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Minute but constant morphological differences within members of Stenothoidae: the *Stenothoe gallensis* group with four new members, keys to *Stenothoe* worldwide, a new species of *Parametopa* and *Sudanea* n. gen. (Crustacea: Amphipoda)

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The hitherto-known species of *Stenothoe* are grouped by their distribution. A key for Mediterranean–Atlantic species is given. To the so-called *Stenothoe gallensis* group (until now, four species), four others are added: *S. andamanensis*, *S. clavetta*, *S. himyara* and *S. senegalensis*, all new to science. Knowledge of *Stenothoe aucklandica*, *frecanda*, *macrophthalma*, *valida* and *verrucosa* is amended. The studied material also yields both a new species of *Parametopa* (*P. gorea* n. sp.) and a new genus (*Sudanea* n. gen.) with *S. inopinata* n. sp.

http://zoobank.org/urn:lsid:zoobank.org:pub:23C8BB82-5CC1-40B2-BED9-431AA55901B9

Keywords: Amphipoda; Stenothoidae; key to Mediterranean–Atlantic *Stenothoe*; *Stenothoe* n. sp.; *Parametopa* n. sp.; *Sudanea* n. gen.; n. sp.

Introduction

The morphology of Stenothoidae is more defined by the lack of clear-cut characters than by easily distinguishable differences, and loss or reduction of characters may have occurred several times independently. Thus, studies on stenothoid phylogeny are difficult and even keys for distinguishing the members are quite tricky.

The genus *Stenothoe* Dana, 1852 is, next to *Metopa* Boeck, 1871, the most numerous one within the family Stenothoidae, and is widespread across the world. The name of the type genus as well as the family is said to allude to the narrow (stenos) mouthparts, and in fact the maxilliped has become slender with reduced plates, the first maxilla has in some members lost one article of the palp, the second maxilla has its plates often sitting not next to but upon each other and the mandibular pulp tends to be reduced or even lost.

Since 1976, this family has kept me busy, publishing alone or with others on various members (Krapp-Schickel 1976, 1993, 1996a, 1996b, 1999, 2000, 2006a, 2006b, 2009a, 2009b, 2009c, 2010, 2011a, 2011b, 2013a, 2013b; Vader and Krapp-Schickel 1996, Krapp-Schickel and Koenemann 2006; Jażdżewska and Krapp-Schickel 2011).

During my regular stays at the Verona Museum (Italy), the Australian Museum (Sydney), the Amsterdam Museum (now transferred to Leiden) and finally during a

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visit at Denmark's Copenhagen Museum (supported by the Synthesys Program of the EU), I found other interesting stenothoids within the collections.

While exploring this material, it became clear that several species currently synonymised with *S. gallensis* are valid species, while undescribed species exist. I also discovered a new species of the closely related genus *Parametopa* and coined a new genus *Sudanea*. Furthermore, keys to geographical groups of *Stenothoe* species are given to aid identification and future detailed studies.

Material and methods

All specimens in alcohol or glycerine were studied under a Reichert and Wild M5 dissecting microscope, then drawn from preparations (dissected and stored in glycerine or Faure's medium) under a Wild M20 microscope. The pencil drawings were partly inked by hand, and partly with the software Adobe Illustrator, using a Wacom A4 drawing board. The material is lodged at the Museums of Verona (Italy), Copenhagen (Denmark) or Yale (see detailed indications in the descriptions).

The abbreviations used throughout are: A, antennae; acc., accessory; art, article; Cx, coxa; Ep 1–3, epimeral plates 1–3; Gn 1, 2, gnathopod 1, 2; IP, inner plate; Md, mandible; Mdp, mandibular palp; Mx 1, 2, maxilla 1, 2; OP, outer plate; P 3–7, peraeopods 3–7; T, telson; U 1–3, uropods 1–3; UL, upper lip; Us, urosome.

Acronyms of museums are as follows:

AMS, Australian Museum, Sydney

MNHUB, Museum für Naturkunde der Humboldt-Universität Berlin (Germany)

MVRCr, Museum Verona (Italy)

NBCL (PWH), Naturalis Biodiversity Center Leiden (Netherlands), coll. Peter Wagenaar Hummelinck

SNM, Copenhagen Natural History Museum (Denmark)

YPM, Yale Peabody Museum (USA)

In this paper the following terms are applied (see also Krapp-Schickel 2011a, p. 1–2):

tooth: non-articulated pointed ectodermal structure;

spine: stout, articulated structure (synonymous with 'robust seta');

seta: slender, flexible articulated structure.

Taxonomy

Family **STENOTHOIDAE** Boeck, 1871
Genus ***Stenothoe*** Dana, 1852

In Krapp-Schickel (2006b), a key to the genus *Stenothoe* was presented, dividing the (at that time) 45 valid species by the characters of a carinate body (one species), prehensile peraeopods (one species), naked telson (10 species) or spinose telson (33 species). While the group with naked telson contains rather well-defined species, the last group still contains species with questionable status.

The situation of *Stenothoe mediterranea* Ledoyer [valid species or subspecies of *S. marina* (Bate)] is still not clearly defined; I count it here as a valid species. In the present study, I define *S. quingtaoensis* Ren as a junior synonym of *S. haleloke*

Barnard, and also *S. irakiensis* Salman as a junior syn. of *S. gallensis* Walker. *S. cattai* was seen partially as a synonym of *S. gallensis* but is herewith revalidated. At the beginning of this study, knowledge had grown to 51 species considered valid; four additional new ones are here described. Here is the actual situation:

S. adhaerens Stebbing, 1888, *S. allinga* Barnard, 1974, *S. andamanensis* n. sp., *S. antennulariae* Della Valle, 1893, *S. aucklandica* Stephensen, 1927, *S. bosphorana* Sowinsky, 1898, *S. brevicornis* Sars, 1883, *S. cattai* Stebbing, 1906, *S. coutieri* Chrevreux, 1908, *S. cavimana* Chevreux, 1908, *S. clavetta* n. sp., *S. crassicornis* Walker, 1897, *S. crenulata* Chevreux, 1908, *S. dentirama* Hirayama & Takeuchi, 1993, *S. divae* Bellan-Santini, 2005, *S. dollfusi* Chevreux, 1887, *S. eduardi* Krapp-Schickel, 1976, *S. elachista* Krapp-Schickel, 1976, *S. elachistoides* Myers & McGrath, 1980, *S. estacola* Barnard, 1962, *S. frecanda* Barnard, 1962, *S. gallensis* Walker, 1904, *S. garpoorea* Krapp-Schickel, 2009c, *S. georgiana* Bynum & Fox, 1977, *S. haleloke* Barnard, 1970 (syn. *S. qingtaoensis* Ren, 1992), *S. hansgeorgi* Krapp-Schickel, 2006b, *S. himyara* n. sp., *S. inermis* Ledoyer, 1979, *S. kaia* Myers, 1985, *S. macrophthalma* Stephensen, 1931, *S. magellanica* Rauschert, 1998, *S. mandragora* Krapp-Schickel, 1996b, *S. marina* (Bate, 1857), *S. marvela* Bellan-Santini, 2005, *S. (m.?) mediterranea* Ledoyer, 1973, *S. megacheir* (Boeck, 1871), *S. menezgweni* Bellan-Santini, 2005, *S. miersi* (Haswell, 1879), *S. microps* Sars, 1895, *S. minuta* Holmes, 1905, *S. moe* Barnard, 1974, *S. monoculoides* (Montagu, 1813), *S. nonedia* Barnard, 1974, *S. penelopae* Krapp-Schickel, 2006b, *S. pieropan* Krapp-Schickel, 1996b, *S. quabara* Barnard, 1974, *S. richiardi* Chevreux, 1895, *S. senegalensis* n. sp., *S. sivertseni* Stephenseni, 1949, *S. stephensen* Reid, 1951, *S. symbiotica* Shoemaker, 1956, *S. tenella* Sars, 1883, *S. tergestina* Nebeski, 1880, *S. valida* Dana, 1852, *S. verrucosa* Krapp-Schickel, 2009c.

Two further species wait to be published.

Within the Mediterranean, five species belong to the group of species with telson lacking spines: *S. cavimana* Chevreux, 1908, *S. elachista* Krapp-Schickel, 1976, *S. mandragora* Krapp-Schickel, 1996b, *S. monoculoides* (Montagu, 1813) and *S. pieropan* Krapp-Schickel, 1996b.

Nine species have a spinose telson: *S. antennulariae* Della Valle, 1893 (until a short time ago thought to be a Mediterranean endemic, but now found also on the Dutch coast, in litt.), *S. bosphorana* Sowinsky, 1898 (until now seen as Mediterranean endemic), *S. cattai* Stebbing, 1906 (until recently called '*S. gallensis*'), *S. dollfusi* Chevreux, 1887, *S. eduardi* Krapp-Schickel, 1976, *S. marina* (Bate, 1857) with *S. mediterranea* Ledoyer, 1973, *S. tergestina* Nebeski, 1880 and *S. valida* Dana, 1852.

From the Atlantic Ocean, the following four species have a telson without spines: *S. brevicornis* Sars, 1883, *S. cavimana* Chevreux, 1908, *S. elachistoides* Myers & McGrath, 1980 and *S. monoculoides* (Montagu, 1813).

Twenty-four species have a spinose telson: *S. antennulariae* Della Valle, 1893, *S. cattai* Stebbing, 1906, *S. coutieri* Chevreux, 1908, *S. crassicornis* Walker, 1897, *S. divae* Bellan-Santini, 2005, *S. dollfusi* Chevreux, 1887, *S. eduardi* Krapp-Schickel, 1976, *S. frecanda* Barnard, 1962, *S. georgiana* Bynum & Fox, 1977, *S. macrophthalma* Stephensen, 1931, *S. marina* (Bate, 1857), *S. marvela* Bellan-Santini, 2005, *S. megacheir* (Boeck 1871), *S. menezgweni* Bellan-Santini, 2005, *S. microps* Sars, 1895, *S. minuta* Holmes, 1905, *S. richardi* Chevreux, 1895, *S. stephensen* Reid, 1951, *S. symbiotica* Shoemaker, 1956, *S. tenella* Sars, 1883, *S. tergestina* Nebeski, 1880 and *S. valida* Dana, 1852, plus two new species, *S. clavetta* and *S. senegalensis* (see below); one additional species is in prep. (Krapp-Schickel and Vader 2014).

From the Pacific Ocean, eight species are known (all with spinose telson): *S. crenulata* Chevreux, 1908, *S. dentirama* Hirayama & Takeuchi, 1993, S. *estacola* Barnard, 1962, *S. frecanda* Barnard 1962, *S. garpoorea* Krapp-Schickel, 2009c, *S. haleloke* Barnard, 1970 (syn. *S. qingtaoensis* Ren, 1992), *S. kaia* Myers, 1985, *S. verrucosa* Krapp-Schickel, 2009c. In addition, one new species from Chile, also with spines on the telson, is ready to be published.

From Australia–New Zealand, the following seven species have a spinose telson: *S. allinga* Barnard, 1974, *S. aucklandica* Stephensen, 1927, *S. miersi* (Haswell, 1879), *S. moe* Barnard, 1972b, *S. nonedia* Barnard, 1974, *S. penelopae* Krapp-Schickel, 2006b, *S. quabara* Barnard, 1974. Only one species from this region, *S. hansgeorgi* Krapp-Schickel, 2006b, has a naked telson.

From the Indian Ocean, only two species have been reported until now: *S. gallensis* Walker, 1904 with spines on the telson, and *S. inermis* Ledoyer, 1979 with a smooth telson; *S. andamanensis* n. sp. from Andaman Sea and *S. himyara* n. sp. from the Red Sea are added here, both with spines on the telson. In Ruffo, 1938 *S. monoculoides* and *S. spinimana* (syn. of *tergestina*) are cited, the first with naked, the latter with spinose, telson; however, no material could be checked at the Verona collection.

From the Subantarctic, the following three species are reported, all having a spinose telson: *S. adhaerens* Stebbing, 1888, *S. magellanica* Rauschert, 1998, *S. sivertseni* Stephensen, 1949.

At the moment the genus *Stenothoe* contains 55 species plus two new species in preparation. The great majority, similar to the type *S. valida* Dana, 1852, show a clear sexual dimorphism: their gnathopods within one sex are quite different in size and shape, gnathopod 1 merus is strongly lobed, the inner plates of the maxilliped are very small and the telson is submarginally beset with strong spines. The other, much smaller group, similar to *S. monoculoides* (Montagu, 1813) and nearly exclusively distributed in the Atlantic–Mediterranean region, shows less or even no sexual dimorphism at all: first and second gnathopods are quite similar in shape, gnathopod 1 merus is not or little lobed, the inner plates of the maxillipeds are well visible and the telson is naked or has only tender marginal setae.

I tried already several times to split the genus into at least two groups, but there is not one character which does not show some variability; even the arrangement of the plates in the second maxillae (a character often very difficult to see, but striking within the stenothoids) is not clearcut in tandem- or riding position, but has also many transitions. It is, especially in this family, so difficult to make groups, as one has to expect convergences everywhere: stenothoids like to live with or even inside other animals, or buried between sand grains in the interstitium; thus several characters lose their function for very different reasons.

In any case, all species treated below belong to the first group.

'*Stenothoe gallensis* group'

Figure 1; Table 1

Stenothoe gallensis is described by Walker (1904) from Ceylon = Sri Lanka (the locality with the most abundant specimens is called Galle, thus the specific name) and

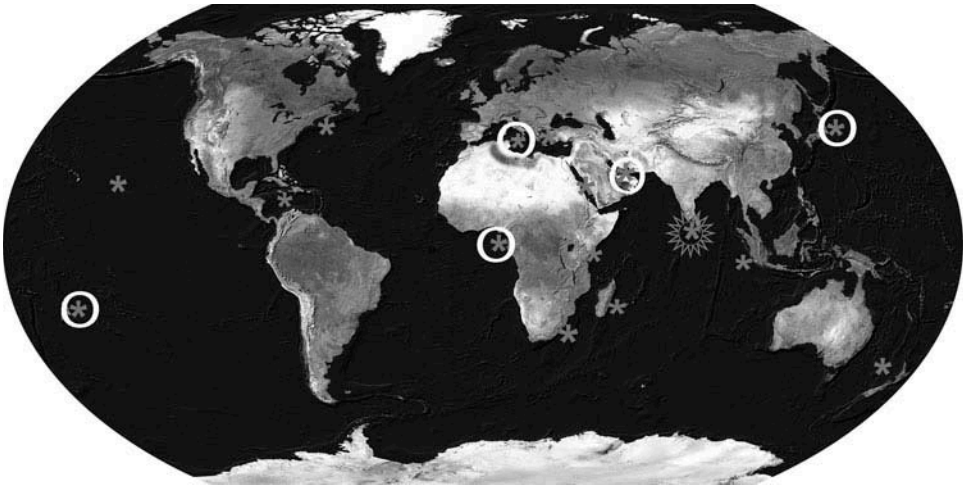


Figure 1. Worldwide citation of members of the so-called '*Stenothoe gallensis* group'. The star with wreath of lace indicates the type locality of *Stenothoe gallensis* at Sri Lanka. Stars surrounded by white circles indicate the type localities of different nominal species (from left to right): *Stenothoe crenulata* Chevreux, 1908; *Stenothoe uncinifera* Mateus & Mateus, 1966; *Stenothoe cattai* Stebbing 1906; *Stenothoe irakiensis* Salman 1985; *Stenothoe dentirama* Hirayama & Takeuchi 1993. Stars not surrounded indicate citations of *S.g.*

shows an upwardly curved and characteristically sculptured last article on the third uropods in males. In the following decades, during the twentieth century, several species with similarly built third uropods were described as new and soon after synonymized with *S. gallensis*, a species then consequently labelled as 'cosmopolitan'. But, as in many other amphipod species, there are extremely similar species all over the world, based on their morphology, with small but constant differences.

Typing '*Stenothoe gallensis*' for a search on the internet brings up citations from seemingly everywhere (Cuba by Ortiz 1978; Hawaii by Barnard 1955; Atlantic by Feeley and Wass 1971; Fox and Bynum 1975; Mediterranean by Krapp-Schickel 1976; 1993; East and South Africa by Walker 1909; K.H. Barnard 1916, 1925; Schellenberg 1928; Griffiths 1973, 1974a, 1974b; Red Sea by Monod 1937; K.H. Barnard 1937; Ruffo 1969; Japan by Nagata 1965), but also many indications about this species as 'invasor', 'non indigenous' or 'introduced'; there is even a citation by Winfield et al. (2006) from soft bottoms of the Sigsbee abyssal plain, Gulf of Mexico, at 3635 m depth.

A closer look at the morphology quickly indicates that this so-called cosmopolitan species must be a complex of several different species, and, before stating an invasion from somewhere, it has to be defined clearly which species lives where. Furthermore, there do exist already the species *S. cattai* Stebbing 1906, *S. crenulata* Chevreux 1908, *S. irakiensis* Salman 1985, *S. dentirama* Hirayama & Takeuchi, 1993 or *S. uncinifera* Mateus & Mateus 1966, which later were all put in synonymy with *S. gallensis* because of the similarly structured third uropod in males, by the above-cited authors (see Figure 1). Given this overview, it seems necessary to look better at all these cited species with their slightly different characters (see Table 1 or species treated in detail below).

Table 1. Matrix of four known species and four new ones of the *Stenothoe gallensis* group with their character distribution.

		gallensis L 5-6 mm	*cattai* L 3-4 mm	*crenulata* L 3 mm	*dentirama* L 2.5-3.2 mm	*andamanensis* n. sp. L 2 mm	*clavetta* n. sp. L 5 mm	*himyara* n. sp. L 2 mm	*senegalensis* n. sp. 3 mm
1	Ocean	Indian	Mediterran	Pacific	Pacific	Indian	Atlantic	Red Sea	Atlantic
2	**Gn1m prop: c+m**	pr > c + m	pr = c + m	pr > c + m	pr > c + m	pr = c + m	pr > c + m	pr > c + m	pr > c + m
3	**Gn1m prop l:w**	l ≥ 2w	l < 2w	l ≤ 2w	l = 2w	l = 2w	l > 2w	l = 2w	l > 2w
4	**Gn2 m palm setae**	long	long	**short**	**few**	long	long	none	long
5	**Gn2 m palm**	1 distal tooth	1 distal tooth	2 distal teeth	many small teeth	2 distal teeth	1–2 distal teeth	1 medial tooth	1 distal tooth
6	**Gn2 m dactyl setae**	short	short	short	**few – naked**	long	long	**none**	short
7	**Gn2 fem propod**	**triang. hump**	**triang. hump**	smooth	smooth	**excavate**	smooth	smooth	smooth
8	**Gn2 male merus post**	rounded incisions and setae	straight distally pointed	rounded, incisions and setae	straight, triangularnot pointed	straight, distally pointed	straight, distally pointed	straight, distally pointed	rounded incisions and setae
9	**Cx2 male post.**	rectangular	rectangular, weakly excav.	**rectangular excavate**	rectangu lar	**quadrateexcavate**	**rectangular, serrate?**	rectangular	rectangular
10	**P6,7 basis post.**	rounded	rounded	rounded	rounded	**excavate/straight**	rounded	**rounded/ straight**	rounded
11	**U2 rami**	**unequal**	subequal	subequal	subequal	**unequal**	subequal	**unequal**	subequal
12	**U3 ram male art1**	distal spine(s)	**spinose along margin**	distal spine(s)	distal spine(s)	distal spine(s)	distal spine(s)	distal spine(s)	distal spine(s)

(*Continued*)

Table 1. (Continued).

13	**U3 m ped: r**	ped > ram	ped = ram	ped = ram	ped > ram	ped < ram	ped > ram	ped = ram	ped = ram
14	**U3 m ramus art2**	weakly sculp, curved	weakly sculpt, curved	strong sculpt. weakly curved	sculpt., scarcely curved	**strong sculptmedially widened**	**strong sculpt,, thick**	**strong sculptnot curved**	**sculpt., curved**
15	**U3 m ram art1:2**	art1 = art2	art1 = art2	**art1 > art2**	art1 = art2	art1 = art2	**art1 > art2**	art1 = art2	art1 = art2
16	**U3 p: art1: art2**	1:0,5:0,5	1:0,6:0,6	1:0,6:0,4	**1:1:1**	**1:1:1**	1:0,5:0,4	**1:1:1**	**1:0.5:0.5**
17	**T spine pairs**	3	**4**	3	3	**2**	3	3	3

1) Distribution:
2) Gnathopod 1 male length ratio of propodus to carpus + merus together
3) Gnathopod 1 male propodus length to width
4) Gnathopod 2 male setae on palm
5) Gnathopod 2 male palm
6) Gnathopod 2 setae on dactylus
7) Gnathopod 2 female propodus palm
8) Gnathopod 2 male merus posterior margin
9) Coxa 2 male shape and posterior margin
10) Peraeopod 6, 7 basis posterior margin
11) Uropod 2 rami
12) Uropod 3 male ramus first article
13) Uropod 3 male length ratio peduncle to ramus
14) Uropod 3 male shape of ramus article 2
15) Uropod 3 male lenth ratio article 1: article 2
16) Uropod 3 male ratio of peduncle to article 1: article 2
17) Telson spine pairs
Note: Character states in bold indicate main differences.

Stenothoe gallensis Walker, 1904
(Table 1)

Stenothoe gallensis Walker 1904: 261–62, pl. 3, fig. 19 (Sri Lanka); Nayar 1959: 17–18, pl- V, figs. 7–19 (Madras coast, India); Nayar, 1967: 144–45, fig. 5e (Sri Lanka).
non Reid, 1951: 228 ff.
Stenothoe irakiensis Salman, 1985: 244–250, figs. 1–4 (Arabian Gulf).

Type locality

Ceylon = Sri Lanka (7°N, 80°E).

Material examined

Three males, 15 females in alcohol, one male slide; Dar es Salaam, Tanzania, coll. Stuhlmann 5/11/1902 (MNHUB inv. Nr. 21544, slide 815).

Diagnosis

Length 5–6 mm. Coxa 2 rectangular, with parallel margins, in hyperadult males posterior margin somewhat excavate. Gn 2 male propodus with two palmar humps near dactylus insertion; palm straight, beset with long, dense setae; no remaining posterior margin; dactylus also densely beset with setae of about half the length of the ones on palm, but they can be worn out and lacking; merus posteriorly rounded, with shallow incisions where long setae are inserted. Gn 2 female propodus triangular, similar to the shape of Gn 1. U 2 rami spinose; U 3 peduncle spinose, ramus art. 1 with one distal spine; ratio peduncle: ramus subequal, with geniculation and sculpture of second article in males.

Redescription

Based on Walker's original description, completing it:

Length of male 5–6 mm.

Head scarcely produced, with minute rostrum. Ocular lobe truncate. Eyes rounded, rather large. Antenna 1 longer than head and peraeonites 1–4, somewhat longer than antenna 2; peduncle length of art 1 and art 2 subequal; flagellum with about 22 articles; accessory flagellum absent. A 2 peduncle length of art 4 = art 5, flagellum > peduncle, about 18 arts.

Mouthparts: Mandible palp absent, with conical hump where insertion would normally occur. Maxilla 1 palp 2-articulate. Maxilla 2 outer plate sitting upon inner one. Maxilliped inner plate rectangular, with 2 distal setae; outer plate lacking.

Peraeon. Peraeonite 4 not elongate, similar in length to peraeonite 3.

Gnathopods 1–2 dissimilar in shape. Gn 1 subchelate; length of propodus = length of merus + ischium together; length of propodus = 3× length of carpus; merus enlarged, produced distally, the tip reaching or surpassing end of carpus; carpus triangular, l ≥ b; propodus 2× as long as broad, palm equal to remaining hind margin, group of defining setae is small and not strong; palm rounded, propodus on palmar corner widest, distally narrowing. Gnathopod 2 merus posterior margin in both sexes crenate, with a setule in each notch. Propodus posterior margin straight, palm in male reaching proximal end of propodus, thus no posterior margin remaining, palmar corner lacking, with two posterodistal humps (Walker:'double-pointed tooth'), the proximal higher, the irregular distal one with 6 intra-marginal setules; about 2.5–3× as long as broad, with few setae in female, dense row(s) of fine longer setae in males; dactylus reaching end of propodus in female, often surpassing it in male, both margins smooth and beset with setae.

Peraeopods: P 3, 4: similar to each other and to *S. marina*. P 5 basis after Walker l.c, 'about half as wide as long, longer than the next 2', which must be an error; merus only little produced distally; propodus nearly as long as carpus + merus together; dactylus strong.

Pleon. Pleonite 3 without dorsal elevation. Epimeron 3 posteroventral corner acute.

Uropods: U 1 reaching end of U 3; peduncle > rami, rami subequal, a spine in the middle of the inner one, 2–3 spines in the middle of the outer one. U 2 shorter than U 1 or U 3, rami subequal, spinose. U 3 peduncle 'longer than the ramus' in text of Walker; but in his illustration U 3 peduncle is equal to ramus art 1 + art 2, peduncle beset with 5–6 spines along the upper margin; ramus art 1 with one distal spine, ramus art 2 upwards bent in the middle and finely denticulate on the upper surface.

Telson concave on the upper side, oblong, with four spines increasing in size distally on the proximal half of each side.

Female. Gn 2 propodus palm convex, without palmar corner, but four nearly equidistant spines and some setae near the middle. U 3 last article straight and not rugose.

Remarks

The crucial characters after Walker are: length and shape of Gn 1 propodus, carpus, merus; Gn 2 two palmar humps near dactylus insertion; P 5 'basis wide, l:b = 2!' (a character which Walker withdrew later, as based on an error), U 3 ratio of peduncle and ramus subequal, geniculation and sculpture of second article in males.

On the Madras coast (India), Nayar (1959) found additional material of this species, and in 1967 again in the Gulf of Mannar (Sri Lanka), which he redescribed and illustrated. In 1985, Salman erected a new species *Stenothoe irakiensis* (thoroughly guarded by Jerry Barnard) from the Arabian Gulf, and it matches perfectly in all described details, except that he describes and illustrates a peduncular spur on U 1, not mentioned before; thus, it is given in synonymy here.

The material from East Africa, that I examined at the Berlin Museum, also matches *S. gallensis* perfectly.

I do not offer an illustration of this species in the present paper, as two colleagues have detailed drawings ready for publication, and on the other hand the drawings by Nayar and especially by Salman (1985) give sufficient information.

Distribution

Indian Ocean: from East Africa to South China Sea.

Stenothoe cattai Stebbing, 1906
(Figure 2; Table 1)

Probolium polyprion Catta, 1876: 15 pl. 2 fig. 1
Stenothoe cattai Stebbing 1906: 195, Chevreux & Fage, 1925: 132, fig. 131; Lincoln, 1979: 202 fig. 92; Krapp-Schickel, 2013a: 139, fig. 11
Stenothoe gallensis Krapp-Schickel, 1976: 15, fig. 14–16; 1993: 701, fig. 481
non *Stenothoe gallensis* Walker, 1904: 261, pl. 3, fig. 19
non *S. cattai* Chevreux & Fage, 1925: 132, fig. 131 (see *S. eduardi* Krapp-Schickel, 1976)
non Stenothoe cattai Reid, 1951: 230, fig. 28

Type locality

Marseille, Mediterranean.

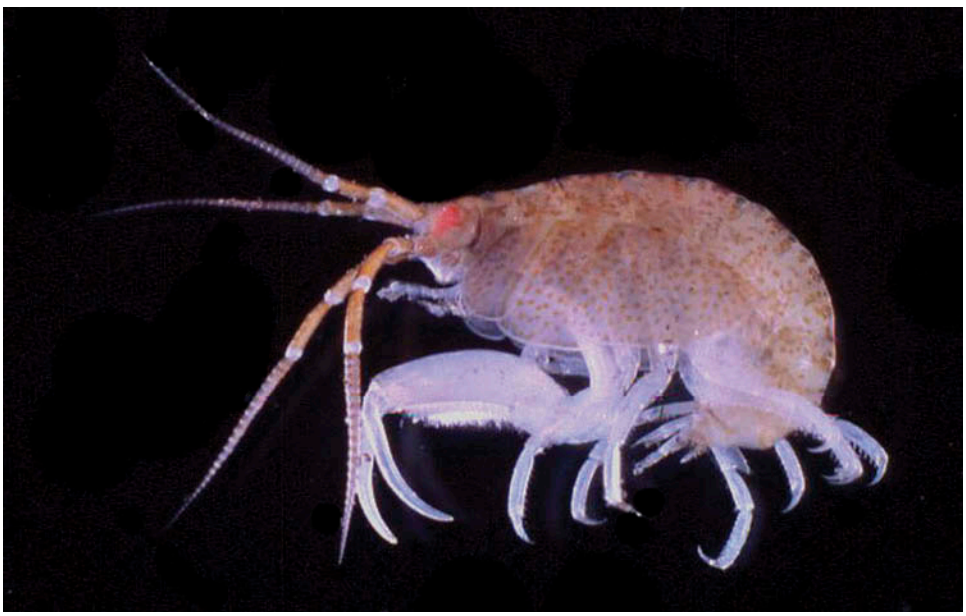


Figure 2. Habitus of *Stenothoe cattai* Stebbing, 1906; photo taken by F. Costa from the surroundings of Messina (Sicily, Mediterranean).

Material examined

See Krapp-Schickel (2013a, 141).
YPM IZ 500281 Bermuda, more than 50 specimens without detailed locality, algae.
YPM IZ 20388, 2 specimens, Bermuda, North Rock, coral rubble 9 m depth, 2/I/1987 coll E. Lazo-Wasem.

Diagnosis

Length 3–4 mm. Gn 2 male propodus palm with dense but short setae, dactylus with few very short setae; carpus posterior margin not much rounded. Gn 2 female propodus with small triangular protuberance. U 3 many spines along upper margin of ramus art 1; art 2 only distally upwardly bent, never geniculate, little sculptured.

Remarks about various authors

The description of Stebbing's new species of 3 mm is very sparse; the hint to *Stenothoe valida* 'partim' described by Della Valle (1893) is not very helpful, as on p. 566 in Della Valle Gn 2 male propodus is described (and illustrated in t. 58) with one distal tooth, exactly as *S. valida* should have, but not the new species. Stebbing erected this species after the description and illustration of *Probolium polyprion* (name preoccupied) by Catta 1876, but Catta himself synonymises his species with *Probolium megacheles* of Heller, 1866, which is again a synonym of *Stenothoe valida* (see Krapp-Schickel 1974 who checked the type material).

Looking finally at the quite detailed illustrations, the most helpful character for this species is not illustrated: U 3 ramus article 1 has in *S. valida* only distal, but no marginal spines (always also marginal ones in the Mediterranean–Atlantic material, see Krapp-Schickel 1976, p. 15, fig. 14–16, 1993, p. 702, fig. 481; Lincoln 1979, p. 202, fig. 92). Gn 1, although illustrated with a rectangular propodus instead of a regularly rounded one, has a short merus and triangular carpus, which never is the case in *S. valida*; thus, it should correspond to the Mediterranean material until now called *S. gallensis.*

Stebbing offers only 'Mediterranean' as type locality, but the type locality of Catta's species is Marseille, and the material was taken from the keel of a ship coming from Pondicherry (India) and the Cape of Good Hope. Perhaps this fact is one of the reasons that *S. cattai* has been given so quickly in synonymy with *S. gallensis*, a species described from Ceylon. Otherwise, *S. valida* is well known as preferring harbours, and thus would have ecologically fitted perfectly.

Original description after Stebbing (1906): Length 3 mm vs 5 mm in Lincoln (1979) (henceforth abbreviated as 'L.'), 4 mm in Chevreux and Fage (1925; henceforth abbreviated 'Ch&F'), 3–3.5 mm in Krapp-Schickel (1993; henceforth abbreviated 'K-S'). U 3 peduncle a little longer than the ramus (vs clearly shorter in L. and Ch&F, while in K-S., p. 702, fig. 481, U 3 male has a shorter peduncle, U 3 female a longer one), ramus art 2 'geniculate' (always straight but only distally somewhat bent in all cited authors).

The description in Chevreux & Fage (1925, p. 132, fig. 131) corresponds well with the one by Lincoln (1979, p. 202, fig. 92) except for Gn 1 where the carpus is shorter in L. (l = b, vs l > b in Ch&F). Gn 2 female shows a triangular acute hump in the middle of the convex palm after Ch&F (p. 132, fig. 131), which is shown in K-S for 'juv. male'. But all authors report many spines along the upper margin of U 3 ramus art 1, a unique character of this species within the *S. gallensis* group.

Distribution

Mediterranean, Atlantic.

Stenothoe crenulata Chevreux, 1908
(Figures 3, 4; Table 1)

Stenothoe crenulata Chevreux 1908: 471–475, fig. 1–3; Shoemaker 1935: 237 fig. 2; Barnard JL 1955: 3–5, fig. 1.

Type locality

Gambier Archipel, Île Mangareva, Polynesia.

Material examined

Male 3 mm, Barbados, off Belairs Res. Inst., Holetown, Caribbean Sea, from corals, slide in the collection of SNM (illustrated).
Male 3 mm Pacific Ocean 4°30′ N, 137°10′E, SNM.
Female 2 mm Venezuela (between Aruba and Blanquila), mud, summer 1936, NBCL (PWH).
Male 2 mm (slide), females 2 mm, 1.5 mm Barbados offshore 02/1964, NBCL (PWH).
Male Curaçao 1462, water-pipe, iron supports in tidal flow, with dense *Pennaria*, *Didemnum*, *Styela* and *Microcosmus*, 0–1 m depth, 02/01/1964, NBCL (PWH).
About 70 males, females and juveniles, Sanur-Bali, Indonesia, algae of 2–4 m depth, July 1993 (MVRCr).

Diagnosis

Length 3 mm. Gn 2 male basis anteriorly widened; palm with dense but short setae, similar to those on dactylus inner margin.

Redescription

Based on Chevreux's original description, completing it:

Length 3 mm.

Head scarcely produced, with minute rostrum. Ocular lobe truncate. Eyes rounded, rather small. Antenna 1 longer than head and peraeonites 1–4, subequal to antenna 2; peduncle length of art 1 > art 2; flagellum with about 17–22 articles; accessory flagellum absent. A 2 peduncle length of art 4 > art 5, flagellum < peduncle, about 16–18 arts.

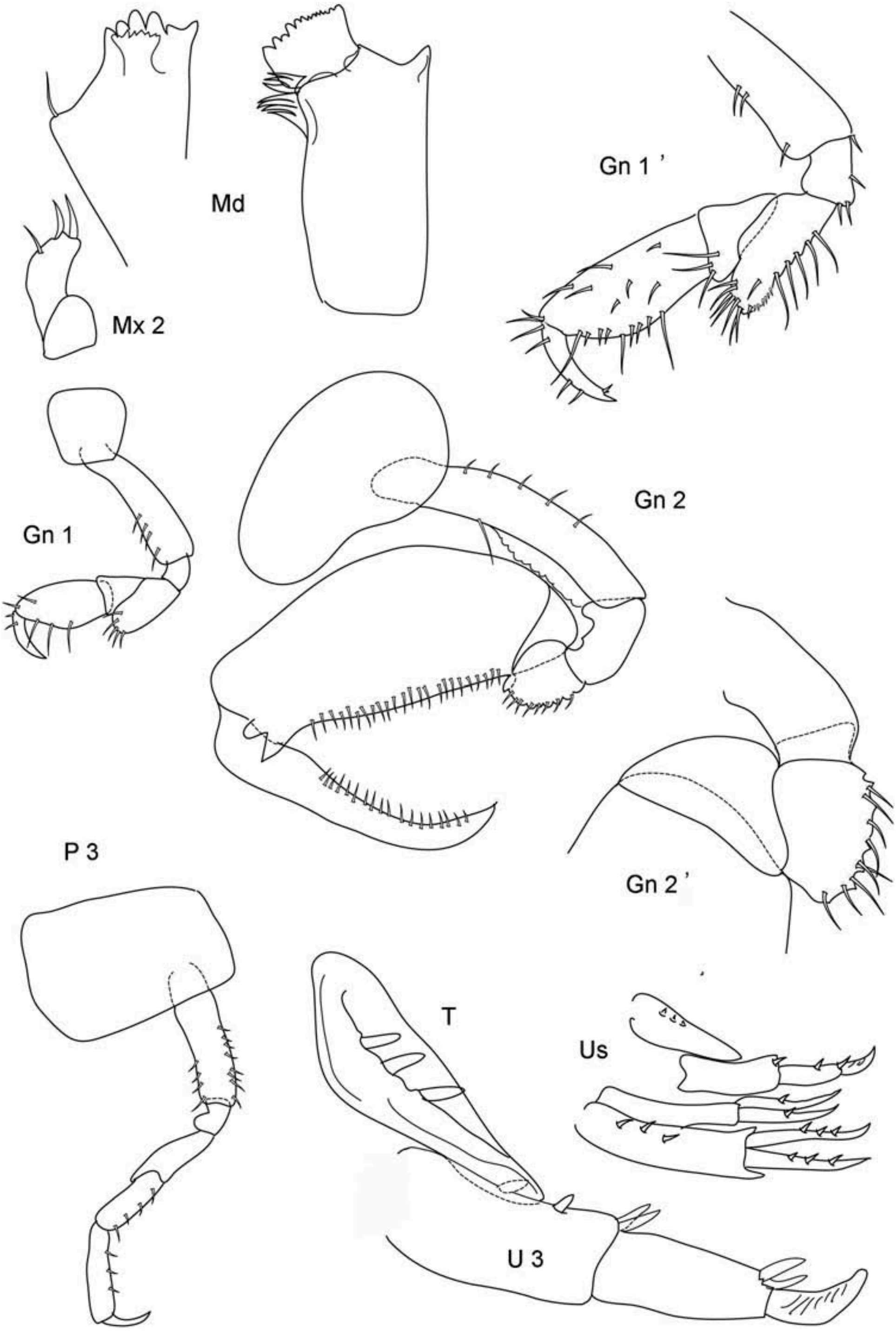


Figure 3. *Stenothoe crenulata* Chevreux, 1908: male, Barbados, Caribbean Sea: Md = left and right mandible; Gn 1, 2 = first and second gnathopod with the same enlargement; Gn 1′, Gn 2′ = both gnathopods partly enlarged; P 3 = third peraeopod; Us = urosome with uropods and telson; U 3 = third uropod; T = telson.

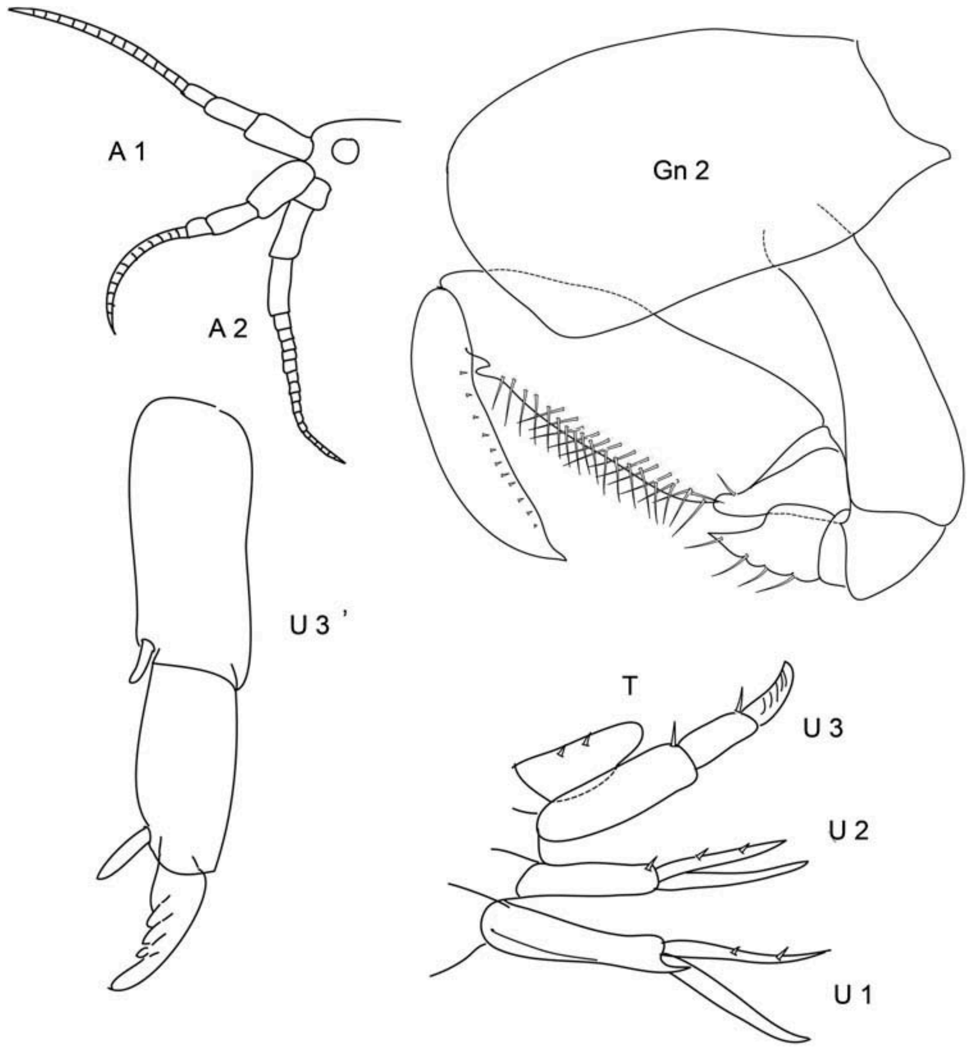


Figure 4. *Stenothoe* cf. *crenulata* Chevreux, 1908: male, 3 mm, Pacific Ocean 4°30′ N, 137° 10′E: A 1, 2 = antenna 1, 2; Gn 2 = male second gnathopod; U 3 = third uropod male; U 1, 2, 3 = uropod 1, 2, 3; T = telson.

Mouthparts: mandible palp absent, with conical hump where insertion would normally occur. Maxilla 1 palp 2-articulate. Maxilla 2 outer plate sitting upon inner one one. Maxilliped inner plate linguiform, with two distal setae; outer plate lacking.

Peraeon. Peraeonite 4 not elongate, wider than peraeonite 3. Gnathopods 1–2 dissimilar in shape. Gn 1 subchelate; length of propodus > merus + ischium together; length of propodus = 2× length of carpus; merus enlarged, produced distally, the tip reaching end of carpus; carpus triangular, l ≥ b; propodus 2× as long as broad, palm equal to remaining hind margin, group of defining setae small and not strong; palm rounded, oblique, propodus on palmar corner widest. Coxa 2 anterior margin rounded, posterior margin excavate, distally narrowing or rectangular. Gnathopod 2 male basis anteriorly widened, sometimes with crenulate margin; merus posterior margin rounded, crenate, with a setule in each notch; propodus posterior margin straight, palm reaching proximal end of propodus, thus no posterior margin remaining, palmar corner lacking, with two posterodistal humps, the proximal higher; propodus about 2.5–3× as long as broad, palm with dense row of fine short setae; dactylus reaching end of propodus, inner margin beset with setae of the similar length as on propodus. Peraeopods: Coxa 3 distally somewhat widening. P 3, 4: similar to each other.

Pleon. Uropods: U 1 reaching end of U 3; with prominent peduncular spur; peduncle > rami, rami subequal, spinose. U 2 shorter than U 1 or U 3, rami subequal. U 3 peduncle equal to ramus, ramus art 1 ≥ art 2, art 1 beset with 2–3 spines along the upper margin, with pair of distal spines, ramus art 2 upwards bent in the middle and regularly sculptured on the upper surface. Telson concave on the upper side, oblong, with three spines on the proximal half of each side.

Female: Gn 2 propodus palm convex, without palmar corner, but four nearly equidistant spines. U 3 last article straight and not rugose.

Remarks

This species has been synonymized with *S. gallensis* and is herewith revived, belonging to the *S. gallensis* group. Difference to the above described *S. gallensis*: length only 3 mm; Cx 2 posteriorly somewhat excavated, distally narrowing, but this character probably changes with size; Gn 2 male basis anteriorly widened, sometimes with crenulate margin, merus posterior margin regularly rounded and densely beset with short setae; length of setae on dactylus and propodus similar; U 2 subequal; U 3 male ramus art 2 claw-like, regularly curved and sculptured; U 3 ratio peduncle ≤ ramus, ramus art 1 > art 2.

J.L. Barnard (1955, p. 3–5, fig. 1) illustrates material of what he called *S. gallensis* collected from Hawaii which seems very similar, but the length of males is given as 5 mm (vs 3 mm in Chevreux for *S. crenulata*), Cx 2 has a rectangular shape and no excavation on posterior margin, male Gn 2 merus has an acute posterodistal corner, and he does not mention nor illustrate the remarkably long peduncular spur on U 1 of *S. crenulata*, also not described by Chevreux, but always well visible in the present material.

The material of *S. crenulata* collected from Puerto Rico by Shoemaker (1935, p. 237 fig. 2) has no body length indicated, Cx 2 is drawn as regularly rectangular, and the setae on Gn 2 propodus are longer than the ones on the dactylus.

From Barbados and from Curaçao came two much smaller males, also illustrated here. The characters mentioned above are mixed, thus probably depending on allometry:

Length is 2 mm, Gn 2 male is very similar to the drawing by Barnard (1955, fig. 1; but body length less than half), Gn 2 merus is also strikingly acute distally, but the setae on the propodus are much longer than illustrated in Barnard, while the ones on the dactylus are extremely short and much less dense. Cx 2 is slightly excavate (vs straight in Barnard), U 1 has a long peduncular spur (not illustrated in Barnard).

More than 20 years ago, I collected quite a lot of stenothoids from Bali (Indonesia): in the same samples there is *S. frecanda* Barnard, 1962 (described from California) and material very close to the original description of *S. crenulata*: Cx 2 is posteriorly slightly excavated or rectangular, Gn 2 male setae on the dactylus as long and dense as on propodus inner margin or somewhat longer. The difference between *S. frecanda* and *S. crenulata* is not very strong, besides the shape of U 3, but U 1 in *S. frecanda* is never straight, but bent upwards in the articulation between peduncle and ramus, and U 2 rami are clearly unequal.

I think all material discussed here matches *S. crenulata* Chevreux morphologically.

Distribution

Indonesia, Polynesia, Hawaii, Caribbean Sea.

Stenothoe dentirama Hirayama & Takeuchi, 1993
(Figure 5; Table 1)

Stenothoe dentirama Hirayama & Takeuchi 1993: 170–175 fig. 22–24.

Type locality

Fukushima, Japan.

Material examined

One juv. male 33°N, 129°4′ E, coll. Schönau 2/1895, one fem. ov. Nagasaki Svenson leg., 20/XI/1897, both deposited at SNM.

Three fem. Tagurazaki, Gulf of Osaka, Japan, 30/6/2009 leg. Arimoto, deposited at MVRCr.

One male Curaçao 1462: water-pipe, iron supports in tidal flow, with dense *Pennaria*, *Didemnum*, *Styela* and *Microcosmus*, 0–1 m depth, 02/01/1964, NBCL (PWH).

One male Curaçao 1469: Candelchi, W-side, scanty *Rhizophora* on rocky shore, many oysters with *Microcosmus*, *Styela* and *Didemnum*, 0–1 m, 18/12/1963 depth, NBCL (PWH).

One ?female Klein Bonaire 1049B: reef debris on sandy beach, 0–1.5 m depth, 13/09/1948, NBCL (PWH).

Diagnosis

Length 2.5–3.2 mm. Gn 2 sexually little dimorphic: Gn 2 palm with many short setae and few long ones; dactylus few short setae or naked. U 3 last article scarcely curved, in male strongly sculptured, in female smooth; length of peduncle subequal ramus article 1 subequal article 2.

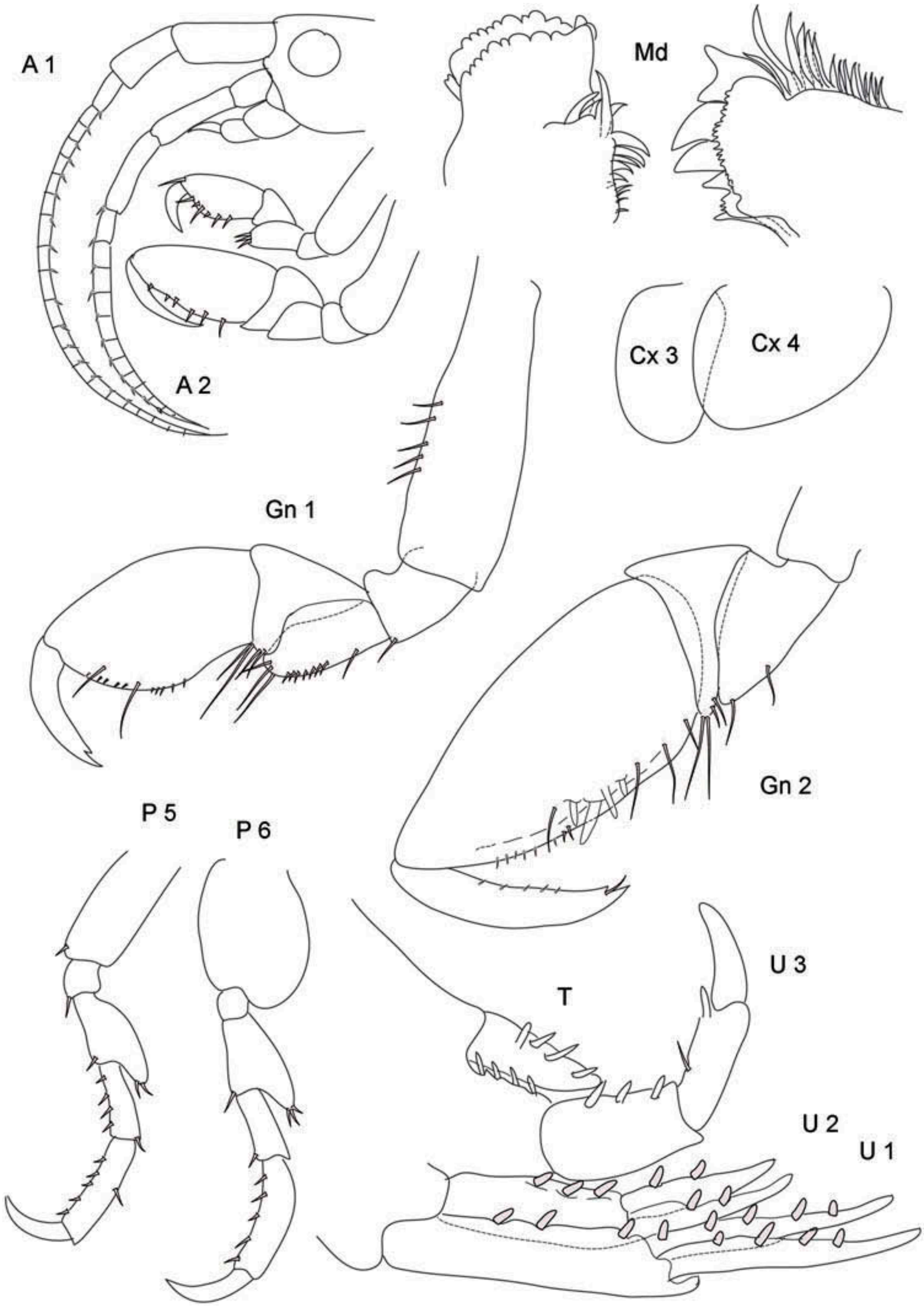


Figure 5. *Stenothoe dentirama* Hirayama & Takeuchi, 1993: female, Nagasaki: A 1, 2 = antenna 1, 2; Md = mandible; Cx 3, 4 = coxa 3, 4; Gn 1, 2 = first and second gnathopod; P 5, 6 = peraeopod 5, 6; U 1, 2, 3 = uropod 1, 2, 3; T = telson.

Remarks

This species clearly belongs to the '*Stenothoe gallensis* group' as it has a strongly sculptured last article in the male U 3, although the authors did not discuss the other members at all when comparing it with other *Stenothoe*. An important and easily differentiating character is the Gn 2 in males which is not or scarcely sexually different from the female.

Distribution

Japan, Caribbean.

Stenothoe andamanensis n. sp.
(Figures 6–8; Table 1)

Stenothoe gallensis ? Ledoyer, 1986: 973–74, fig. 384

Holotype

Male 2 mm, harbour of Havelok, Andaman Islands, Bay of Bengal; coralligène, 1–8 m depth; coll. Ulrich Schiecke 22. XII.1978, sample 13; slide MVRCr 7672.

Additional material

Two males 2 mm, two ovigerous females 2 mm, same locality; slides MVRCr 7673, 7674.

Type locality

Andaman Islands, Indian Ocean.

Etymology

The specific epithet is built as an adjective from the locality of Andaman Islands.

Diagnosis

Length 2 mm. Gn 2 male palm with many long setae. Gn 2 female propodus shallow excavate. Cx 2 male quadrate and excavate. P 6, 7 posteriorly straight or excavate. U 3 male peduncle < ramus, peduncle subequal ramus article 1 subequal article 2.

Description

Length 2 mm.

Head. Eyes medium, round. Mxp IP well visible, OP absent. Mx 1 palp with two arts. Mx 2 plates riding. A 1 ≥ A 2, in female A 1 flagellum with nine arts, A 2 with seven arts.

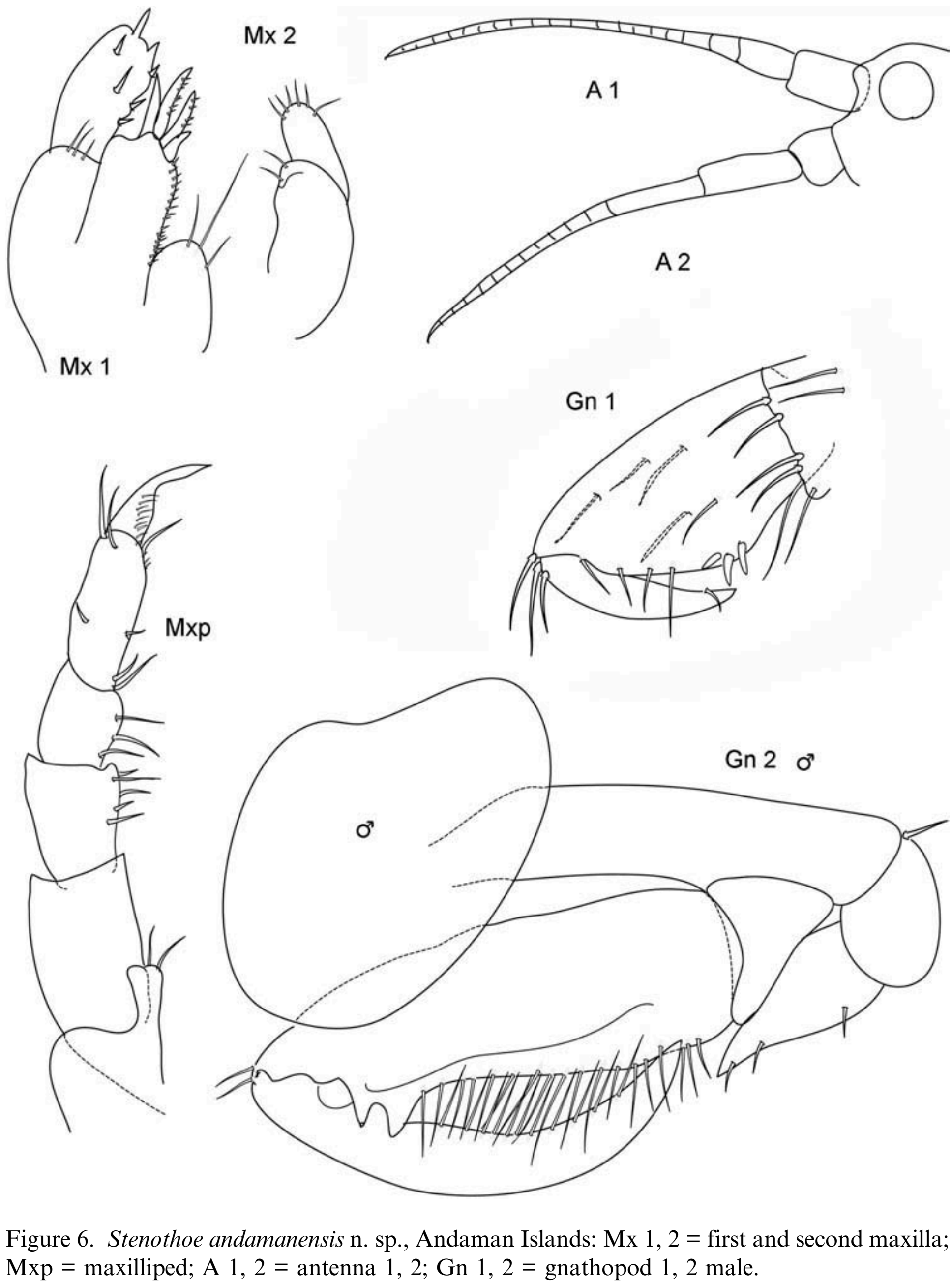


Figure 6. *Stenothoe andamanensis* n. sp., Andaman Islands: Mx 1, 2 = first and second maxilla; Mxp = maxilliped; A 1, 2 = antenna 1, 2; Gn 1, 2 = gnathopod 1, 2 male.

Peraeon. Gn 1 basis slender, naked; merus not reaching end of carpus, length of propodus subequal to carpus + merus, marginally and distally with long and flexible plus short and stiff setae; carpus triangular; propodus with clear medial palmar corner of about 150°, with remarkable group of defining setae; length of palm subequal to that of remaining hind margin.

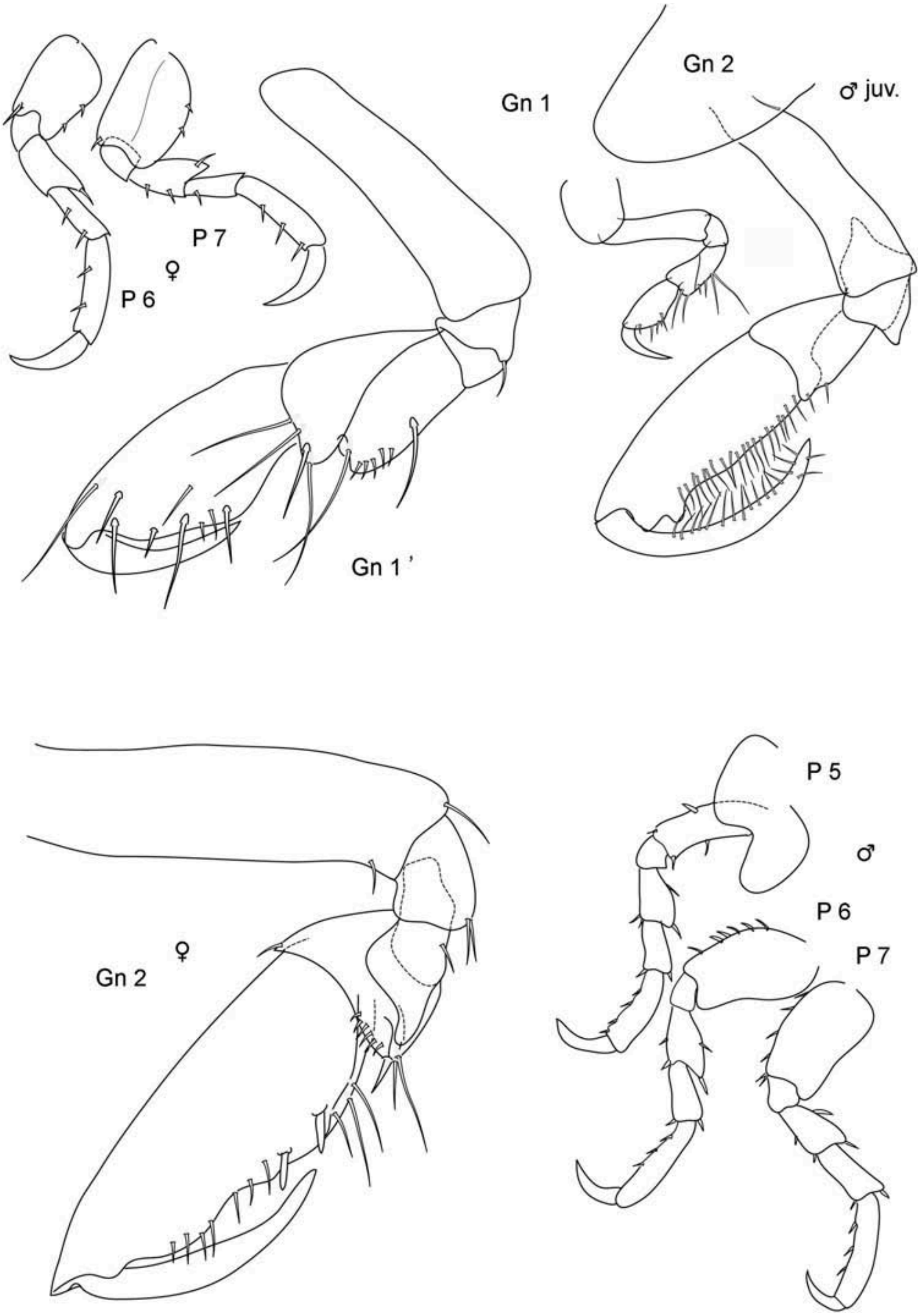


Figure 7. *Stenothoe andamanensis* n. sp., Andaman Islands: Gn 1, 2 juv. male; Gn 2 female = gnathopod; P 6, 7 female resp. P 5, 6, 7 male = peraeopods.

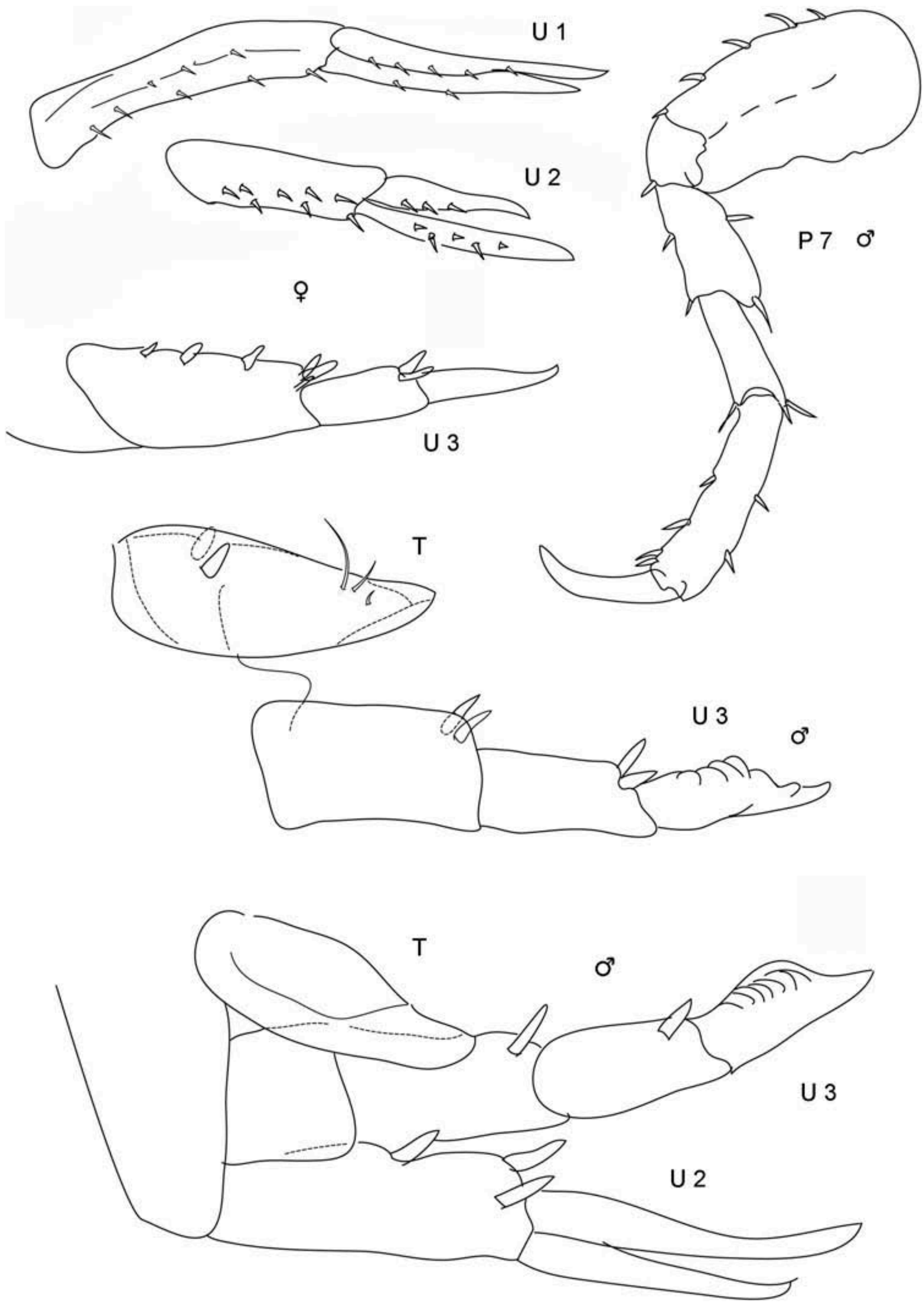


Figure 8. *Stenothoe andamanensis* n. sp., Andaman Islands: P 7 = peraeopod 7; U 1, 2, 3 male resp. female = uropods; T = telson.

Cx 2 male about as long as wide, posteriorly excavate. Gn 2 merus posterior margin smooth, distally acutely ending and often surpassing carpus. Propodus in male with straight and densely setose palm, distally with two humps; dactylus setose. Peraeopods: P 5 basis l: b = 3; merus posterodistally not much lengthened or widened; with nearly rectangular bases on P 6–7 in males, hind margin less widened than in females, without posterodistal lobe.

Pleon. U 1 richly spinose, rami subequal; U 2 rami clearly different; U 3 peduncle shorter than ramus, ramus art 1 with 1–2 robust spine(s), ramus art 2 straight and not upwards bent, medially thickened and with strong grooves. Telson proximally with a pair of spines, distally some setae.

Ovigerous female. Gn 2 merus distally rounded, propodus with only a few setae, palm with characteristic shallow excavation; dactylus naked. U 3 second art of ramus straight, without grooves and not thickened, distally scarcely upwards bent.

Remarks

This species belongs to the *S. gallensis* group, and differs in some easily visible morphological details from *Stenothoe gallensis* from Sri Lanka: first of all in the body length (only half as long), then in the Gn 2 of the females (shallow excavation on palm of propodus) and in the shape of U 3 (last article not upwards bent or 'geniculate', but straight and distally thickened).

The description of '*Stenothoe gallensis*' by Ledoyer (1986, p. 973–74, fig. 384) matches well with the present species, but Gn 2 female does not show the excavation on the palm of propodus and U 3 male is not thickened distally. Both could depend on immature material.

Distribution

Andaman Islands, Indian Ocean.

Stenothoe clavetta n. sp.

(Figures 9–13; Table 1)

Stenothoe valida Kunkel 1910: 16–19, fig. 5

Holotype

Male 3 mm, Sandys Parish, Fort Scaur, Great Sound, 15 feet depth. 2/VIII/1991, coll. W. Rose; in alcohol. YPM IZ 20473.

Additional material

Alcohol material (all material coming from Bermuda and deposited at YPM; if not otherwise noted, collected by Michael Gable):

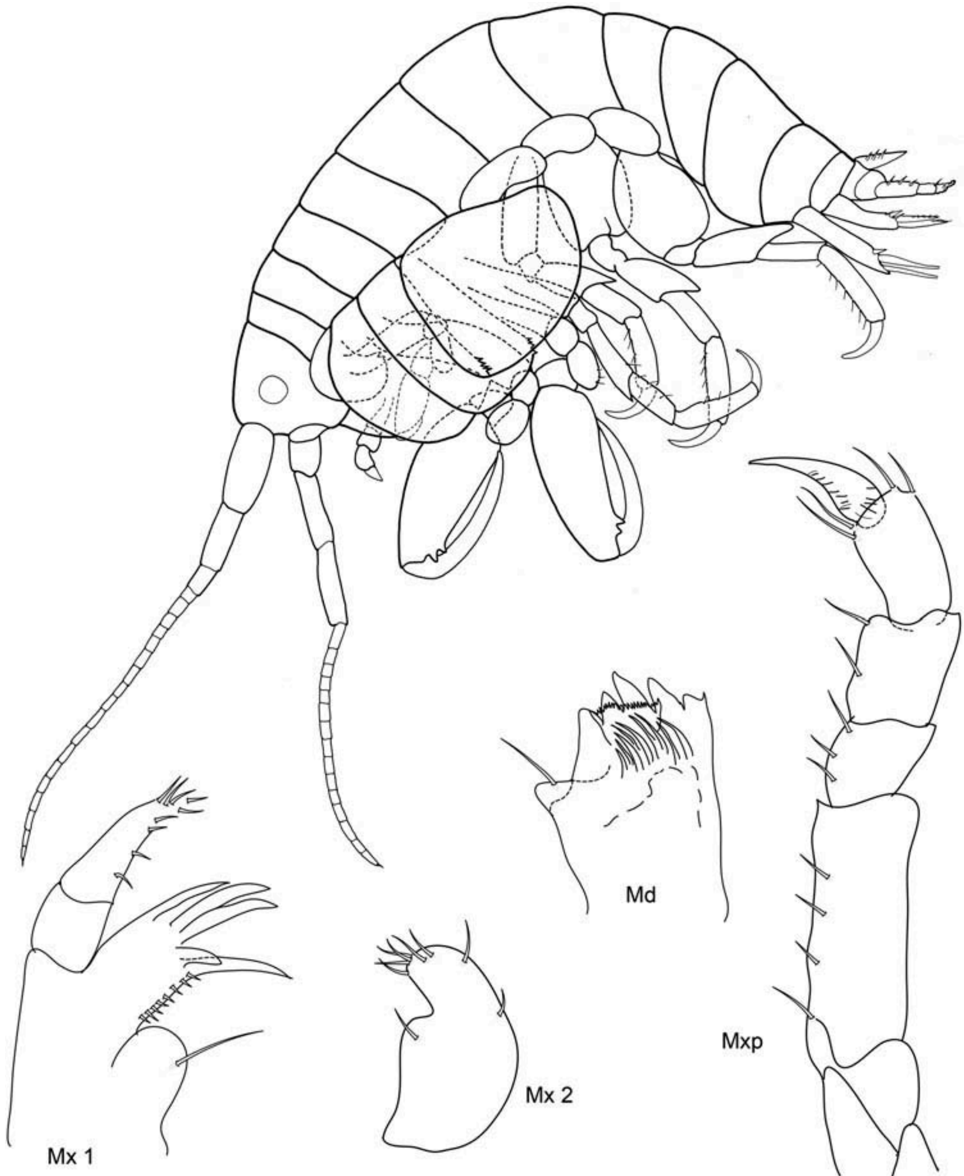


Figure 9. *Stenothoe clavetta* n. sp., Bermuda: habitus male; Mx 1, 2 = maxilla 1, 2; Md = mandible; Mxp = maxilliped.

IZ 20381 one spec. St. George's Parish, off Natural Arches Beach, from algae 8 m depth, 6.I.1987, coll. A. Baldinger + E. Lazo-Wasem.

IZ 20382 one fem. 3 mm. North Rock, from broken sea whip encrusted with algae. 8 m depth, 6.II.1987, coll. A. Baldinger.

IZ 20383 four spec. off Bermuda, North Rock, from algal scrapings, 9 m depth. 2/VI/1987, coll. A. Baldinger.

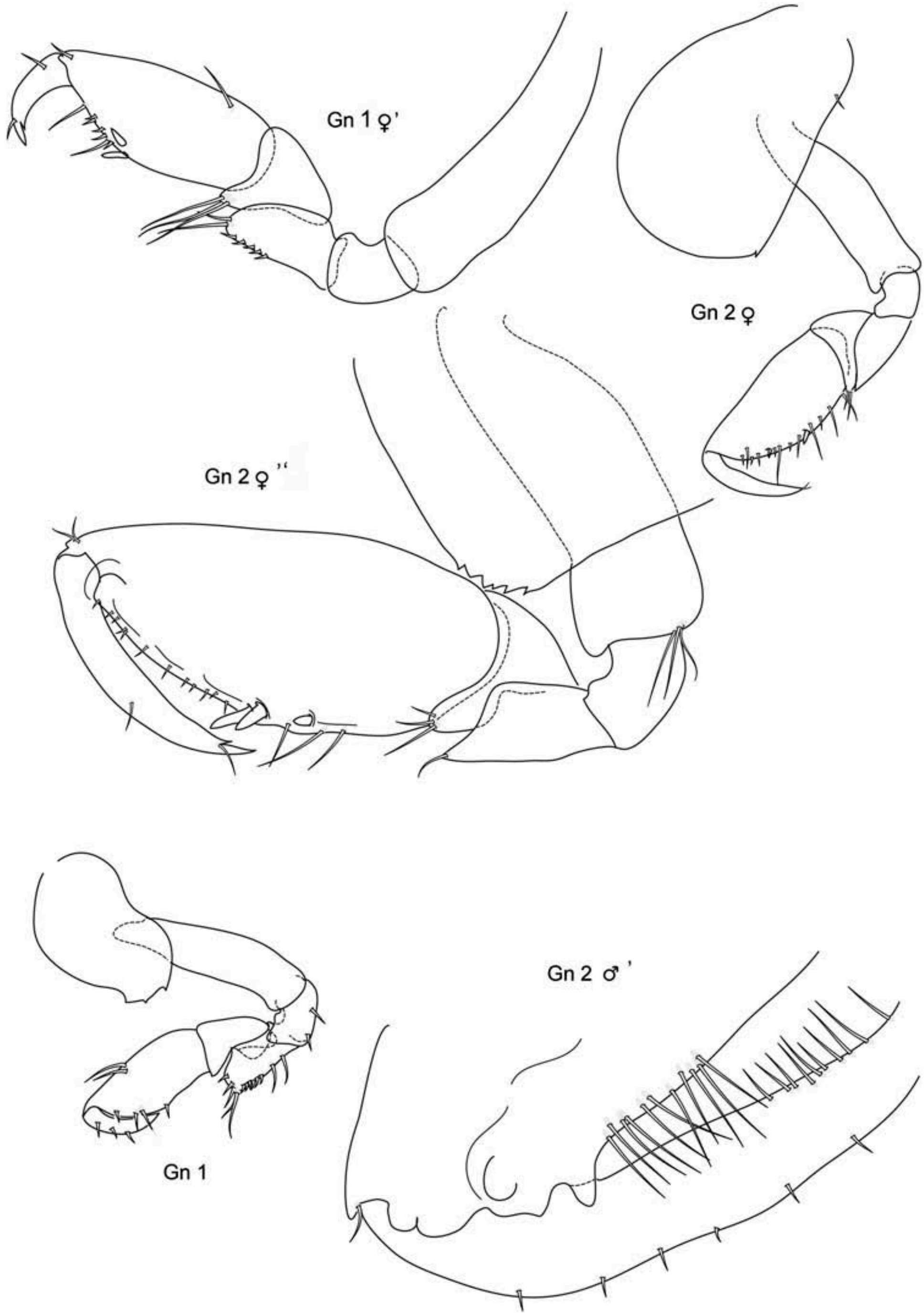


Figure 10. *Stenothoe clavetta* n. sp., Bermuda: Gn 1, 2 = gnathopod 1, 2 in male and female; Gn 1′, 2 ‘ and “ = gnathopod 1, 2 enlarged.

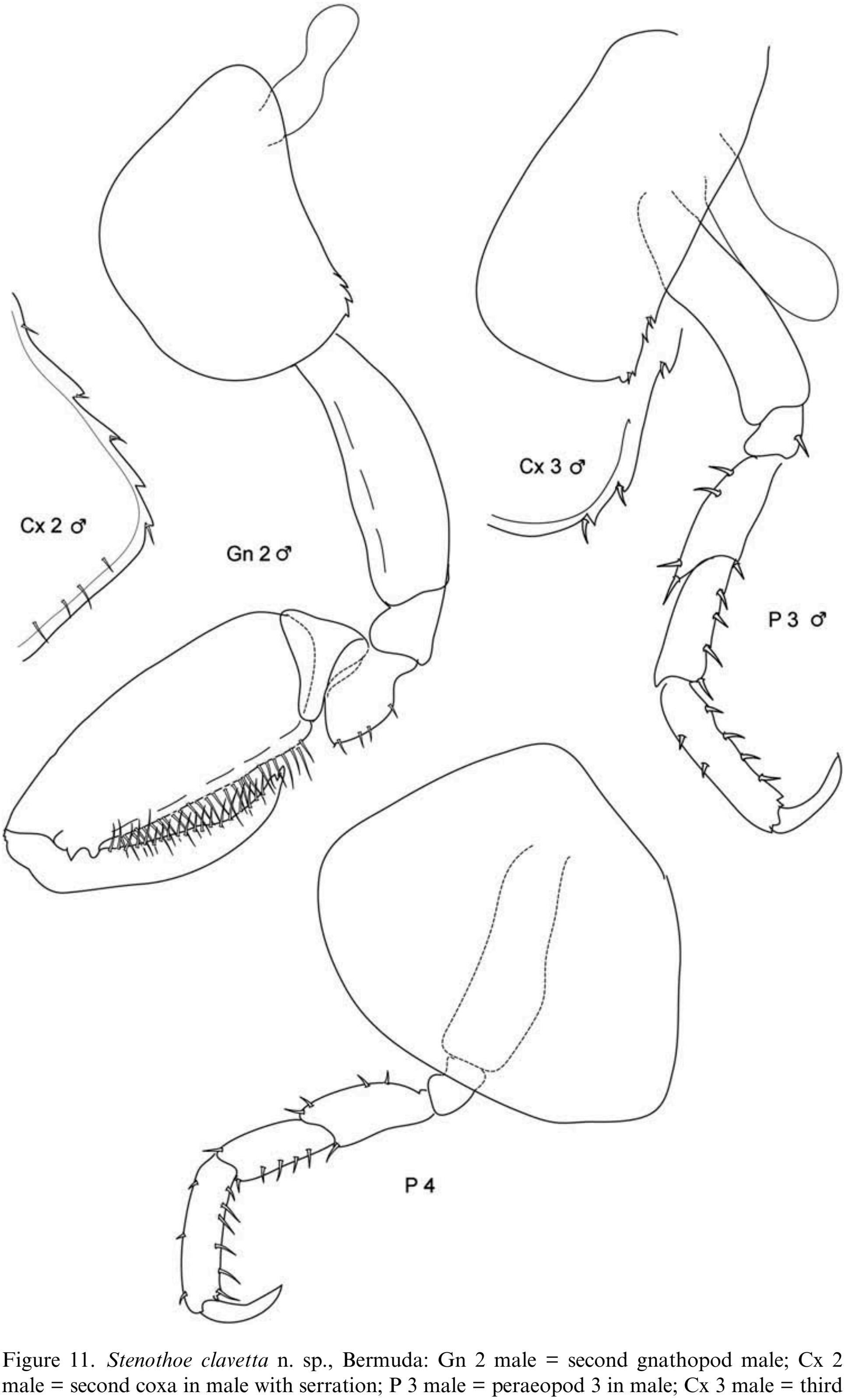


Figure 11. *Stenothoe clavetta* n. sp., Bermuda: Gn 2 male = second gnathopod male; Cx 2 male = second coxa in male with serration; P 3 male = peraeopod 3 in male; Cx 3 male = third coxa in male with serration; P 4 = peraeopod 4.

IZ 20384: one spec., St. George's Parish, off Natural Arches Beach., from bottom sediment (sand) 8 m depth, 6.I. 1987.
IZ 20386: six fem.+ juv. Harrington Sound, 'Shark Hole', green algae. 25.V.1987.
IZ 20387: 22 fem. and juv. North Rock, coll. Eric Lazo-Wasem 8.II. 1987; algal scrapings and debris.
IZ 20389 two spec. Hamilton Parish, Harrington Sound, 'Shark Hole', from attached invertebrates and algae. 25/V/1987.
IZ 20390 eight spec. Hamilton Parish, Harrington Sound, 'Shark Hole' in *Jania* (alga); 25/V/1987. Coll. A. Baldinger.
IZ 20391 five juv. Hamilton Parish, Harrington Sound, behind Bermuda Aquarium, from *Agaricia*, oyster shell and debris. 2/VI/1987.
IZ 20462 63 fem. and juv.; Hamilton Parish, Shelly Bay, off Promontory NNW of bay. 3/VI/1985.
IZ 20463 10 males, fem. juv. 2.5–3.5 mm. Hamilton Parish, Shelly Bay, off Promontory NNW of bay. 3/VI/1985.
IZ 20464 one male 3 mm Hamilton Parish, Shelly Bay, 3/VI/1985.
IZ 20465 two spec. Hamilton Parish, Shelly Bay, 3/VI/1985.
IZ 20466 45 fem. and juv. Hamilton Parish, Shelly Bay, 3/VI/1985.
IZ 20467 eight males, fem. and juv., 2.5–3 mm. Hamilton Parish, Shelly Bay, 3/VI/1985.
IZ 20468 one male 3 mm; Hamilton Parish, Harrington Sound, SharkHole. 3/VI/1985.
IZ 20469 12 spec., Hamilton Parish, Harrington Sound, Bermuda Aquarium, entrance to Harrington Sound across from Bermuda Aquarium. 17/VIII/1988. Coll. E. Lazo-Wasem and J. Hamilton. two slides male 3 mm, one slide female 2.5 mm.
IZ 20470 25 fem. ov. and juv. Hamilton Parish, Harrington Sound, Bermuda Aquarium, entrance to Harrington Sound across from Bermuda Aquarium. 17/VI/1988, coll. E. Lazo-Wasem and J. Hamilton.
IZ 20471 60 males, ov. females and juv., beautiful sample: St. George's Parish, underneath Long Bird Causeway. S side and under. 20/VI/1988, coll. E. Lazo-Wasem.
IZ 20472 five fem. + juv., Southampton Parish, off Pompano Beach Club. 2 m depth, 21/VI/1988, coll. E. Lazo-Wasem.
IZ 20473 14 spec., Sandy's Parish, Fort Scaur, Great Sound, 15 feet depth. 2/VIII/1991, coll. W. Rose.
IZ 20474 45 males, ov. fem. and juv. 3–3.5 mm; St. George's Parish, Whalebone Bay, railroad pilings between Whalebone Bay and Coney Island. 10 feet fepth, 3/VI/1991, coll. A. Elston and W. Rose. One slide fem. 3 mm.
IZ 20475 56 males, fem. ov. and juv., but bad material. St. George's Parish, Whalebone Bay, railroad pilings between Whalebone Bay and Voney Island. 10 feet depth. 3/VI/1991, coll. A. Elston and W. Rose.
IZ 500047 two juv. 2 mm, one juv. 1.5 mm, 27.V. 1989, Shelly Beach, subtidal algae.
IZ 500233 two juv. 2 mm, 1.5 mm, 30.V. 1989, algae on Boilers.

Etymology

The specific name alludes to the shape of the third uropod of the male, similar to a little club, pin or bludgeon; the Latin word 'clavetta' is used as noun in apposition.

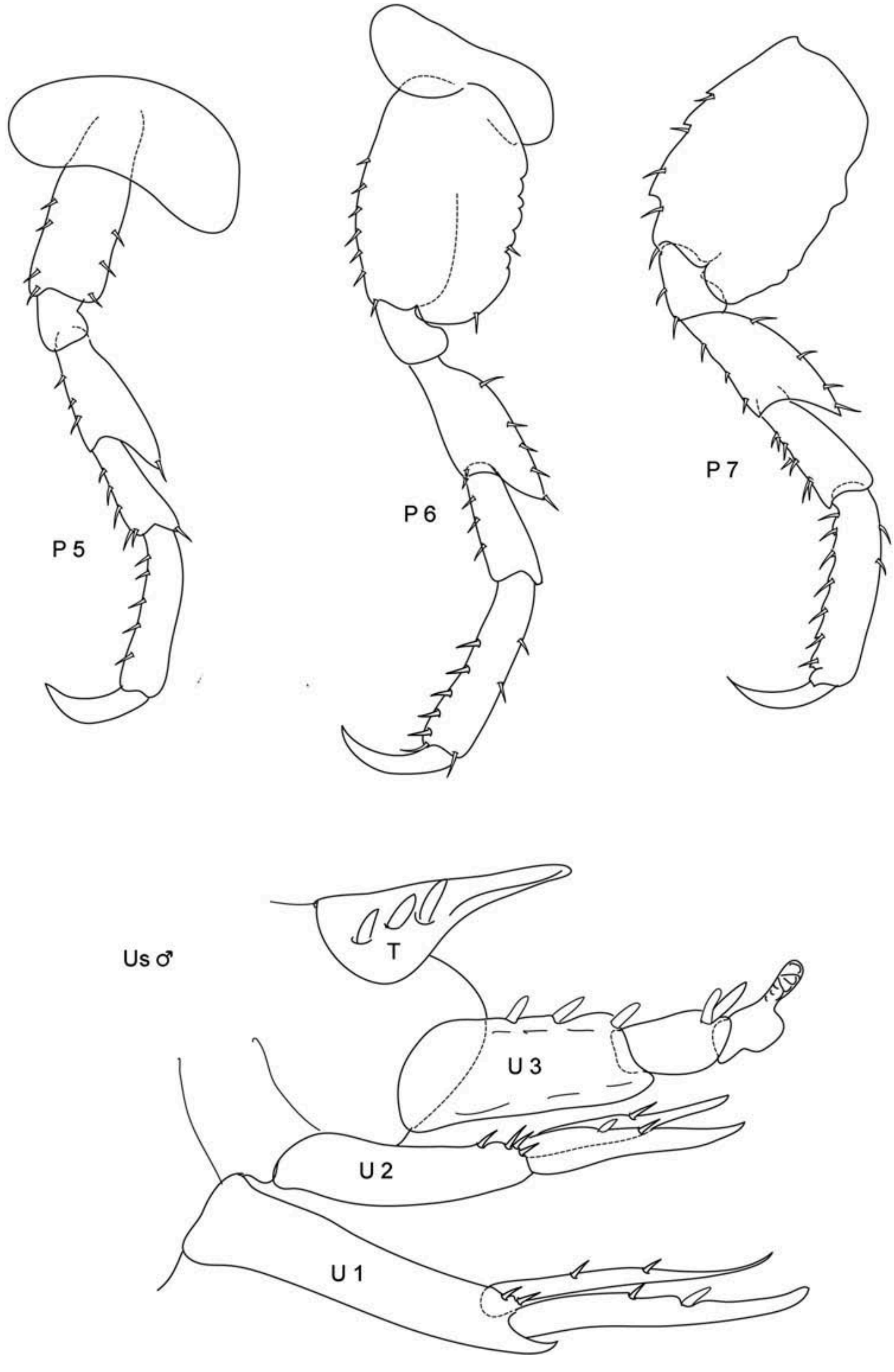


Figure 12. *Stenothoe clavetta* n. sp., Bermuda: P 5, 6, 7 = peraeopod 5, 6, 7; Us = urosome in male; U 1, 2, 3 = uropod 1, 2, 3; T = telson.

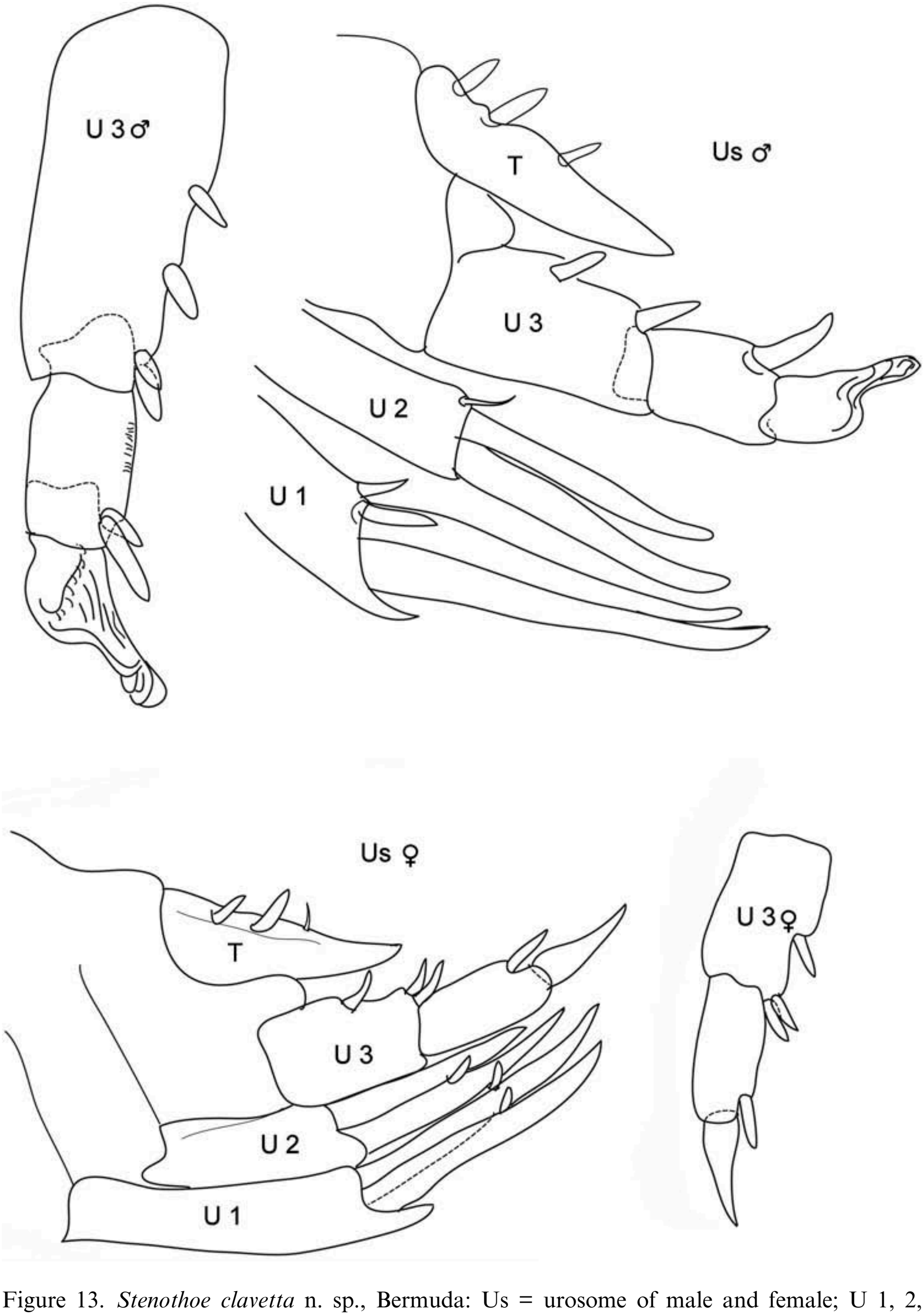


Figure 13. *Stenothoe clavetta* n. sp., Bermuda: Us = urosome of male and female; U 1, 2, 3 = uropod 1, 2, 3.

Diagnosis

Length 2.5–3.5 mm. Male Cx 1, 2 and 3 with fine serration on distoposterior margin. U 3 male ramus art 2 the proximal half about as wide as long, then abruptly narrowing and bluntly ending.

Description

Length. 2.5–3.5 mm.

Head. Antenna 1 three times longer than head, about as long as head + peraeonites and subequal to A 2. Dorsal smooth. A 1 flagellum about 18 arts, A 2 flagellum about 15 arts.

Mouthparts: Md with lacking palp; Mx 2 plates in riding position; Mxp long and narrow, IP and OP short.

Peraeon. Coxae. Cx 1 in adult male and female distally with some incisions, Cx 2, 3 on posterodistal corner irregularly finely dentate; Cx 2 in male about twice as long as wide, anteriorly shorter and rounded; Cx 3 rectangular, more than twice as long as wide, Cx 4 smooth, shield-like, trapeze-shaped, wider than long.

Gnathopods: Gn 1 propodus twice as long as wide, carpus triangular, merus on posterior margin beset with spines. Gn 2 female similar to Gn 1, merus less prominent, without spines and distally acute; propodus with smooth palm and strong defining spines on palmar corner. Gn 2 male propodus up to three times as long as Gn 1 propodus, in adult males propodus ratio l:b about 3, distally narrowing and near dactylus insertion 1–2 teeth, posterior margin as well as dactylus inner margin densely beset with long setae; carpus triangular, shorter than wide; merus longer than wide, posterior margin smooth, with short setae.

Cx 3 with fine serration on distoposterior margin.

Peraeopods: P 5 basis linear. P 6, 7 basis ovoid and subequal, about twice as long as wide, posterior margin with incisions; merus posterodistal corner somwhat widened and lengthened, reaching about one third of carpus.

Pleon. Uropods: U 1 naked peduncle (vs *S. gallensis* peduncle with spines) with distal spur, rami somewhat unequal, with few spines. U 2 similar to U 1, but without spur and shorter; U 3 in female peduncle with three strong spines, about the same length as ramus article 1, while the claw- or dactylus-like art 2 is shorter. U 3 male peduncle is longer than ramus (vs in *S. gallensis* subequal to ramus), with 3–4 spines, art 1 is longer than art 2 and has two distal spines. The last article of the ramus has a very peculiar shape, being rounded and thickened proximally and abruptly narrowed in about half of the length (vs *S. gallensis*, whereas art 2 is sculptured, but not abruptly narrowed), with the distal half about one third of the width, strongly sculptured and finger-like rounded ending. Telson: triangular, with three pairs of spines.

Distribution

Bermuda, Atlantic Ocean.

Remarks

There is no doubt that Kunkel described the here found new species, under the name of *Stenothoe valida*; his illustration of U 3 fits perfectly in its unusually thickened and abruptly narrowing last article. Barnard (1955, p. 5) had already surmised that this species is a new one. However, in the text, Kunkel writes that the second article of the ramus is longer than the first one (which is not the case in our material, and the opposite is illustrated in his fig. 5), and it is not clear what he illustrated with 'ep 3'; it may be the second coxa. Kunkel even mentions the serration on some coxae ('ventral margin very finely serrate'), a unique character in the '*gallensis* group', to which it clearly belongs.

Stenothoe himyara n. sp.

(Figures 14–17; Table 1)

Holotype

Male 2 mm, Port Sudan, Flamingo Bay, corals and short algae + epiphytes, 11.12. 1970, U. Schiecke coll. 1 slide MVRCr 7614.

Additional material

Same locality as above: two females dissected on slide MVRCr 7615; 14 females 1.7–2 mm, five juv. 1.5 mm in alcohol. All deposited at MVRCr.

Type locality

Port Sudan, Red Sea.

Etymology

Many living beings found in the Red Sea receive the specific name 'erythraeus, -a, -um' (classical Greek for 'red'), stressing the colour of the earth or sandstone in the region. But there is also another explanation, going back to the population of the Himyares living there, allegedly also meaning 'the red ones'. The epithet is used as an adjective.

Diagnosis

Length 1.5–2 mm. Male Cx 1, 2 and 3 without serration on distoposterior margin. U 3 male ramus art 2 proximal half about as wide as long or wider, then abruptly narrowing and bluntly ending like a thumb.

Description

Length 1.5–2 mm.

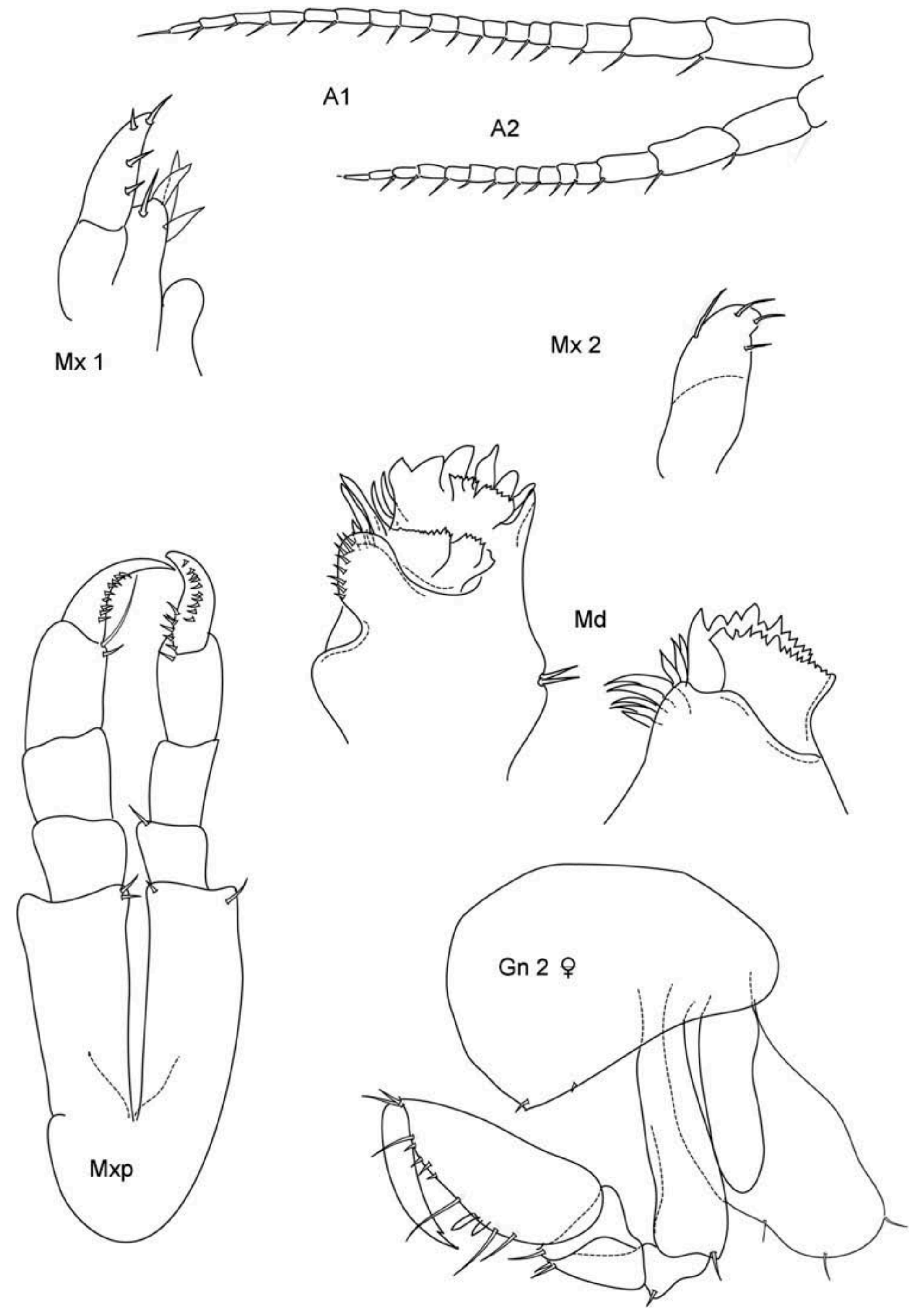


Figure 14. *Stenothoe himyara* n. sp., Red Sea. A 1, 2 = antennae; Mx 1, 2 = first and second maxillae; Md = mandible; Mxp = maxilliped; Gn 2 = second gnathopod female.

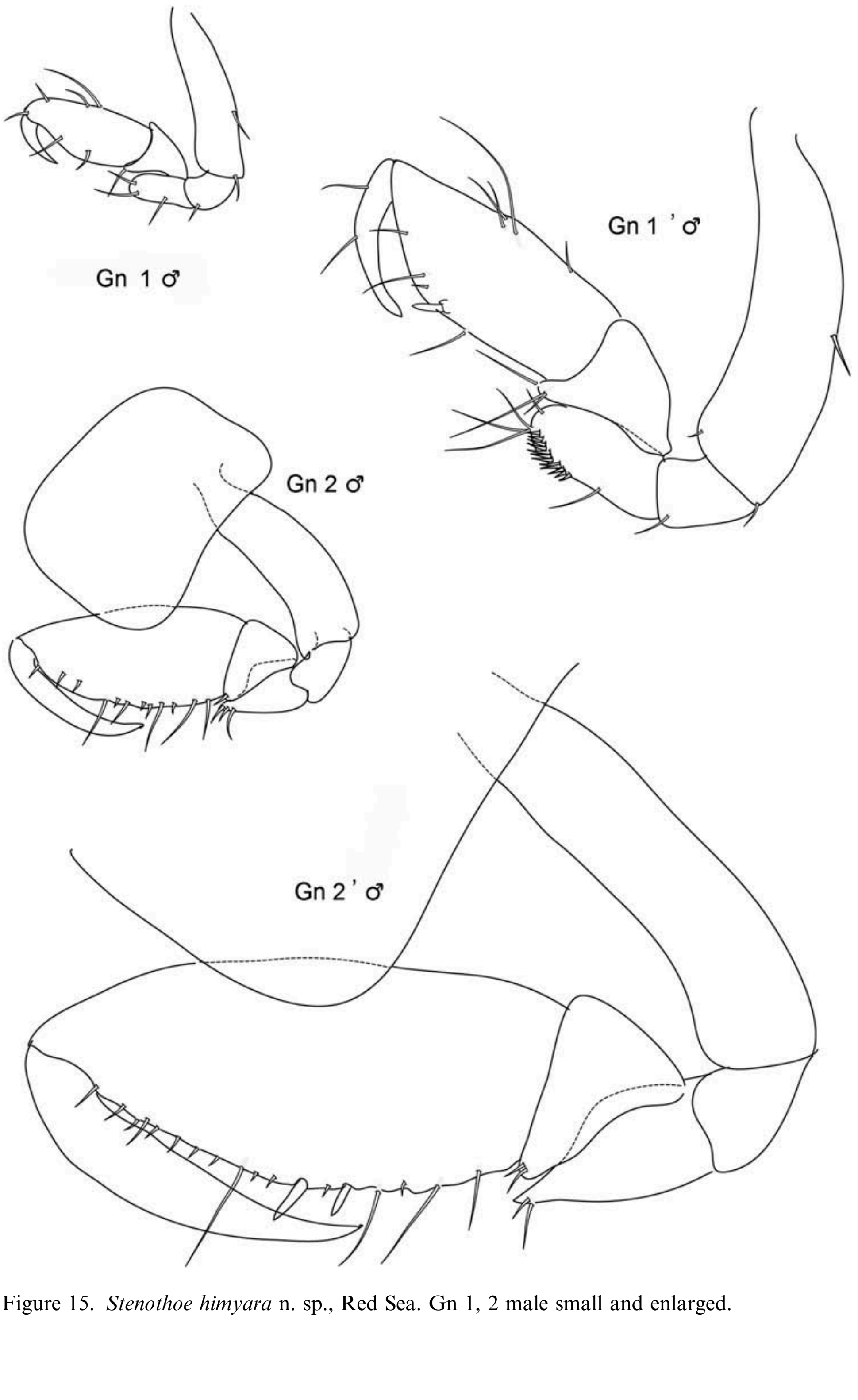


Figure 15. *Stenothoe himyara* n. sp., Red Sea. Gn 1, 2 male small and enlarged.

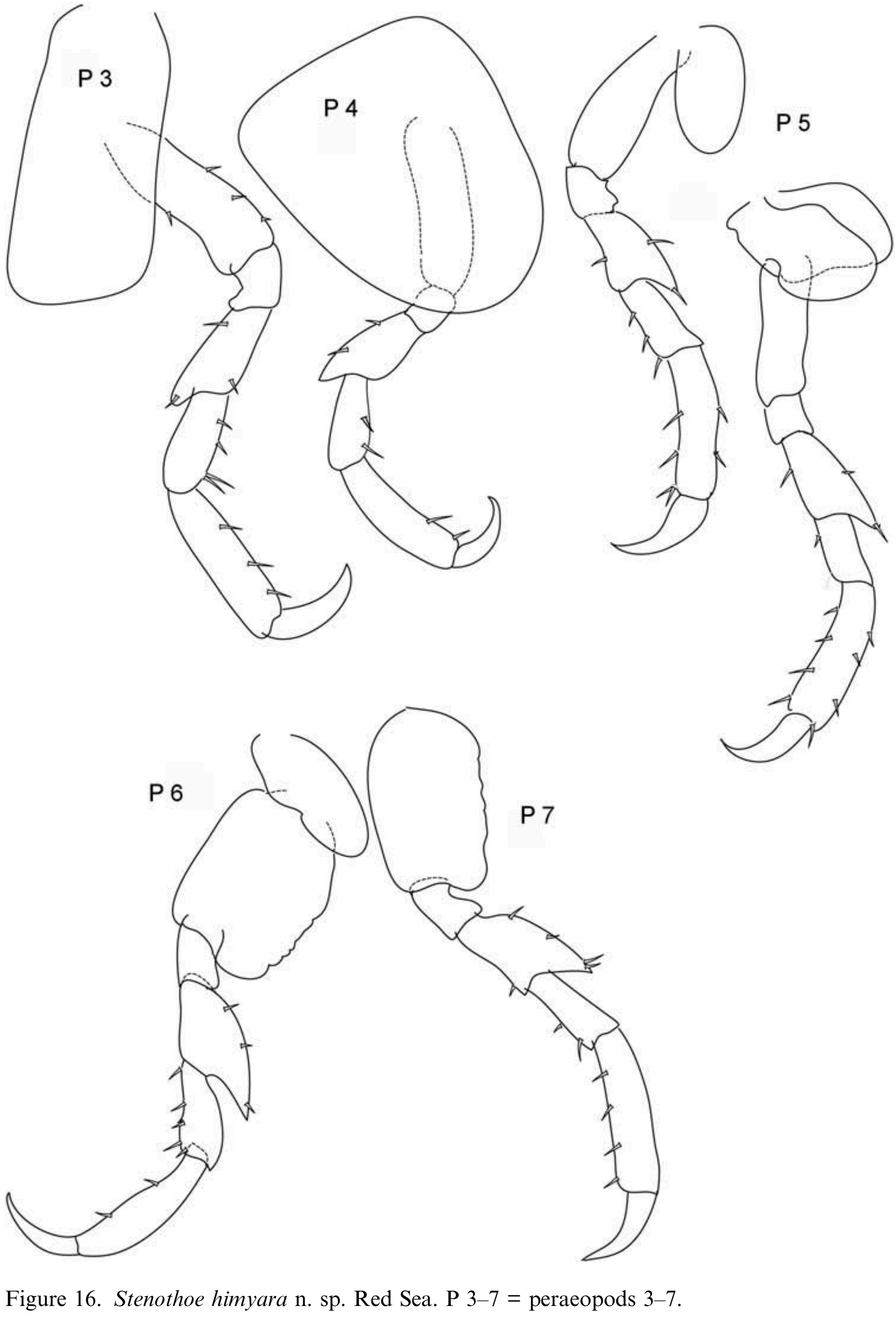


Figure 16. *Stenothoe himyara* n. sp. Red Sea. P 3–7 = peraeopods 3–7.

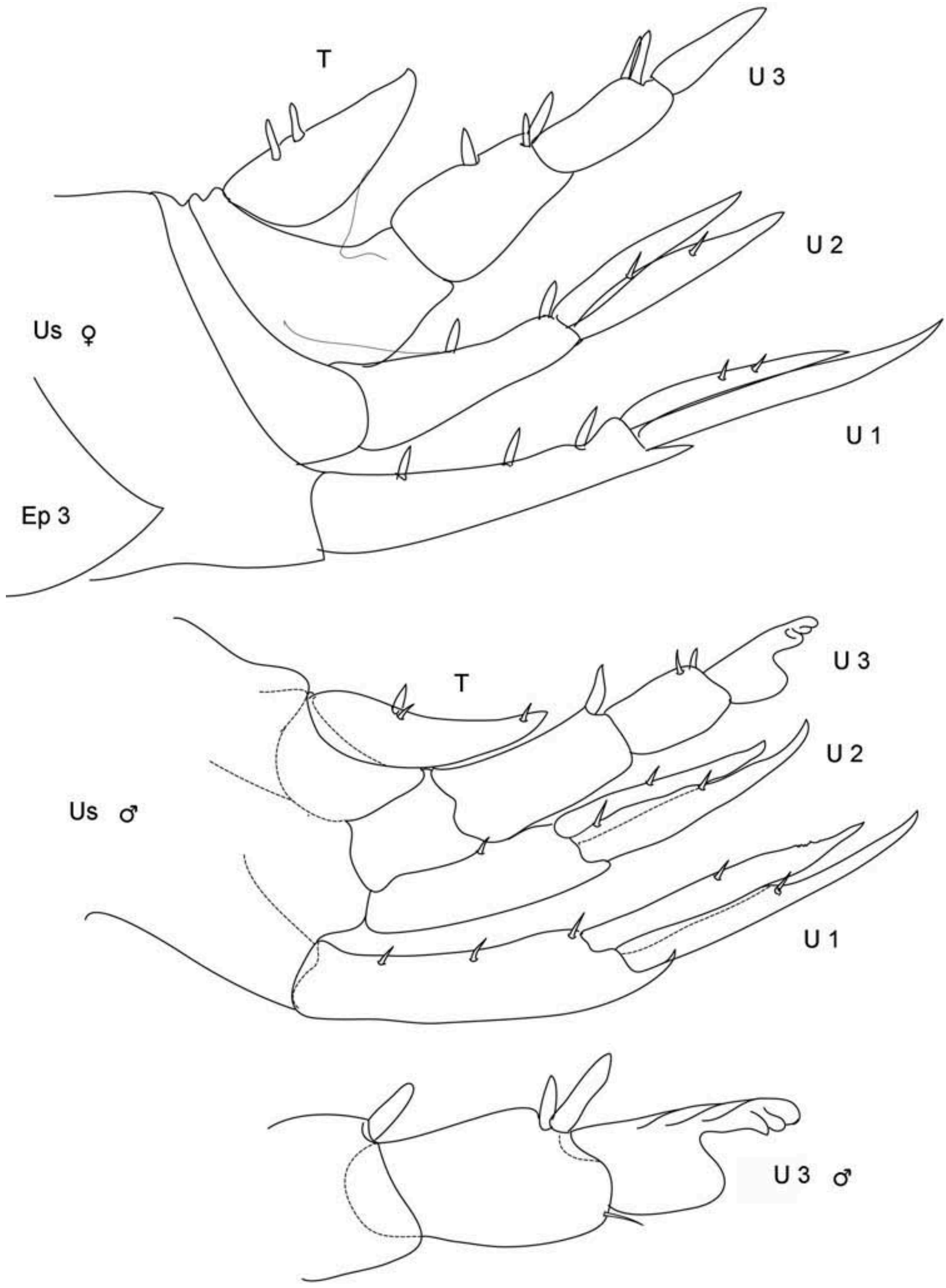


Figure 17. *Stenothoe himyara* n. sp., Red Sea. Ep 3 = third epimeral plate. Us = urosome of male and female. U1–3 = uropods 1–3; T = telson.

Head. Antennae: A 1 three times longer than head, about as long as head + peraeonites and clearly shorter than A 2. A 1 flagellum about 14 arts, A 2 flagellum about 11 arts.

Mouthparts: Md with lacking palp; Mx 2 plates in riding position; Mxp long and narrow, IP and OP vanishing.

Peraeon. Coxae: Cx 2 in both sexes longer than wide, anteriorly rounded; Cx 3 rectangular, more than twice as long as wide, Cx 4 smooth, shield-like and trapezium-shaped, wider than long. Gnathopods: Gn 1 propodus twice as long as wide, carpus triangular, merus on posterior margin beset with spines. Gn 2 female similar to Gn 1, merus less prominent, without spines and distally acute; propodus with smooth palm and strong defining spines on palmar corner. Gn 2 male propodus twice as long as Gn 1 propodus, in adult males propodus ratio l:b somewhat more than 2, distally near dactylus insertion no teeth or incisions, neither posterior margin nor dactylus inner margin beset with dense long setae; carpus triangular, shorter than wide; merus longer than wide, distally acute, posterior margin smooth.

Peraeopods: P 5 basis linear. P 6, 7 basis ovoid and subequal, less than twice as long as wide, posterior margin with small incisions; merus posterodistal corner widened and lengthened, reaching about one third to one half of carpus.

Pleon. Uropods: U 1 peduncle with spines, with distal spur, rami somewhat unequal, with few spines. U 2 similar to U 1, but without spur and shorter; U 3 in female peduncle with three strong spines, about the same length as ramus article 1 and the claw- or dactylus-like art 2. U 3 male peduncle is shorter than ramus, with one distal spine; art 1 is subequal art 2 in length and has two distal spines. The last article of the ramus U 3 shows a very peculiar shape being circularly rounded proximally and abruptly narrowed in about half of the length, with the distal half of about one third of the width, strongly sculptured and thumb-like rounded ending. Telson: triangular, with two pairs of spines.

Remarks

This quite small species has an astonishingly similar U 3 to the Atlantic new species *S. clavetta*, seemingly a useful convergent structure within the *S. gallensis* group (may be for fixing the body somewhere?). Otherwise, there are important differences, such as the length (*S.c.* twice as big), the Gn 2 in males (without special teeth or incisions in *S.h.*) and A 2 < A 1 in *S.h.*, vs subequal in *S.c.*

Distribution

Red Sea.

Stenothoe senegalensis n. sp.

(Figures 18–20; Table 1)

S. gallensis Reid 1951: 228 ff. part., fig. 27
? *S. uncinifera* Mateus & Mateus, 1966: 177–178, fig. 3–6

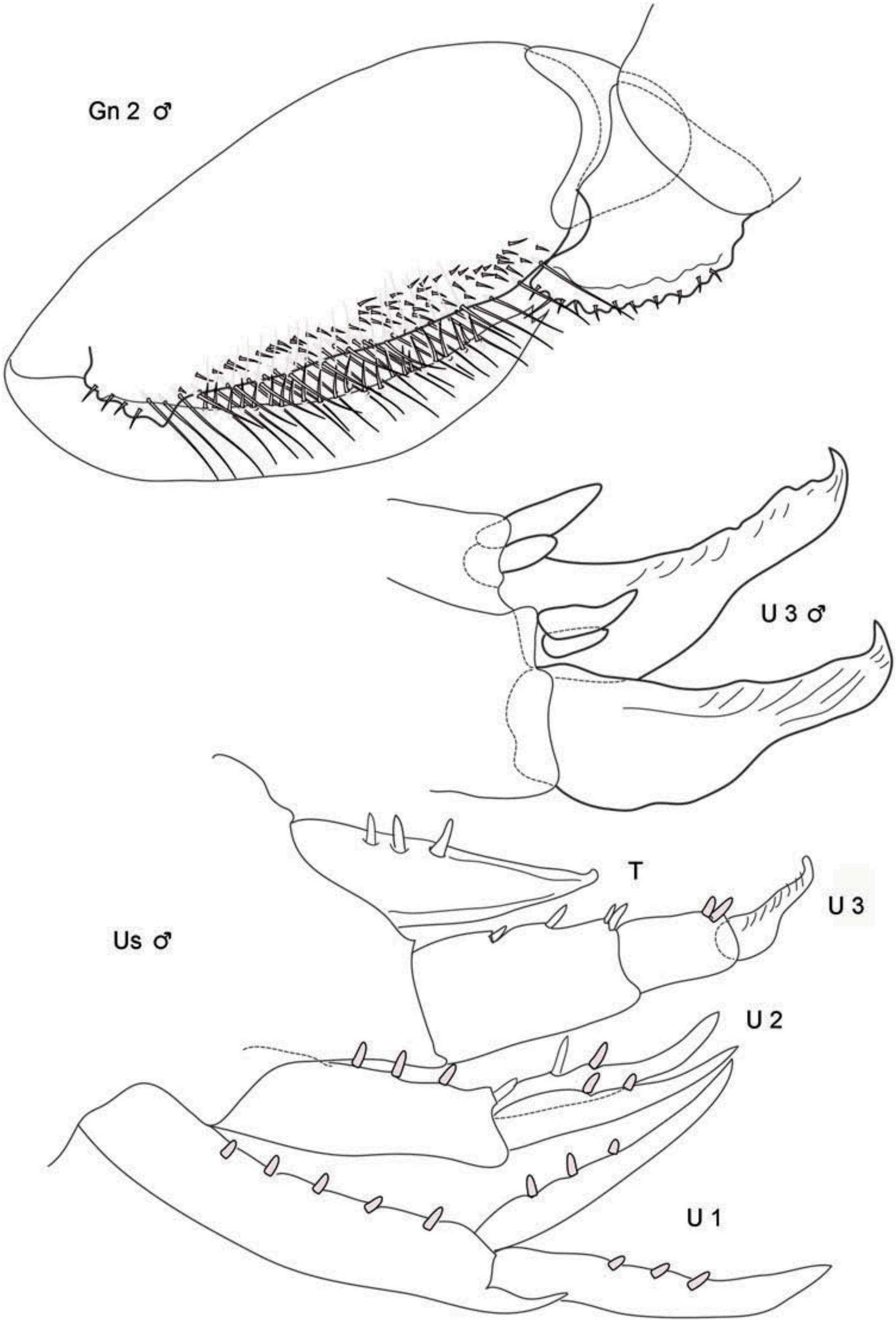


Figure 18. *Stenothoe senegalensis* n. sp., Senegal, male, 3 mm: Gn 2 = second gnathopod; Us = urosome; U 1, 2, 3 = uropod 1, 2, 3; T = telson.

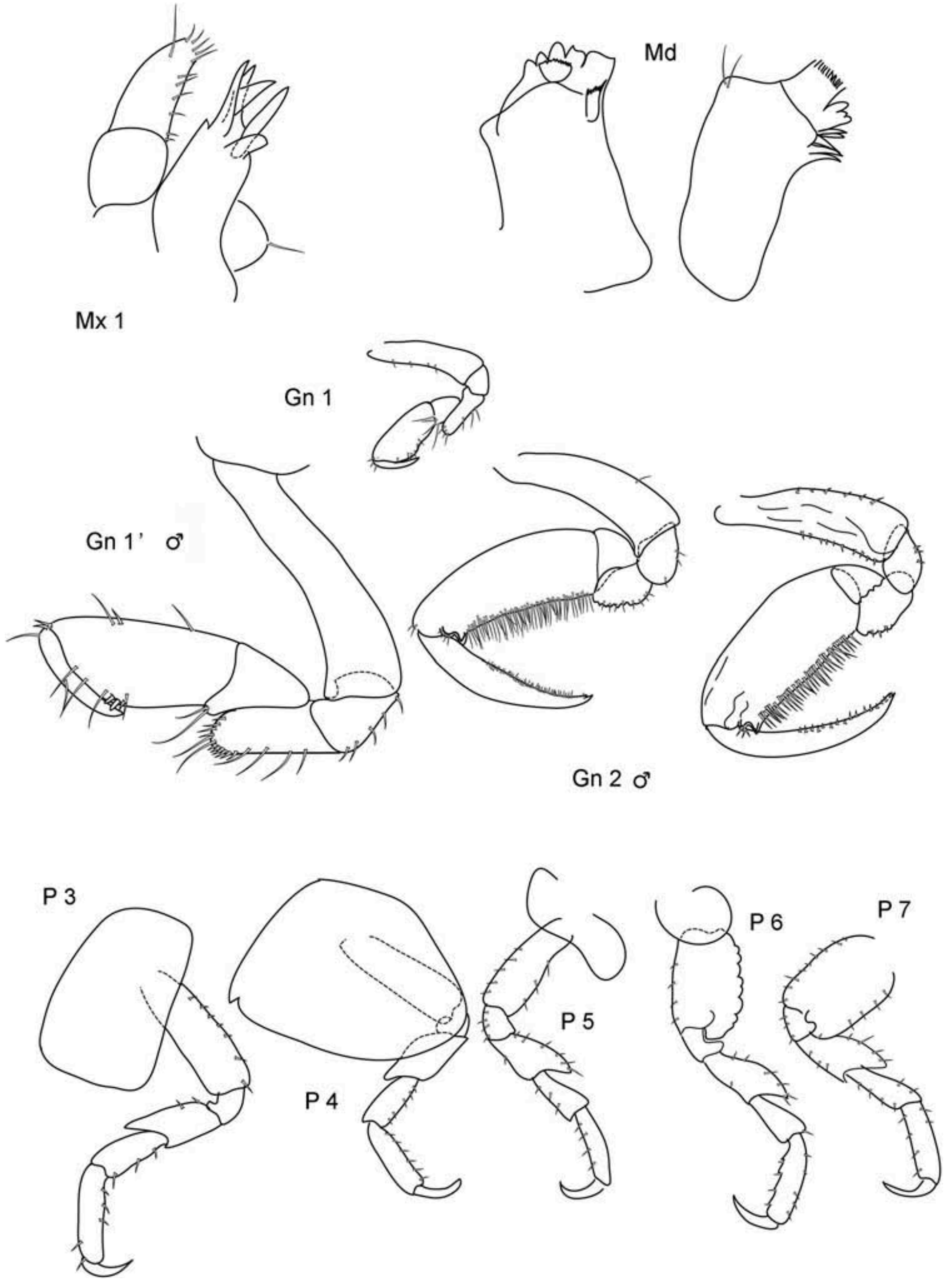


Figure 19. *Stenothoe senegalensis* n. sp., Senegal male: Mx 1 = maxilla 1; Md = mandible; Gn 1, 2 = gnathopod 1, 2; P 3–7 = peraeopod 3–7.

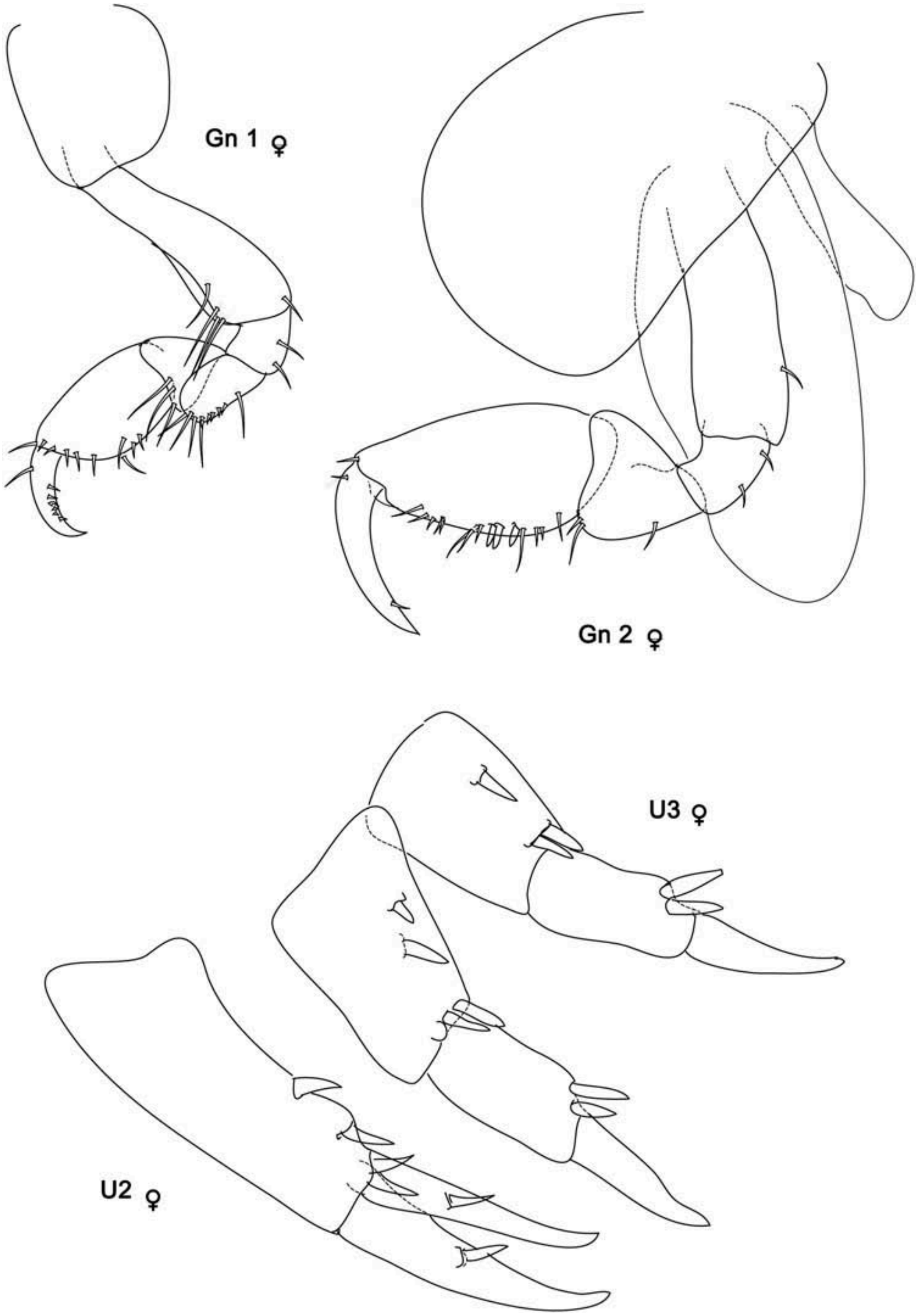


Figure 20. *Stenothoe senegalensis* n. sp., Senegal female: Gn1, 2 = first and second gnathopod; U2, 3 = second and third uropod.

Holotype

Male 3 mm from Tarrafal, Île de Santiago near Dakar, Sénégal (71) 30 m depth, 02/03/1954, J. Cadenat coll., slide MVRCr 7705.

Additional material

Male 3 mm from same locality as above: one slide MVRCr 7706; female ov. 2 mm, one Île de Gorée, Sénégal (50) from calcareous algae, 25/04/1953, J. Cadenat coll., slide MVRCr 7707.

About 100 males, females, juveniles from Île de Gorée, Sénégal (50) from calcareous algae, 25/04/1953, J. Cadenat coll.; in alcohol, MVRCr.

Etymology

After the type locality.

Description

In parentheses, some characters of *S. gallensis* and citation of Reid (1951, p. 228 ff.) about his '*S. gallensis*':

Length 3 mm.

Head. Eyes rounded, small (rather large in *S. gallensis*; Reid: small). Antenna 1 subequal to head and peraeonites 1–4 (vs longer in *S. gallensis*), flagellum with 12 arts (*S.g.* 22, Reid: 12). A 2 flagellum = peduncle (vs. > peduncle), flagellum with 14 arts (*S.g.* 18, Reid 14).

Peraeon. Peraeonite 4 wider than the ones before (vs not elongate, similar in length to peraeonite 3). Gn 1 length of propodus > length of merus + ischium together; length of propodus = 1.5× length of carpus (*S.g.* 3×). Gnathopod 2 male palm with two posterodistal humps, the proximal forming a right angle (vs without right angle). Gnathopod 2 female palm regularly rounded, smooth (see Reid 1951, fig. 27 g). Peraeopods: coxa 4 with notch on anterodistal corner; merus well produced distally (vs.only little produced distally), but not surpassing the middle of carpus; propodus clearly shorter than carpus + merus together (vs nearly as long as carpus + merus together).

Pleon. Uropods: U 1 not reaching end of U 3 (vs reaching end of U 3), with long peduncular spur. U 3 peduncle subequal to ramus (*S.g.* longer, Reid: the ramus is only a little, if at all, longer than the peduncle), with two robust spines along the upper margin and a pair on the distal margin (vs 5–6 spines); ramus art 1 with two distal spines (vs 1), ramus art 2 proximally much thicker than distally, with many coarse gutters, tip acutely uncinate (*S.g.*: upwardly bent in the middle and finely denticulate on the upper surface; Reid: serrated dorsally, proximal swelling ventrally).

Remarks

Reid (1951, p. 228) reports ovigerous females with 2 mm length and others with 5 mm length; thus, he clearly did not have only one species in his samples called '*S. gallensis*'. After the illustration of his *S. cattai* (p. 231, fig. 28), he probably had *S. valida* females (see below) in his collection of West African amphipods (sampling locality 11°54′ N, 17°14′ W, off Bathurst, Gambia), but the material of his '*S. gallensis*' matches the here-described animals from Senegal. The most striking differences from *S. gallensis* or from *S. valida* are the body length, the shape of Gn 2 female, basis and merus of P 7, the shape of U 2, U 3. Differences from *S. clavetta*: the serration on the coxae and the shape of U 3. In the present material, there is some crenulation but never the incisions of *S. clavetta*.

The material could belong to *Stenothoe uncinifera* Mateus and Mateus (1966, p. 177–178, fig. 3–6), but only one incomplete female was found and the description is poor and shows an artifact, ? damaged or malformed U 3 (sampling locality Ponta da Mina, île Principe). The shape of basis and merus P 7 is similar to that of *S. valida*, but otherwise the species belongs to the *S. gallensis* group.

Distribution

Senegal, Atlantic Ocean.

Herewith ends the description of various members of the *Stenothoe gallensis* group.

As the above-described material is quite close to the morphology of *S. valida* Dana (which has straight and unsculptured U 3 articles also in males, and thus does not belong to the *S. gallensis* group), a description of this species is herewith included:

Stenothoe valida Dana, 1852
(Figures 21–23)

S. validus Dana 1852: 311; Dana 1853: 924–925, pl. 63 fig. 1a–o.

Type locality

Rio de Janeiro.

Material examined

Nearly 200 spec. Hamilton Parish, Harrington Sound, behind Bermuda Aquarium, from hydroids 2/VI/1987; YPM IZ 20392.

Male 4.5 mm from Gorée (Senegal), calcareous algae, 25/04/1953, slide MVRCr 7675.

Female 4 mm from Gorée (Senegal), calcareous algae, 25/04/1953, slide MVRCr 7676.

? male 2 mm, fem. 3 mm Bonaire, Kralendijk near Pasanggrahan, 03–05/09/1930 NBCL (PWH).

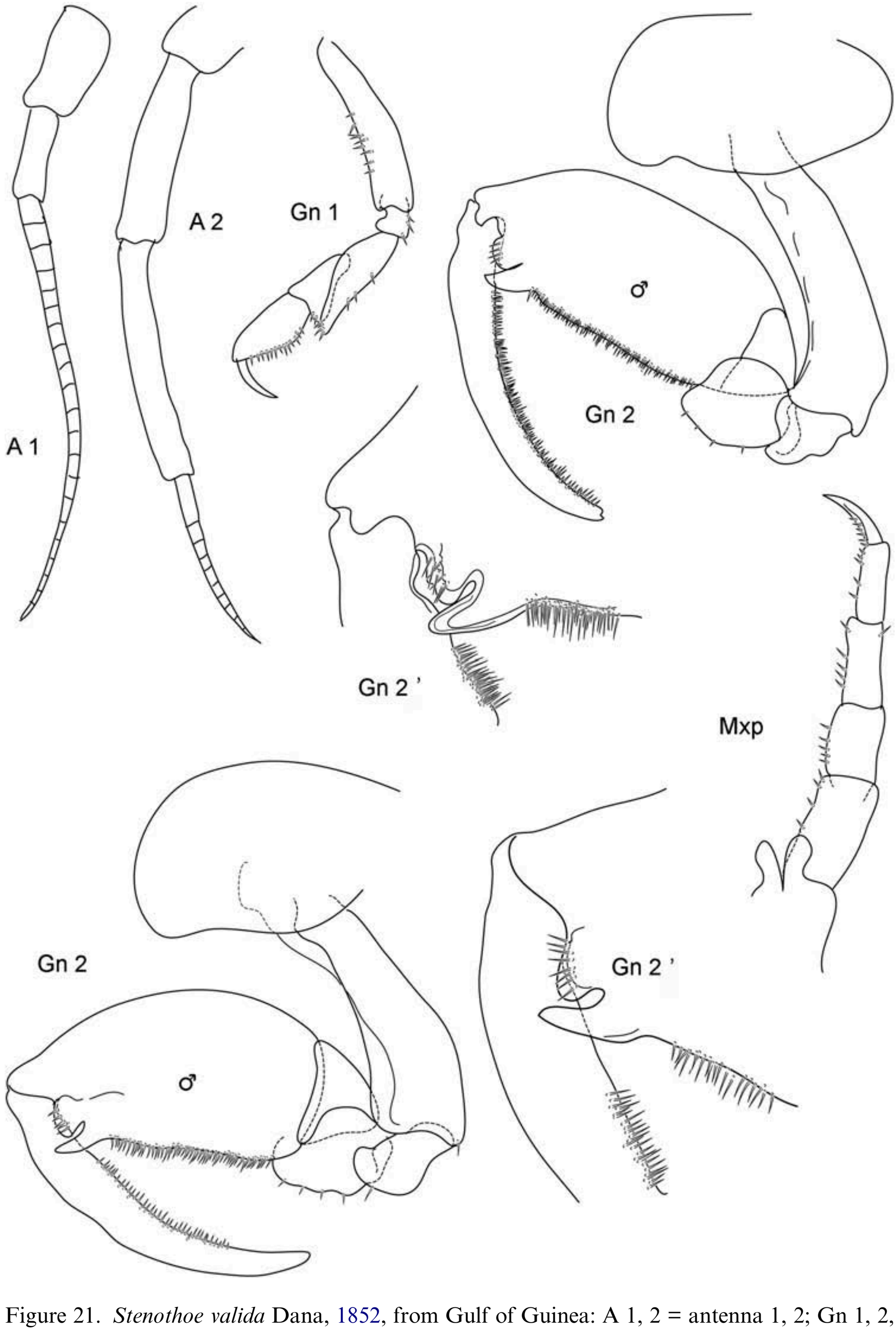


Figure 21. *Stenothoe valida* Dana, 1852, from Gulf of Guinea: A 1, 2 = antenna 1, 2; Gn 1, 2, Gn 2′ = first and second gnathopod, the latter enlarged; Mxp = maxilliped.

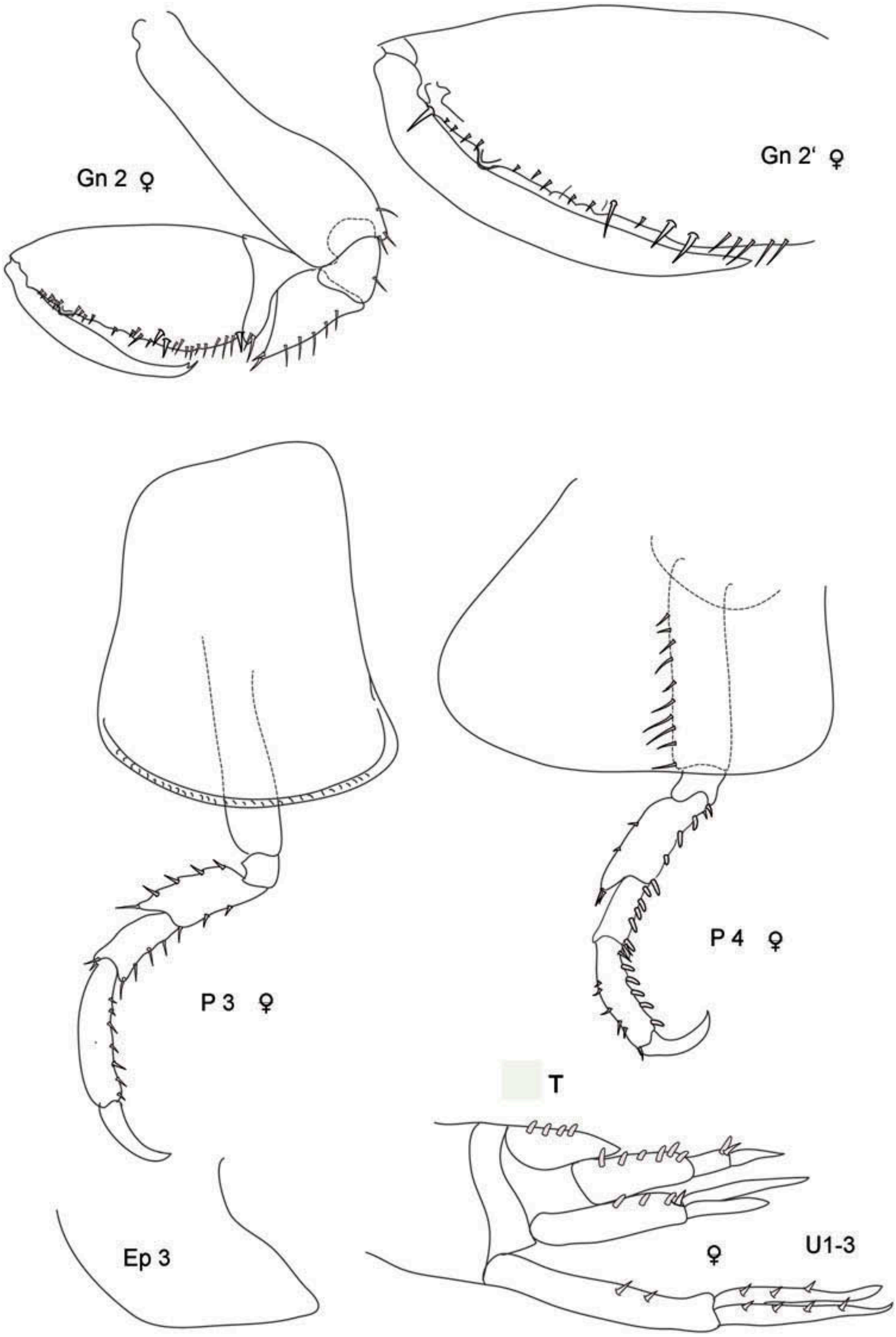


Figure 22. *Stenothoe valida* Dana, 1852, from Gulf of Guinea: Gn 2 female = second gnathopod of female, Gn 2′ partly enlarged; P 3, 4 = peraeopod 3, 4; Ep 3 = epimeral plate 3; Us = urosome; U 1, 2, 3 = uropods 1, 2, 3; T = telson.

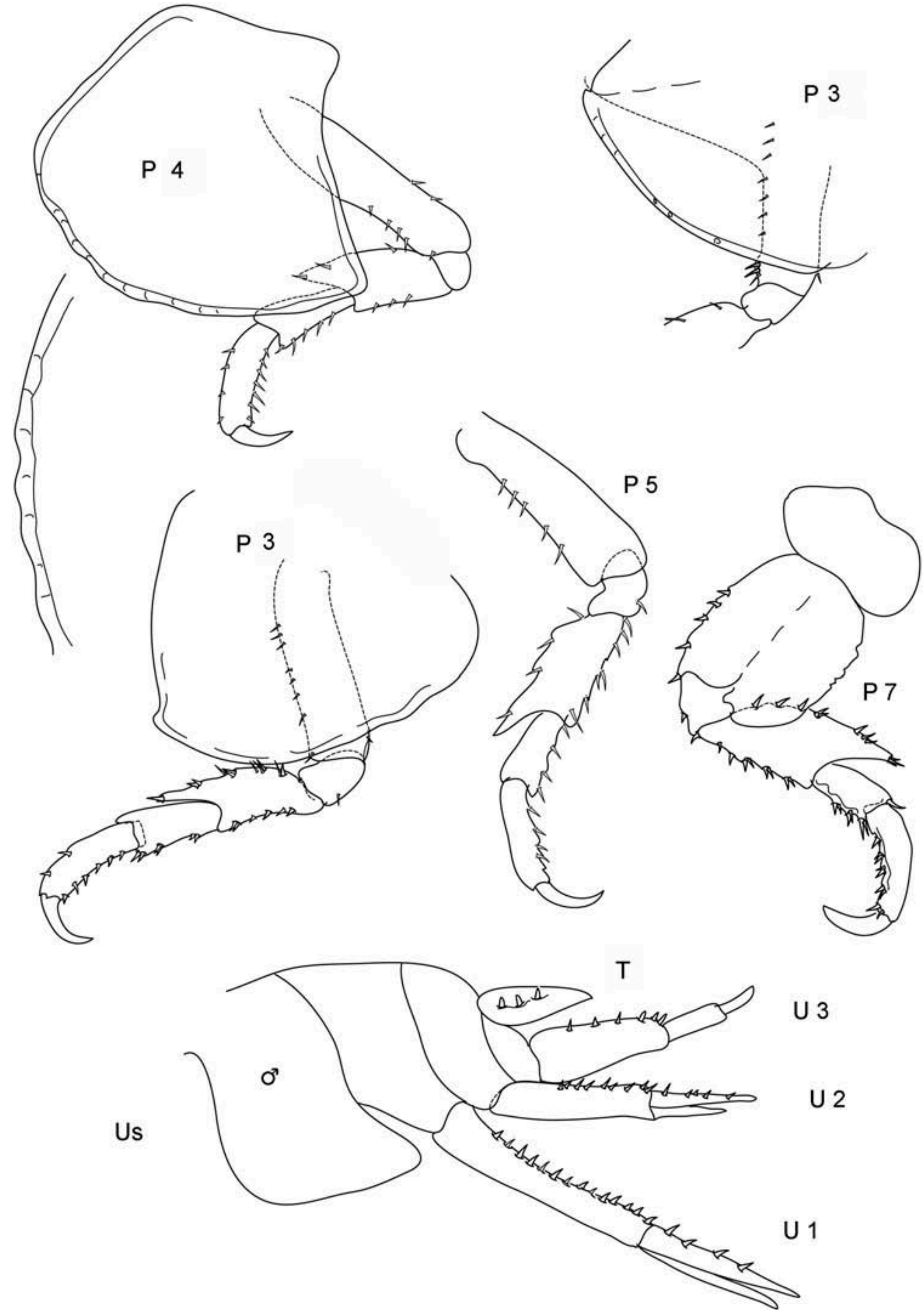


Figure 23. *Stenothoe valida* Dana, 1852, from Gulf of Guinea: P 3–7 = peraeopod 3–7; Us = urosome; U 1, 2, 3 = uropod 1, 2, 3; T = telson.

? male 3 mm Venezuela 1202 (between Aruba and Blanquila), mud without rock debris, mud, summer 1936, NBCL (PWH).
? fem. ov. 4 mm Barbados, Caribbean Sea without any details. NBCL (PWH).
? fem. ov. 3.5 mm, E- China Sea 25° 28′N, 120° 29′ E, NBCL (PWH).
? male 3 mm, harbour of Havelok, Andaman Islands, Bay of Bengal; coralligène, 1–8 m depth; coll. Ulrich Schiecke 22. XII.1978, slide MVRCr 7682.
? Two fem. ov. 3 mm, same locality, slide MVRCr 7708, 7709.

Remarks

Two characters are quite helpful for the determination: the widened and extremely lengthened merus of P 6, P 7 reaching the end of carpus, and male Cx 3 with margins not parallel, but rather triangular or even trapezium-shaped, not very different from Cx 4, while females have a rectangular Cx 3 like all other *Stenothoe* members. The first character is repeated everywhere in the literature, but the second one is barely described, though illustrated in Chevreux (1935, pl. 16), Barnard (1953, pl. 15; 1970, fig. 165) and Krapp-Schickel (1976, fig. 21).

The information about the length varies from '3–4 lines' given in the description by Dana, 1853 (meaning about 30–40% of an inch probably, thus up to 7.5–8 mm), 5–6 mm in Chevreux and Fage, 1925, up to 8 mm in Lincoln 1979, 5–6 mm in Krapp-Schickel 1993.

Also Reid (1951, p. 231, fig. 28) found *S. valida* in his samples, besides material of *S. senegalensis* n. sp.

Three differences to the original description of *S. valida* Dana are (1) very large round dark-pigmented eyes; (2) the body length (here 3–4.5 mm; in *S. valida* the original description reports '3–4 lines', which means up to 7.5–8 mm); and (3) the shape of Gn 2 female. For this last character, Dana (1853, p. 924) writes: 'palm nearly straight', and the margins of propodus and dactylus are densely beset with setae like in male; here Gn 2 propodus hind margin is regularly rounded, the propodus is medially the widest and shows a triangular hump. But all this variation could depend on allometry.

Not only in the samples of Reid, but also in the material studied here from Senegal, the two stenothoids *S. senegalensis* n. sp. and *S. valida* were living together. For distinguishing them it is helpful to look at the following characters: ovigerous females of *S. senegalensis* less than 3 mm, in *S. valida* more than 3 mm; U 3 male in *S. senegalensis* uncinate, in *S. valida* always straight; U 2 in *S. senegalensis* with subequal rami, in *S. valida* rami clearly unequal; Gn 2 female in *S. senegalensis* with rounded and smooth palmar margin, in *S. valida* with triangular hump or more elevations near dactylus insertion; eyes in *S. senegalensis* of normal size, in *S. valida* large and dark pigmented; P 7 in *S. senegalensis* basis always longer than wide, in *S. valida* strongly widened, merus in *S. senegalensis* never reaching carpus, in *S. valida* much widened, lengthened and usually reaching carpus.

Three specimens found at the Andaman Islands fit quite well the description of the morphology of *S. valida*; however, they are only about 3 mm and P 6, 7 basis is still wider; Gn 2 propodus of ovigerous females has a slightly different shape, not being widest in the middle, but towards the proximal end. But the three specimens are too few for judging if these character states are stable or variable.

I have the strong suspicion that not only has *Stenothoe gallensis* erroneously been called cosmopolitan, but *Stenothoe valida* too may well be a group of morphologically extremely similar species living in different regions of the world. I give here all the citations I know about this species, ordered by geographical region. Maybe they can be helpful in this 'detective' task.

(1) Mediterranean and Atlantic Ocean:

Dana (1852, p. 311; 1853, p. 924, pl. 63); Bate (1862, p. 60–61, pl. 9, fig. 6); Stossich (1880, p. 246); Carus (1885, p. 407); Della Valle (1893, p. 566–568, pl. 58, figs. 74–78); Graeffe (1902, p. 22); Stebbing (1906, p. 194); Chevreux (1908, p. 4–8, figs. 4–6 (*S. assimilis*); 1913, p. 2–3; 1935, p. 81–84, p. 16, figs. 7, 12, 30, t. 16); Walker (1910a, p. 621–622, fig. 1; 1910c, p. 31–32); Chevreux and Fage (1925, p. 138, fig. 137); Giordani-Soika (1949, p. 187–188); Spooner (1950, p. 249–250); Barnard (1953, p. 83–84, fig. 15; 1970, p. 250–251, fig. 165); Krapp-Schickel (1976, p. 24–27, fig. 19–21; 1993, p. 706–708, fig. 485); Ledoyer (1977, p. 409); Diviacco (1979, p. 96, t. 1); Lincoln (1979, p. 198, fig. 90); Diviacco (1983, p. 89–91, fig. 3, t. 1).

(2) South Africa:

K.H. Barnard (1925, p. 345–346); Griffiths (1974a, p. 200, 202; 1974b, p. 252; 1975, p. 168).

(3) Australia–New Zealand:

Chilton (1924, p. 270); Hale (1927, p. 314, fig. 3); Barnard (1972b, p. 158; 1974, p. 129).

(4) Pacific Ocean:

J.L. Barnard (1953, p. 83–87, pl. 15; 1959, p. 21; 1961, p. 178; 1964, p. 105; 1971, p. 122).

(5) Indian Ocean:

Schellenberg (1928, p. 641); Ledoyer (1967, p. 125, fig. 4b; 1979, p. 133; 1986, p. 975–977, fig. 385); Sivakrakasam (1969, p. 373–376, figs. 2A, B).

Distribution

Until now seen as cosmopolitan, which is questionable.

Here follow some other members of *Stenothoe* for clearing up discovered taxonomic problems or streamlining the species' distinctions.

Stenothoe aucklandica Stephensen, 1927
(Figure 24)

Stenothoe aucklandica Stephensen 1927: 311–313, fig. 8
Stenothoe aucklandica var. *falklandica* Schellenberg 1931: 113–114, fig. 61
J.L. Barnard 1972b: 157

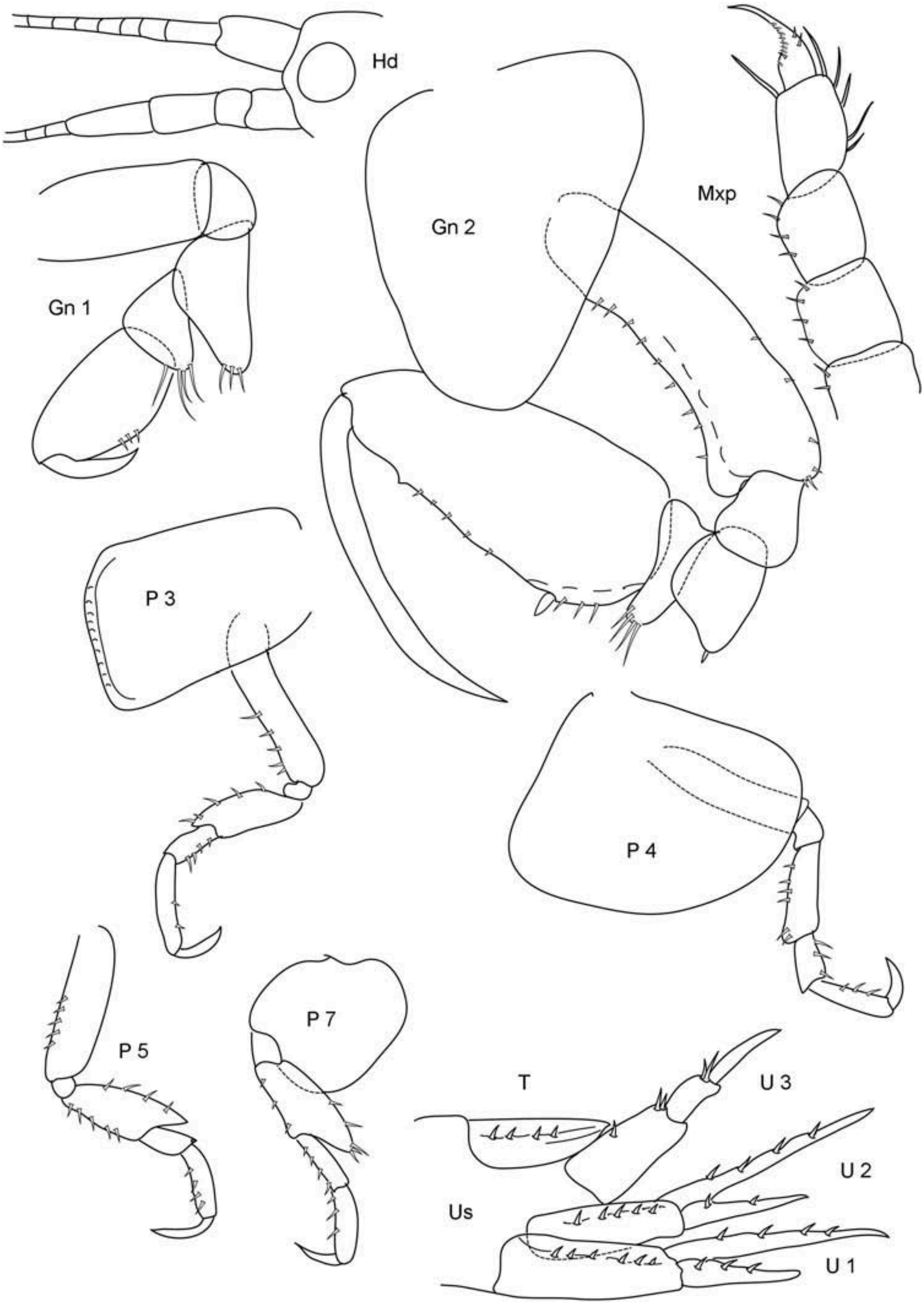


Figure 24. *Stenothoe aucklandica* Stephensen, 1927: Hd = head, Mxp = maxilliped; Gn 1, 2 = gnathopods 1, 2; P 3–7 = peraeopod 3–7; Us = urosome; U 1–3 = uropod 1–3; T = telson.

Material examined

Auckland Islands, Feb. 1973 Jim Lowry coll., sandy bay (1 slide); Auckland Islands red algae on rock, 0–2 m, Feb. 1973 Jim Lowry coll. (2 slides), both deposited at the AMS.

Falkland Islands det. Schellenberg (1 slide), deposited at SNM.

All the studied material matches the original description of *S. aucklandica* except the unequal rami of U2, which are defined for *S. aucklandica* var. *falklandica* Schellenberg, 1931 from the Falkland islands as different from those of *S. aucklandica*, but are equal also to the Falkland material studied here, and the reported ovoid bases on P 6, 7, which are here nearly circular.

Thus, the variety *S. a. falklandica* is withdrawn.

Distribution

Auckland and Falkland Islands.

Stenothoe macrophthalma Stephensen, 1931
(Figure 25)

Stenothoe macrophthalma Stephensen 1931: 196, fig. 58.

Material examined

I checked and illustrated this single specimen, deposited at SNM, with more details than in the original description.

Type locality

North Atlantic.

Distribution

After 1931, I am unaware of any recorded specimens other than the single holotype, found at 60–65°N, 0–45°W at 425 m depth in the bathyal of the North Atlantic.

Stenothoe verrucosa Krapp-Schickel, 2009c

Stenothoe verrucosa Krapp-Schickel 2009c: 98–100

Material examined

Three specimens Nagasaki, deposited at SNM.
One specimen East China Sea, deposited at SNM.

Type locality

Southeast Indonesia.

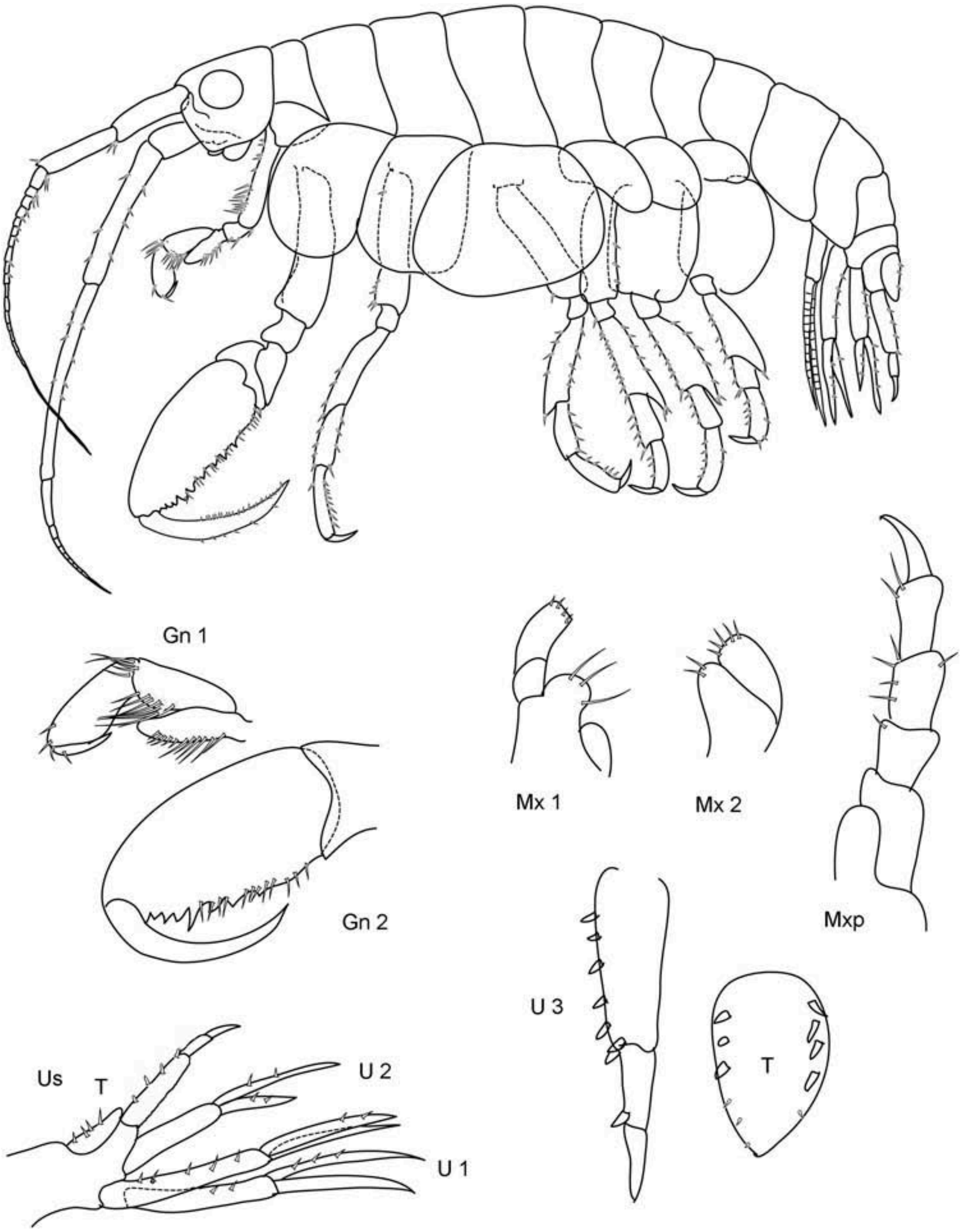


Figure 25. *Stenothoe macrophthalma* Stephensen, 1931: Mx 1, 2 = maxilla 1, 2; Mxp = maxilliped; Gn 1, 2 = gnathopod 1, 2; Us = urosome; U 1–3 = uropod 1–3; t = telson.

Remarks

Morphologically, this species is astonishingly similar to the above-cited *S. macrophthalma*, besides the much smaller size of 3.5 mm, Cx 3 not rectangular but trapezium-shaped and A 2 peduncle art 5 short. In the present specimens, the name-giving 'warts' on Gn 2 palm are always present, but never the ones on A2 peduncle; thus, the shape of antenna 2, described and photographed in the original paper (Krapp-Schickel 2009c), could be an anomaly or depend on allometric growth.

Distribution

Pacific Ocean: Indonesia, East China Sea.

Stenothoe frecanda Barnard, 1962

Stenothoe frecanda Barnard 1962: 151, fig. 18; Barnard 1966: 31

Material examined

32 males, females, juveniles, Sanur/Bali/Indonesia, algae 3 m depth, July 1993, coll. Krapp. Together with *S. crenulata* Chevreux. Deposited at MVRCr.

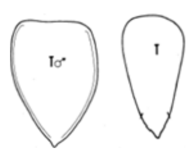
Remarks

As far as I know, no other localities were cited until now besides the Californian coast from Monterey Bay to South California shelf, 64–92 m depth.

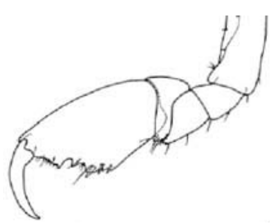
Distribution

California, Indonesia; 3–92 m depth.

Key to Mediterranean–Atlantic _Stenothoe_ species with telson without spines (but there may be marginal setae)
(four Atlantic ones plus three Mediterranean endemics):



1. Gn 2 propodus in male with 1–2 U-shaped incisions in the middle of the palm; in female smooth .... ***S. cavimana*** **Chevreux, 1908** (2–2.2 mm)

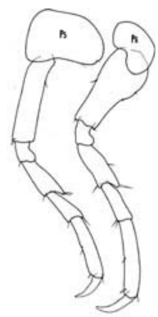


- Gn 2 propodus palm not U-shaped incised 2

2. P6, 7 basis hind margins rounded 3
- P6, 7 basis hind margins not regularly rounded 4

3. Gn 1 with palmar corner of about 90°; Gn 2 palm proximally with shallow excavation; U 3 peduncle much longer and thicker than ramus .... ***S. brevicornis*** **Sars, 1883** (8 mm)
- Gn 1, 2 palmar corner clearly wider; Gn 2 palm without excavation; U 3 peduncle shorterthan ramus [with pair of setae] ..... ***S. monoculoides*** **(Montagu, 1813)** (3 mm)

4. P 6 basis rectolinear like P 5, hind margin totally straight [P 7 basis hind margin proximally rounded, distally narrow and straight; T with pair of setae] .... ***S. pieropan*** **Krapp-Schickel, 1996b**
- P 6 basis hind margin proximally rounded, distally narrow and straight 5



5. P 6 and P 7 basis hind margin proximally rounded, distally narrow and straight [eyes reduced] .... ***S. elachistoides*** **Myers & McGrath, 1980** (1.4 mm)
- P 6 basis hind margin proximally rounded, distally narrow and straight, P 7 basis hind margin regularly rounded 6

6. Telson l:w = 2, with pair of fine marginal setae on distal quarter; U 2 longer ramus clearly shorter than peduncle; P 7 basis strongly widened and posteriorly regularly rounded .... ***S. elachista*** **Krapp-Schickel, 1976** (1–1.5 mm)
- Telson l:w < 2, margin naked; U 2 longer ramus about as long as peduncle; P 7 basis weakly widened and posterior margin mostly straight .... ***S. mandragora*** **Krapp-Schickel 1996b** (1.3–2 mm)

There are only two more species worldwide without spines on the telson, *S. hansgeorgi* Krapp-Schickel, 2006b from Australia and *S. inermis* from the Indian Ocean. All the other species have spines on the telson.

Key to Mediterranean–Atlantic *Stenothoe* species with submarginal spines and marginal setae on the telson

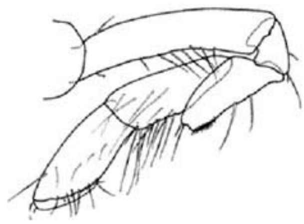
(The 24 species cited above for the Atlantic plus *S. bosphorana*, Mediterranean endemic)

1. Body carinate .... ***S. richardi*** **Chevreux, 1895** (5 mm)
- Body smooth 2

2. Peraeopods prehensile .... ***S. symbiotica*** **Shoemaker, 1956** (7 mm)
- Peraeopods not prehensile 3

3. Eyes totally lacking .... ***S. marvela*** **Bellan-Santini, 2005** (4 mm)
- Eyes present 4

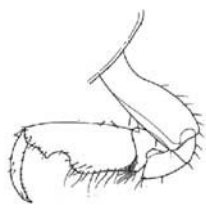
4. Gn 1 carpus free posterior margin parallel to anterior one 5



- Gn1 carpus posterior margin mostly hidden by merus 6

5. A 1, 2 short, robust; P 7 merus widened but not reaching distal end of carpus ... . ***S. antennulariae*** **Della Valle, 1893** (1.5 mm)
- A 1, 2 long, slender; P 7 merus reaching distal end of carpus. .... ***S. bosphorana*** **Sowinski, 1898** (3–4 mm)

6. Gn 2 propodus male, female with semicircular excavation 7



- Gn 2 propodus not as above 8

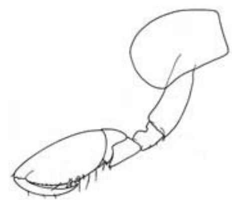
7. Gn 2 propodus male, female semicircular excavation on distal half of propodus, palm smooth .... ***S. dollfusi*** **Chevreux, 1887** (3 mm)
- Gn 2 propodus male, female excavation in the middle or proximal part of propodus, palm distally with many teeth ... ***S. divae*** **Bellan-Santini, 2005** (6 mm)

8. Gn 2 propodus female with wide, regular and very shallow excavation, palm smooth (male unknown) .... ***S. menezgweni*** **Bellan-Santini, 2005** (5 mm)
- Gn 2 not excavated 9

9. Gn 2 male, female palm straight, clear defined palmar corner .... ***S. minuta*** **Holmes, 1905** (2 mm)
- Gn 2 male, female palm corner lacking 10

10. Gn 2 in male like in female posterior margin of propodus regularly rounded 11
- Gn 2 in male propodus not regularly rounded, but with serrations, irregular incisions, easily visible humpsor teeth) 12

11. Sexually dimorphic, Gn 2 male larger than in female, in both sexes propodus hind margin smooth; in male length of Cx 2 and Gn 2 propodus similar; U 3 peduncle about twice as wide, beset with long spines [common in algae] .... ***S. tergestina*** **(Nebeski, 1880)** (3 mm)



- Not sexually dimorphic; Gn 2 hind margin with tiny triangular hump(s) at scarcely defined palmar corner; Cx 2 much longer than Gn 2 propodus; U 3 peduncle slender, about three times as long as wide, with short spines [living in anemones] .... ***S.*** **n. sp. Krapp-Schickel & Vader** in prep. (3 mm)

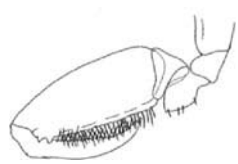
12. Gn 2 dactylus ending at palmar corner in about half length of propodus posterior margin 13
- Gn 2 dactylus ending at proximal end of propodus posterior margin 14

13. Gn 2 male (females unknown) palm very finely serrated, U 3 peduncle longer than ramus .... ***S. coutieri*** **Chevreux, 1908** (6 mm)
- Gn 2 female (male unknown) palm irregularly strongly serrate; U 3 peduncle subequal to ramus .... ***S. stephensen*** **Reid, 1951** (2 mm)

14. Gn 2 male palm straight, on palmar corner a semicircularly rounded spinose hump; P 7 merus lengthened but not widened; U 3 peduncle shorter than ramus .... ***S. georgiana*** **Bynum & Fox, 1977** (3.5 mm)
- Gn 2 not as above 15

15. Gn 2 male propodus with prominent tooth/teeth on distal end of propodus, followed by a corner 16

- Gn 2 propodus male serrated or incised, but no prominent corner 21



16. Gn 2 propodus with rectangular palmar corner,palm with distally narrow U-shaped excavation, followed by prominent tooth 17

- Gn 2 propodus without U-shaped excavation 18

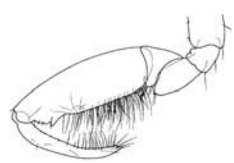
17. P 7 merus distoposterior corner strongly lengthened and widened, posterodistally reachingnearly end of carpus; Gn 1 basis with groups of short setae .... ***S. valida*** **Dana, 1852** (5–8 mm)

- P 7 merus widened but not much lenthened; Gn 1 basis with few short setae .... ***S. senegalensis*** **n. sp.**
- P 7 merus very narrow, not widened nor lengthened; Gn 1 basis with regular setation along whole margin .... ***S. tenella*** **Sars, 1883** (5.5 mm)

18. Gn 2 male dactylus as long as propodus 19
- Gn 2 male dactylus shorter than propodus 20

19. Gn 2 male palmar corner totally lacking; Gn 2 male palm straight, distally with minute triangular tooth near dactylus insertion; Gn 1 merus more than twice as long as wide; U 3 peduncle elongate, about 4 times as long as wide; U 3 art 1 without spines, art 2 straight .... ***S. frecanda*** **Barnard, 1962** (3–3.6 mm)
- Gn 2 male with short palm defined by small triangular tooth; Gn 1 merus less than twice as long as wide; U 3 peduncle conical, about 2–3 times as long as wide; U 3 art 1 spinose, art 2 curved and finely sculptured .... ***S. cattai*** **Stebbing, 1906** (3–5 mm)

20. Gn 2 male palm with scattered setae, slightly serrate; dactylus with few very short setae; P 7 merus strongly lengthened and widened, reaching end of carpus; antennae short and robust, U 3 peduncle robust and longer than rami .... ***S. crassicornis*** **Walker, 1897** (2 mm)
- Gn 2 male propodus and dactylus densely beset with long setae; dactylus with long setae. P 7 merus not widened, scarcely lengthened; U 3 peduncle slender, about as long as ramus .... ***S. eduardi*** **Krapp-Schickel 1976** (4 mm)



21. Gn 2 palm concave [in female palm regulularly serrate, in male 3 times U-shaped incised. P 7 merus not widened nor lengthened; U 3 peduncle much longer than ramus] .... ***S. megacheir* (Boeck, 1871)** (8 mm)
- Gn 2 propodus straight 22

22. U 3 ramus art 2 curved and sculptured, proximally thickened, distally abruptly narrowed, apical end thumb-like .... ***S. clavetta* n. sp.** (2.5–3.5 mm)
- U 3 ramus art 2 straight and not sculptured 23

23. Very big eyes; A 2 peduncle art 5 > art 4 [Gn 2 palm partly serrated, with several triangular elevations] .. ***S. macrophthalma* Stephensen, 1931** (single male) (7 mm)
- Eyes not very big; A 2 peduncle art 5 not longer than art 4 24

24. Eyes normal; A 2 peduncle art 5 = art 4; Cx 2 in male and female posteriorly excavated .... ***S. marina* (Bate, 1857)** (4 mm)
- Eyes very small; A 2 peduncle art 5 < art 4; Cx 2 in female posterior margin convex .... ***S. microps* Sars, 1895** (only female, 8 mm)

Key to Pacific *Stenothoe* species

1. U 3 male ramus art 2 somewhat curved, on inner side rugose 2

- U 3 male ramus art 2 straight, not sculptured 3

2. Gn 2 propodus male and female similar, proximally rounded and distad continuously narrowing, hind margin smooth. Telson distally rounded .... ***S. dentirama* Hirayama & Takeuchi** (2 mm)
- Gn 2 propodus male and female dissimilar: in female hind margin regularly rounded, in male totally straight or even slightly concave, distally near dactylus insertion two sharp teeth .... ***S. crenulata* Chevreux, 1908** (3 mm)

3. Gn 2 male and female with clear palmar corner 4
- Gn 2 male and female without palmar corner 5

4. A 1 in male clearly longer A 2; Gn 1 merus reaching distal carpus; Gn 2 palm straight or convex .... ***S. garpoorea* Krapp-Schickel, 2009c** (2.5 mm)
- A 1 shorter A 2; Gn 1 merus not reaching distal carpus; Gn 2 palm in male concave .... ***S. estacola* Barnard, 1962** (3 mm)

5. Gn 1 propodus rectangular, anterior and posterior margin parallel, with clear palmar corner; Gn 1 merus not reaching end of carpus; Gn 2 propodus hind margin rounded, without any tooth .... ***S. haleloke* Barnard, 1970** (3 mm)

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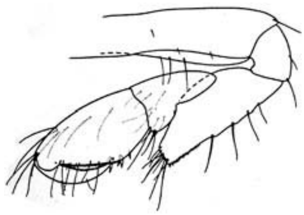
Gn 1 propodus without strong palmar corner, carpus and merus lengthened, merus reaching end of carpus; Gn 2 propodus not smooth 6



6. Gn 2 propodus male with one acute distal tooth followed by deep incision and 1–2 blunt elevations near dactylus insertion; in female blunt elevation in the middle of palm; Cx 3 rectangular .... ***S. kaia*** **Myers, 1985** (4.2 mm)
- Gn 2 propodus male without acute tooth; Cx 3 trapez-shaped, distad widening ... 7

7. Gn 2 in male propodus hind margin with many small 'warts' (sometimes also found on peduncle A 2) .... ***S. verrucosa*** **Krapp-Schickel, 2009c** (3.5 mm)
- Gn 2 propodus in male on distal end of smooth and straight hind margin with one triangular elevation near dactylus insertion. ***S. frecanda*** **Barnard, 1962** (3.6 mm)

Key to *Stenothoe* from Australia and New Zealand

1. Telson naked; Gn 2 male palm with two deep excavations .... ***S. hansgeorgi*** **Krapp-Schickel, 2006b** (3.5–4 mm)
- Telson with spines and setae; Gn 2 never deeply excavated 2

2. U 3 ramus art 1 with three groups of spines along the margin .... ***S. quabara*** **Barnard, 1974** (3 mm)

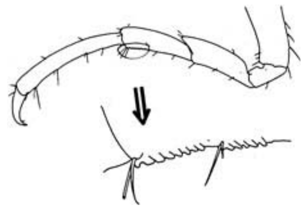
- U 3 ramus art 1 only distal spines 3

3. Gn 1 length of merus, carpus and propodus subequal. Gn 2 palm in both sexes coarsly serrated. Trapez-shaped Cx 3 on distal margin stiffened by 'stridulation ridges'. P 7 basis posteriorly broadened and much lengthened, merus distally reaching proximal end of propodus .... ***S. penelopae*** **Krapp-Schickel, 2006b** (2–3 mm)
- Gn 1 propodus always longer than carpus and merus. Gn 2 palm with or without distal tooth, but never regularly serrated. P 7 basis neither much broadened nor much lengthened, merus never reaching propodus 4

4. Gn 2 palm distally with one (more or less) prominent tooth..........................5
- Gn 2 palm smooth 6

5. Gn 2 propodus also in adults with few short setae and small triangular hump distally .... ***S. aucklandica*** **Stephensen, 1927** (2.5 mm)
- Gn 2 propodus of adults with long setae, distal tooth followed by V-shaped incision .... ***S. miersi*** **(Haswell, 1879)** (3.5 mm)

6. P 3–4 carpus disto–posterior margin and P 5–7 carpus disto-anterior margin with stridulating humps; merus poorly produced ...... ***S. moe*** **Barnard, 1972a** (3 mm)
- P 3–7 carpus smooth 7



7. U 2 rami subequal; A 1 < A 2; T ratio l: w = 9: 4 . ***S. allinga*** **Barnard, 1974** (4 mm)
- U 2 rami clearly unequal; A 1 subequal A 2; T ratio l: w = 9: 5 .... ***S. nonedia*** **Barnard, 1974** (3 mm)

Key to *Stenothoe* species from the Indian Ocean

1. Telson naked. P 3–7 naked. U 3 naked, ramus art 2 straight and smooth .... ***S. inermis*** **Ledoyer, 1979** (3 mm)
- Telson, peraeopods and U 3 with spines 2

2. U 3 ramus art 2 slender, along the distal ¾ of inner margin fine transverse sculptures .... ***S. gallensis*** **Walker, 1904** (5–6 mm)
- U 3 ramus art 2 in male medially thickened, with thick sculptures 3

3. U 3 ramus art 2 in male medially widened, distad gently narrowing; U 1 without peduncular spur. Gn 2 in both sexes propodus narrow, palm somewhat convave .... ***S. andamanensis*** **n. sp.** (2 mm)
- U 3 ramus art 2 in male medially abruptly narrowing, second half of article with only 1/3 of width of the first one. U 1 with peduncular spur. Gn 2 female propodus regularly rounded .... ***S. himyara*** **n. sp.** (1.5–2 mm)

Key to *Stenothoe* species from the Subantarctis

1. Gn 2 propodus posterior margin in both sexes beset with long dense setae, at about anterior third (female) or anterior quarter (male) an acute and clearly prominent long tooth .... ***S. sivertseni*** **Stephensen, 1949** (2.5–3 mm)
- Gn 2 propodus sculptured, but without prominent tooth 2

2. Gn 2 palm in both sexes with defined palmar corner, remaining hind margin of propodus about same length as palm. U 3 peduncle length subequal to ramus, on peduncle one distal and one medial group of spines. Eyes normal, rounded .... ***S. magellanica*** **Rauschert, 1998** (2.2 mm)
- Gn 2 palm without palmar corner, dactylus subequal in length to total propodus hind margin. U 3 peduncle unusually lengthened and thickened, along the margin beset with about 7 spines. Eyes very large .... ***S. adhaerens*** **Stebbing, 1888** (4 mm)

Among the material from Senegal, I found still another species, formerly placed within the genus *Stenothoe:*

Parametopa Chevreux, 1901

Included species: *P. alaskensis* (Holmes, 1904); *P. crassicornis* Just, 1980; *P. kervillei* Chevreux, 1901.

Diagnostic characters

Antennae subequal. Mandible without palp, molar protruding, small. Maxilla 1 palp with one article. Gn 1 simple to subchelate, merus lengthened, partially to totally covering carpus posteriorly. Gn 2 subchelate to parachelate. P 5 basis rectilinear, P 6–7 basis widened and rounded.

Parametopa gorea n. sp.
Figures 26, 27

Holotype

Adult specimen 3 mm from Gorée (island near Senegal) 17–3-53, 'contenu stomacal de *Spondyliosoma cantharum*', slide MVRCr 7671.

Additional material

Fem. ov. 3 mm, fem. 2.5 mm, same locality, stored in alcohol at MVRCr.

Etymology

Collected on the coasts of Gorée, Italian Gorea, a small island off the coast of Senegal.

Diagnosis

Gn 1 propodus subchelate, merus reaching end of carpus; Gn 2 propodus anterior and posterior margin parallel, palm oblique, with several incisions and humps; basis with many robust spines on anterior margin; U 1–3 and T strongly spinose.

Description

Length. 2.5–3 mm.

Head. Antennae subequal in length, length of A 1 ped. art 1 = art 2, art 3 about one third; flagellum with 14 arts. A 2 peduncle art 4 somewhat longer than art 5, flagellum with eight arts. Mouthparts: Mx 1 palp with one art; Mx 2 lobes in riding position; Md palp lacking; Mxp narrow, OP vanishing.

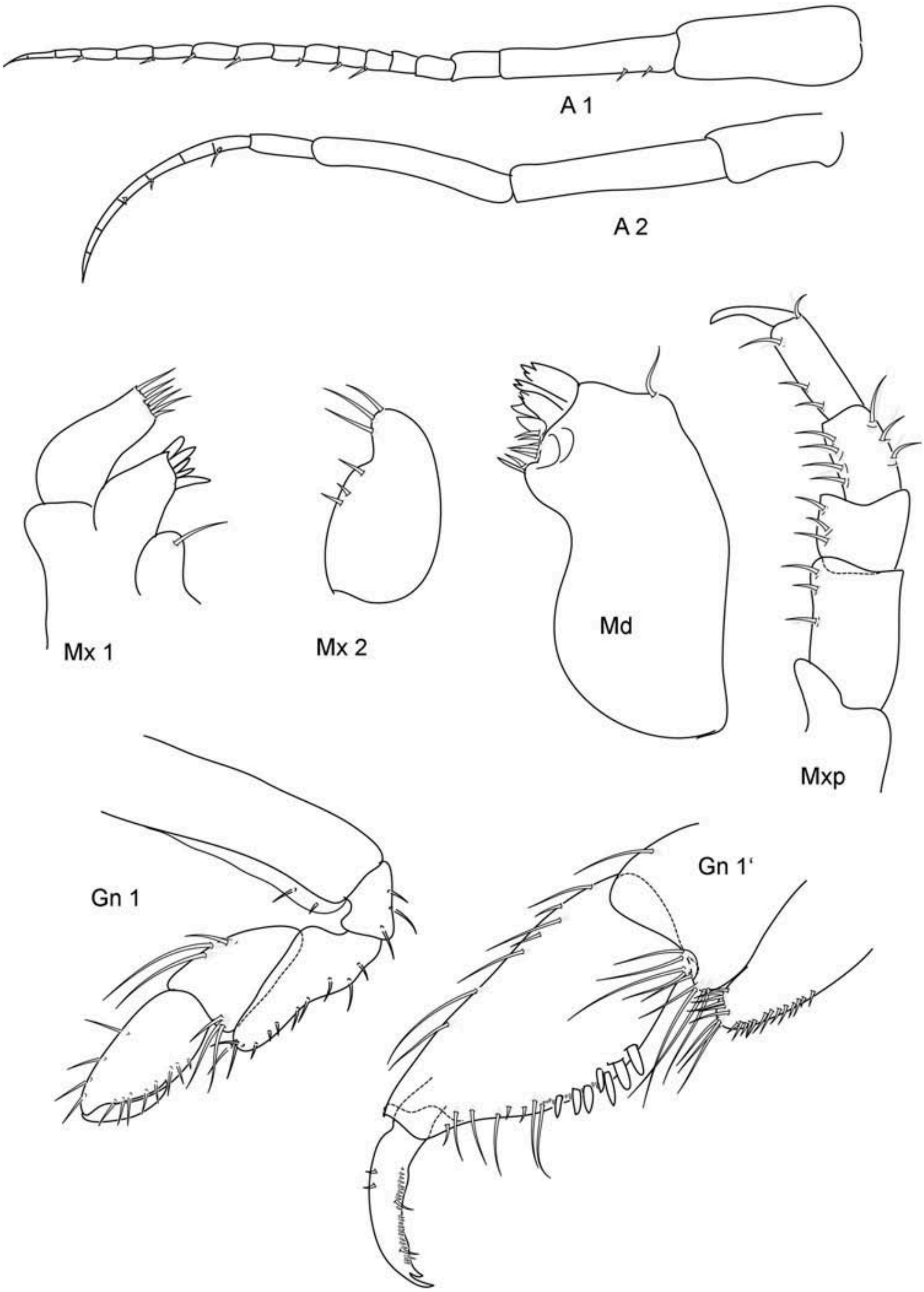


Figure 26. *Parametopa* gorea n. sp. male, Senegal: A 1, 2 = antennae; Mx 1, 2 = first and second maxillae; Md = mandible; Mxp = maxilliped; Gn 1 first gnathopod small, Gn 1′ enlarged.

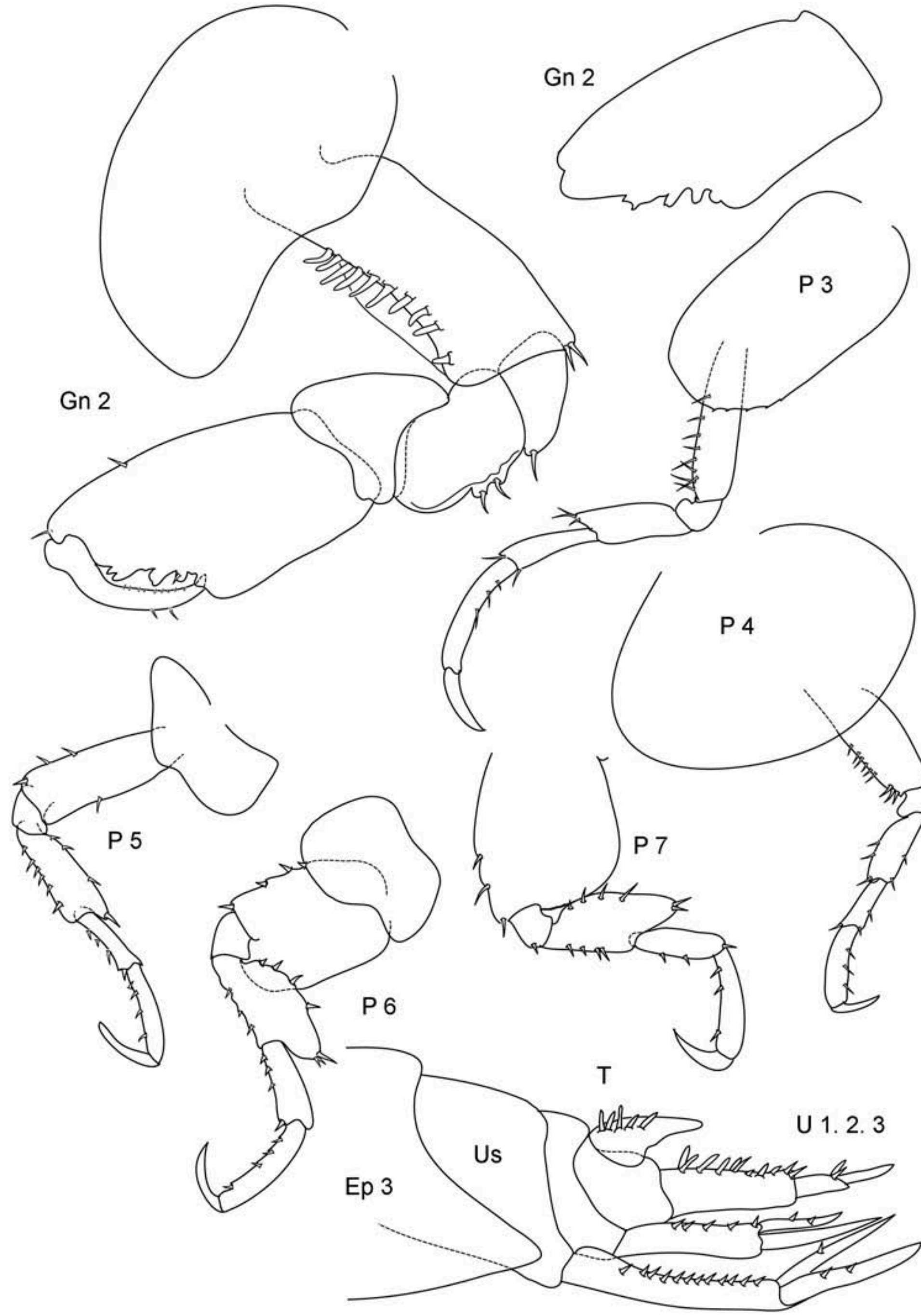


Figure 27. *Parametopa* gorea n. sp. male, Senegal: Gn 2 = gnathopod 2 complete and only propodus; P 3–7 peraeopods 3–7; Ep 3 = epimeral plate 3; Us = urosome; U 1, 2, 3 = uropod 1, 2, 3; T = telson.

Peraeon: Gn 1 subchelate, merus reaching end of carpus, distally not acute but rounded ending; propodus ovoid, palm oblique, about half length of propodus. Cx 2 anterior margin regularly convex, posterior margin concave; Gn 2 basis on anterior margin beset with many strong spines; carpus triangular, length subequal to width; propodus with nearly parallel margins, palm oblique, with many more or less deep incisions and humps; dactylus about half length of propodus. Cx 3 narrow, with parallel margins, distally slightly serrate, Cx 4 much wider than deep, ovoid. Peraeopods: P 3 > P 4; P 3 basis with many setae anteriorly; P 5 basis rectilinear, dactylus ≥ half length of propodus; anterior margin of merus, carpus and propodus with many spines; P 6, 7 basis widened, merus on both margins with spines, posterior one widened and lengthened, but not reaching half length of carpus.

Pleon: Ep 3 posteriorly bluntly produced; U 1–3 peduncle richly spinose; U 1 ped > subequal rami; U 2 rami unequal; P 3 ped > ramus, length of ramus art 1 = art 2; T with 5 pairs of spines marginally.

Distribution

Senegal, Atlantic O.

Key to *Parametopa* species

1. Gn 2 propodus rectangular, palmar corner 90° (rectipalmate) or even less 2
- Gn 2 propodus with oblique palm, palmar corner much more than 90° 3

2. Gn 1 simple, Gn 2 palm concave; A 1 flagellum with 4 arts, U 3 ramus art 1 naked .... ***P. crassicornis* Just, 1980** (3.2 mm) NW Greenland
- Gn 1 simple to subchelate; Gn 2 palm straight; A 1 flagellum > 10 arts, U ramus art 1 with marginal spines .... ***P. kervillei* Chevreux, 1901** (5 mm) French coast of English Channel

3. Gn 2 propodus palm with U-shaped excavation near palmar corner, palm defined by prominent elevation; P 5–7 with very few marginal spines; U 3 ramus and T naked .... ***P. alaskensis* (Holmes 1904)** (? mm) Alaska
- Gn 2 propodus palm with several small incisions, palm defined by blunt corner; P 5–7 richly spinose on both margins; U 3 ramus and T densely beset with spines .... ***P. gorea* n. sp.** (2.5–3 mm) West Africa, Senegal

Within the present material from the Red Sea, I found a stenothoid with Gn 1 similarly long as but wider than Gn 2:

Sudanea n. gen.

Diagnostic characters

Mandible without palp. Gn 1 about as long as but clearly wider than Gn 2; Gn 2 with parallel margins. P 6,7 basis widened. T without spines.

Remarks

The narrow second gnathopod with parallel margins strongly reminds of the genus *Chucullba* J.L. Barnard 1974, where both gnathopods show this shape. The propodus of Gn 1 is quite similar to Gn 2 of *Sandrothoe* Krapp-Schickel, 2010, where also the urosome is matching; but in *Sandrothoe* the basis of P 6, 7 is rectangular.

Sudanea inopinata n. sp.
(Figures 28, 29)

Holotype

Male 2 mm, Flamingo Bay, Port Sudan, reef with epiphytic algae, 12/1970 U. Schiecke coll., slide MVRCr 7710.

Additional material

Female 2 mm on slide MVRCr 7711, nine juv. 1.2–1.5 mm in alcohol.

Type locality

Port Sudan, Red Sea.

Etymology

The epithet reflects the region inhabited by the species, at Port Sudan.

Diagnosis

Md without palp; Mx 2 in riding position. Gn 1: Gn 2 subequal in length, but Gn 1 clearly wider. Gn 2 with parallel margins. P 6, 7 basis widened with posterodistal lobe, much longer than wide. U 2 with unequal rami, U 3 ratio ramus: peduncle = 2. Telson naked.

Description

Length. 1.5–2 mm.

Head. Antennae subequal in length, length of A 1 ped. art 1> art 2, art 3 about half art 1; flagellum with 7–8 arts. A 2 peduncle art 4 subequal art 5, flagellum with four arts. Mouthparts: Mx 2 lobes in riding position; Md palp lacking; Mxp narrow, OP vanishing.

Peraeon. Gn 1 subchelate, merus reaching end of carpus, distally not acute but rounded ending; propodus ovoid to triangular, palm oblique, about half length of propodus; palmar corner defined by one strong spine. Cx 2 anterior margin irregularly convex, posterior margin straight; Gn 2 basis on anterior margin naked; carpus

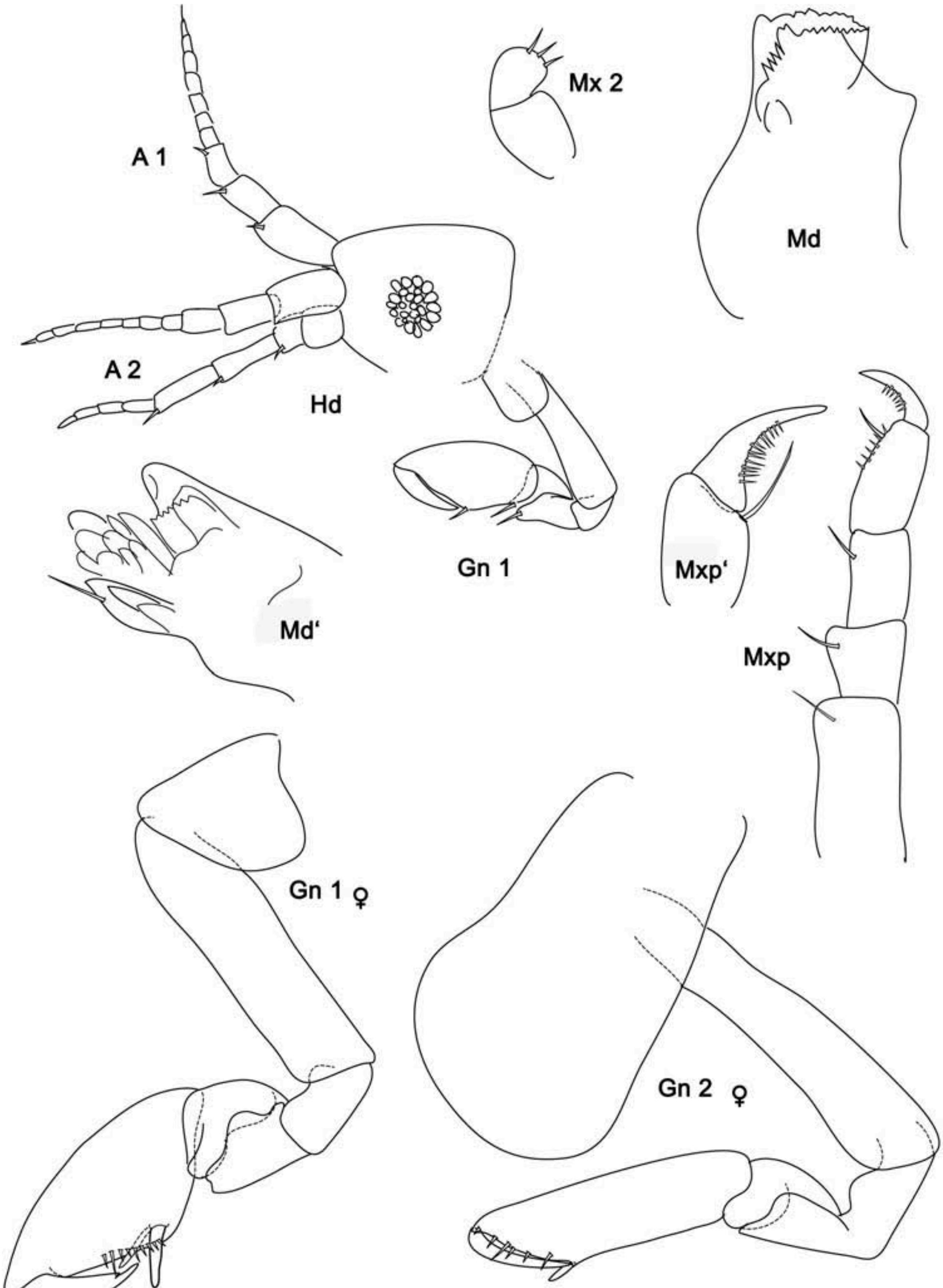


Figure 28. *Sudanea inopinata* n. g. n. sp. female, Red Sea: A 1, 2 = antennae; Hd = head; Mx 2 = second maxilla; Md, Md' = mandible of both sides; Mxp = maxilliped; Gn 1 = first gnathopod; Gn 2 = second gnathopod.

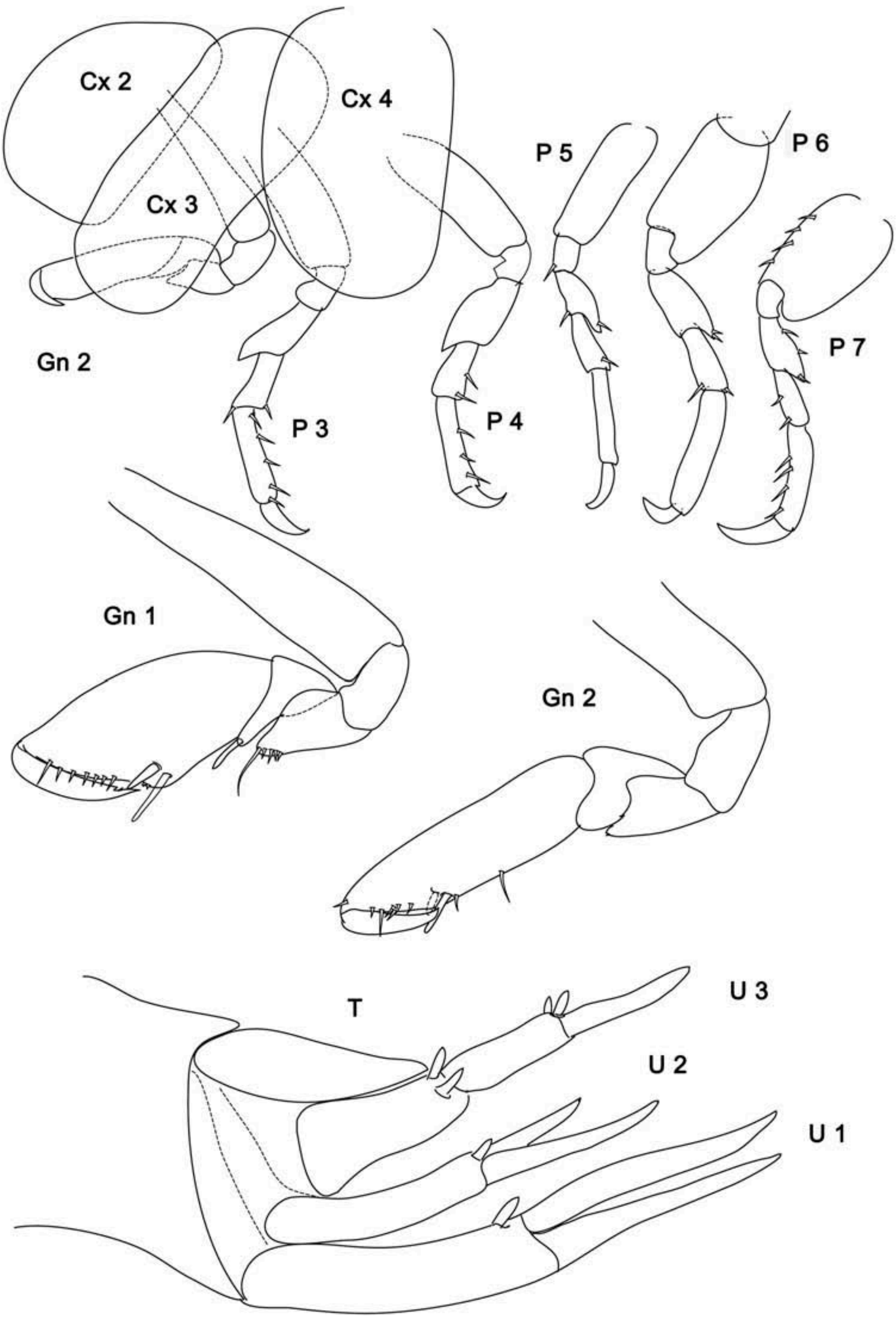


Figure 29. *Sudanea inopinata* n. g. n. sp. female, Red Sea: Cx 2–4 = coxae 2–4; Gn 1, 2 = first and second gnathopod; P 3 7 = peraeopod 3-7; U 1–3 = uropod 1–3; T = telson.

triangular, longer than wide, rounded; propodus with totally parallel margins, palm short, oblique, beset with short spines; palmar corner well defined by one srong spine; dactylus about one third length of propodus. Cx 3 with parallel margins, smooth; Cx 4 deeper than wide. Peraeopods: P 3 > P 4; P 5 basis rectilinear, dactylus ≥ half length of propodus; anterior and posterior margins of merus, carpus and propodus with few spines; P 6, 7 basis widened, merus on posterior margin with spines, posterior margin neither widened nor lengthened.

Pleon: U 1–3 peduncle poorly spinose; U 1 ped subequal to subequal rami; U 2 rami unequal; U 3 length of ramus art 1 = art 2 = peduncle; T naked.

Distribution

Port Sudan, Red Sea.

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No potential conflict of interest was reported by the author(s).

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