
bottae (M.-Edw.) (= *martensis* (Weber)), STEBBING, 1906, p. 553; SCHELLENBERG, 1940, p. 206.	?	?	Flores, etc.
brito Stebb., CHEVREUX & FAGE, 1925, p. 279, figs.	5 [1]	3 [1]	W. Europe, Mediterr., Japan
capensis (Dana), BARNARD, 1940, p. 470 (lit.), fig.	2 [2]	2 [2]	S. Africa
crassicornis DERJAVIN, 1938, p. 108, fig.	×	×	Japan
darwini (Fr. Müller), STEBBING, 1906, p. 545.	?	?	Brazil
deshayesi (Aud.), CHEVREUX & FAGE, 1925, p. 278, fig.	0	0	W. Europe, Mediterranean
diemensis Hasw., STEBBING, 1906, p. 548	?	?	Austral., Tasman., N. Caledonia
franchetti MACCAGNO, 1936, p. 179, no fig.	?	?	Red Sea
fritzi Stebb., SCHELLENBERG, 1938a, p. 211, fig.	0	2	Costa Rica, Brazil
gracilis (Dana), STEBBING, 1906, p. 551	0	?	S.E. Asia
kempi TATTERSALL, 1914, p. 449, figs.	0	2	Assam
landanae SCHELLENBERG, 1925, p. 160, no fig.	?	?	W. Africa
limicola Hasw., STEBBING, 1906, p. 547	0	?	Queensland
longicornis (Say) (= *megalophthalma* (Bate)), SMALLWOOD, 1903	c. 10	5	Eastern N. America
margaritae n. sp.	0	3–4	Margarita (Venezuela)
martensis, vide *bottae*.			
megalophthalma, vide *longicornis*.			
novae-hollandiae STEBBING, 1906, p. 553; SHEARD, 1937, p. 25	c. 7	2	E. Australia
pachypus DERJAVIN, 1938, p. 109, figs.	?	?	Japan Sea
patersoni K. STEPHENSEN, 1938, p. 247, figs.	0	0	Stewart Isl.
pollicifera (Stimps.), STEBBING, 1906, p. 550	?	?	N. Pacific Ocean
pravidactyla Hasw., STEBBING, 1906, p. 546	×	×	Tasmania
quadrimana (Dana), STEBBING, 1906, p. 548; SHEARD, 1937, p. 25	0	?	Australia
quadrispinosa BARNARD, 1940, p. 470, figs.	×	×	S. and S. W. Africa
quoyana (M.-Edw.), CHILTON, 1917, p. 294, figs.	×	×	New Zealand
rectimana (Dana), K. STEPHENSEN, 1935b, p. 143, figs.	6	4	Tahiti, Society Isl.
sinensis CHILTON, 1925, p. 283, figs.	?	?	China
spinipalma (Dana), STEBBING, 1906, p. 552	0	?	Tropical Pacif. Ocean
skoogi STEBBING, 1922, p. 8, figs.	0	?	Angola
telluris (Bate), CHILTON, 1917, p. 299, figs.	4 [3]	4 [3]	New Zealand
tricornuta SHOEMAKER, 1920, p. 373, figs.	4	2	Congo, Angola
tridentata STEBBING, 1906, p. 546.	×	×	California
tumida G. M. Thoms., CHILTON, 1917, p. 296, figs.	3 [4]	2 [4]	New Zealand
zachsi DERJAVIN, 1938, p. 108, figs.	×	?	Japan

[1] Specimens in Zool. Museum, Copenhagen; CHEVREUX determ.
[2] Specimens in Zool. Museum, Copenhagen; STEBBING determ.
[3] Specimens in Zool. Museum, Copenhagen.
[4] Specimens in Zool. Museum, Copenhagen; CHILTON determ.

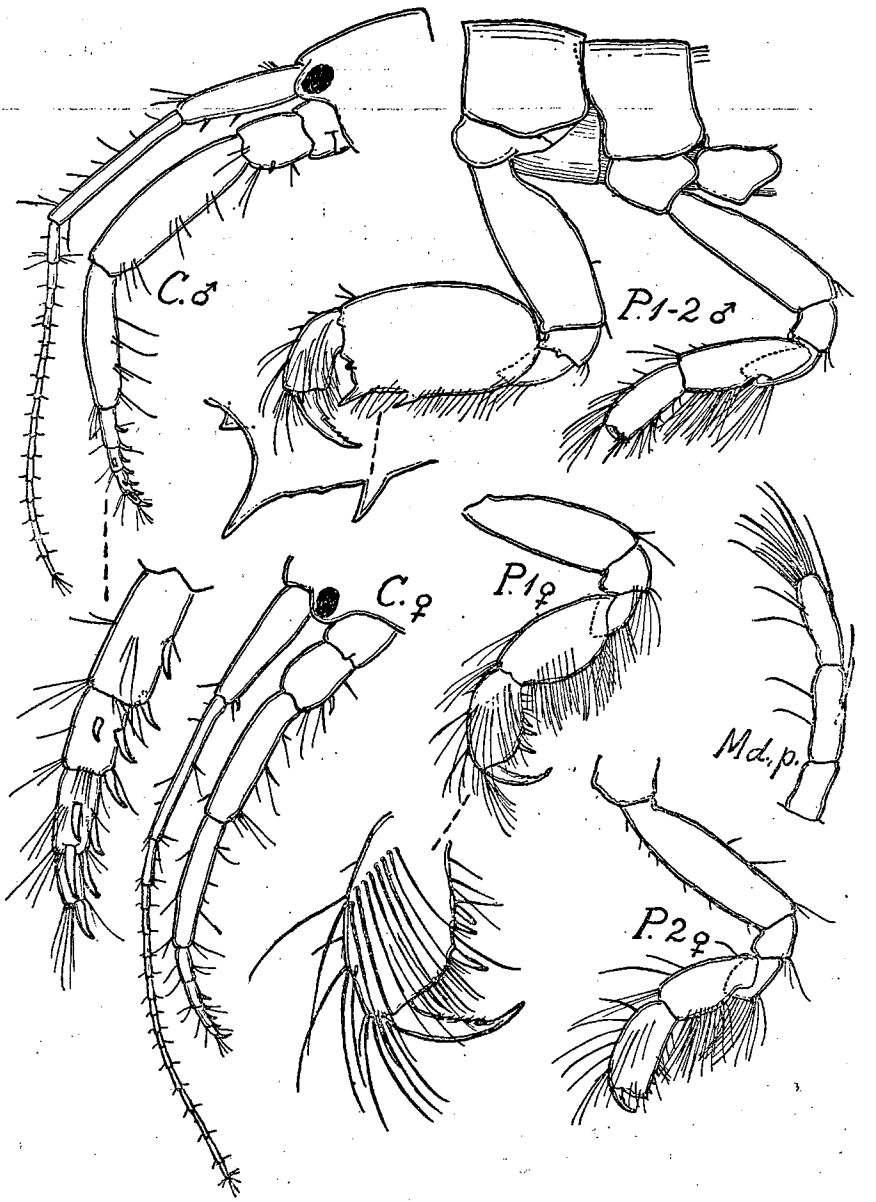

Fig. 3. *Grandidierella bonnieroides*, ♂ ♀, from Salinja Paloe Lechi, BONAIRE.

No ventral spiniform process. Ocular lobes somewhat protruding, obtuse; eyes oblong, black. Antenna 1, first joint as long as head, second joint a trifle longer and more slender; third joint short; flagellum as long as peduncle, comprising of about 16 joints. Accessory flagellum not present. Antenna 2 reaches about to the middle of flagellum of antenna 1; penultimate joint of peduncle $1^1/_3$ times as long as ultimate joint, and stouter; flagellum short, consists of 4 joints provided with spines and setae. Oral parts were not dissected; palp of mandible with first joint only $^2/_3$ as long as either of the next two joints.

Pereiopod 1 (gnathopod 1), second joint not very robust, nearly parallel-sided; the joint is probably flat, for I could not find any longitudinal depression on outer side. Fifth joint also nearly parallel-sided, about twice as long as it is broad, with palm transverse; palm defined by a not very strong, simple tooth; in addition there is sometimes (but not in young individuals) a short spinous process at the middle of palm, and a similar, but longer process on hind margin. Sixth joint slightly curved, nearly parallel-sided, breadth about half maximal length; finger as long as sixth joint. Pereiopod 2 (gnathopod 2), second joint narrow; fifth joint narrow, $1^1/_2$ times as long as sixth joint which is parallel-sided, with palm transverse. All the other limbs not different from *G. bonnieri* (STEBBING, 1908). Metasome segments 1–3 have lower hindcorners evenly rounded.

Description of ovigerous female, 5,5 mm, from Salinja Paloe Lechi, Bonaire, 22.VIII.1930 (fig. 3).

Antenna 1 not different from ♂. Antenna 2, penultimate joint in peduncle not longer than ultimate joint and not much stouter. Pereiopod 1, second joint more slender than in ♂; fifth joint oval, with palm short, oblique, with 3 spines; finger much longer than palm. Pereiopod 2 differs from ♂ only in fifth joint which is not longer than sixth. The other limbs not different from ♂.

Affinities. In 1933 (b, p. 434) I wrote that pereiopod 1 and the other limbs were not different from STEBBING's figure (1908) of *G. bonnieri* (from port Canning, Lower Bengal), but identified the species with *G. megnae* (Giles), as CHILTON had considered the two species synonymous. Since then a rather great deal of literature on the genus has appeared, and several new species have been described. BARNARD (1935, p. 299) has revised the Indian species of the genus and has found a species which he calls *G. bonnieri* Stebbing; but BARNARD's own specimens have „a medio-ventral spiniform, backwardly directed process on peraeon segment 1 in (adult) ♂, and a smaller one on segment 2" (BARNARD, 1935, fig. 12d). Such processes are totally absent in the specimens from the Dutch West Indies, and they are not mentioned in STEBBING, 1908. So my species is not identical with BARNARD's; but are they identical with STEBBING's species? The re-examination of the material from the Dutch West Indies has stated a few minor differences which in 1933 I considered local variations: pereiopod 1 ♂ in my material has fifth joint parallel-sided, not rather oval, and there are (in adult specimens) three spinous processes (not one); pereiopod 2 ♂ has fifth joint longer than sixth (in STEBBING's figure they are equal-sized); pereiopod 1 ♀ is evidently not different in the two forms, but pereiopod 2 ♀ seems in STEBBING's drawing to have sixth joint more oval than in my material. Also in antennae 1–2 there are minor differences. The Dutch West Indian specimens represent probably a new species for which I propose the name *bonnieroides* because of its great similarity to *G. bonnieri* Stebbing; but it cannot be identical with *G. bonnieri*, BARNARD, 1935.

Distribution. Bonaire and Curaçao, see above. SHOEMAKER (1935b, p. 40) records ,,*G. megnae* (Giles)" from Etang Saumâtre, a brackish lake of Haiti, and from the stomach of a flounder at Tortugas, Florida. SHOEMAKER mentions a few characters, and nothing herein is at variance with the supposition that he had *G. bonnieroides* before him, possibly with exception of the largest ovigerous female (from Haiti) which ,,bears on the lower inner margin of the fourth joint of antenna 2 four evenly placed, forward-pointing spines. These spines are quite conspicuous, but apparently have not been mentioned in any of the descriptions heretofore". I have not been able to trace these spines in the material from Bonaire and Curaçao. Further SHOEMAKER (1943, p. 3) mentions (without further comments) four specimens of ,,*G. megnae* (Giles)" from the stomach of a ray, *Dasyatis sabinus* (LeSueur), from Lemon Bay, Saratoga County, Florida.

I have not found other records of any species of the genus *Grandidierella* from the West Indian area.

On the genus *Grandidierella*. BARNARD (1935, p. 295 seq.) has published a key to all the species known up to that year, with remarks on several species. Since then the following species have been established:

G. nottoni SHOEMAKER, 1935b, p. 67, figs. (Mazatlan, Sinaloa, Pacific coast of Mexico).

G. africana SCHELLENBERG, 1936, p. 154 = specimens of ,,*G. megnae*" from Cameroons, SCHELLENBERG, 1925, p. 166, and specimens of ,,*G. gravipes*" from Cameroons, BARNARD, 1935, p. 299.

G. perlata SCHELLENBERG, 1938a, p. 91, figs. (Fiji Islands).

G. bispinosa SCHELLENBERG, 1938a, p. 92, figs. (Bismarck Archipelago).

G. japonica K. STEPHENSEN, 1938 (Hokkaido, Japan).

Probably but three species are Atlantic, viz. *G. bonnieroides* (see above), *G. elongata* CHEVREUX, 1925 (p. 392; Senegal), and *G. africanus* SCHELLENBERG, 1936 (Cameroons); all the others belong to the Indo-Pacific coasts.

ZOOGEOGRAPHICAL REMARKS

The literature regarding freshwater and litoral amphipods from the West Indies and the adjacent parts of the American continent (Florida, Venezuela) is very scarce; as far as I know there do not exist other papers on the amphipod fauna of these parts of the world than STEBBING, 1895 (Antigua), SHOEMAKER, 1931 (Barbados), and 1933a–b (Florida and the West Indies), K. STEPHENSEN, 1933a–b (Bonaire, Curaçao and Aruba), SHOEMAKER, 1935a–b (Puerto Rico and the Virgin Islands; the West Indies) and 1943 (Florida), and HUBRICHT, 1943 (eastern U.S.A.; fresh water only). So the amphipod fauna of the West Indies is very inadequately known. SHOEMAKER, 1935a, wrote the greatest paper, comprising all the species known from a restricted area (Puerto Rico and the Virgin Islands), and yet it mentions only 24 species (over the half of species known from the West Indies), 3 (or 4) of which are not litoral.

Because of our extremely inadequate knowledge of the freshwater and litoral amphipod fauna of the West Indies (and tropical America) not much can be stated regarding the zoogeographical position of the amphipod fauna of the area in question (8 species + 1 sp. indet.), but no doubt it belongs to the tropical East American

fauna; only a single species, *Parhyale inyacka*, is much more widely distributed. Four are not found outside the area (viz. the three *Lysianassa* spp. and *Talorchestia margaritae* n.sp.). One (*Metaniphargus curasavicus*) is found also in the Virgin Islands, and one (*Grandidierella bonnieroides*) possibly also at Florida and Haiti. *Quadrivisio lutzi* is known also from British Guiana and Brazil; an allied species, *Q. bengalensis* STEBBING, 1907, occurs along the coast of the Indo-Pacific Ocean.

Only one species, *Parhyale inyacka*, is known to be much more widely distributed than the others (Virgin Islands, Bonaire, Canaries, Senegal, and even from the E. side of Africa at 26° S). This is probably due to two different circumstances. For the first it is larger (length about 10 mm) than the majority of the others and therefore not so easily overlooked; for the second it belongs to the family *Talitridae*, the majority of which live amongst floating sea-weed or the like and therefore can be transported by the currents.

KEY TO THE AMPHIPODS OF BONAIRE, CURACAO, ARUBA AND MARGARITA

(Figures in K. STEPHENSEN, 1933a–b)

1. Pereiopod 2 (gnathopod 2), third joint half as long as second (1933a, fig. 3: P. 2). 2
   Pereiopod 2 (gnathopod 2), third joint short, at most 1/4 the length of second (1933a, fig. 6: P. 2). 4
2. Pereiopod 1, finger falciform (1933b, fig. 2: P. 1). . . . . *Lysianassa falcata*
   Pereiopod 1, finger not falciform. 3
3. Pereiopod 6, second joint has hind margin straight (1933b, fig. 1: P. 6) . . . . . *Lysianassa hummelincki*
   Pereiopod 6, second joint has hind margin rounded (1933a, fig. 2: P. 6) . . . . . *Lysianassa*(?) *bonairensis*
4. Eyes large, round 5
   Eyes small, oblong or missing 6
5. Uropod 3, inner ramus present, but rudimentary (1933b, fig. 4. Up. 3); hand of pereiopod 2 ♂ without a distinct pollex (1933b, fig. 3: P. 2 ♂) . . . . . *Parhyale inyacka*
   Uropod 3, inner ramus absent (present paper, fig. 3: Up. 3); hand of pereiopod 2 ♂ with a distinct pollex (present paper, fig. 3: P. 2 ♂) . . . . . *Talorchestia margaritae*
6. Eyes not present (1933a, fig. 6: Ceph.); uropod 3, one ramus long, narrow, the other very short (1933a, fig. 8: Up. 3). . . . . *Metaniphargus curasavicus*
   Eyes present 7
7. Uropod 3 has only a single ramus . . . . . *Grandidierella bonnieroides*
   Uropod 3 has two rami. 8
8. Uropod 3, rami broad, much longer than peduncle (1933a, fig. 4: Up. 3); sometimes two pairs of black eyes (1933a, fig. 3: Ceph.). *Quadrivisio lutzi*
   Uropod 3, rami short, one of them ending in two hooks . . . . *Amphithoidae*

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