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A new species of *Gastrosaccus* (Crustacea, Mysidacea) from beaches in Madagascar

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Abstract

Gastrosaccus madagascariensis sp.nov. is common in the surfzone of sandy beaches along the east and south coasts of Madagascar. Morphologically, it is characterised by having seven lateral spines along each side of the telson; with spines 2–4 and the penultimate spine being dorso-lateral in origin. One or two spinules are interspersed between the fifth and terminal spines. The fourth exopod segment of pleopod 3 in the male is bulbous, bearing two terminal barbed unequal spines. A robust and naked seta is also present on the same segment in the male.

Introduction

The taxonomy of the mysid fauna from Madagascar has received little attention since the 1970's and only 23 species (Table 1) are described todate (Mauchline & Murano, 1977; Bacescu, 1975; Muller, 1993). Approximately half of the known species are oceanic and most of the nearshore species were described in a series of papers by Nouvel (1964, 1965, 1966, 1967, 1969, 1971, 1974, 1978). Mysids described by Nouvel were all collected at Nosy-Bé in the north-western region. Other studies by Ledoyer (1970, 1974) report on mysids collected at Tulear on the southwest coast of the island.

The genus *Gastrosaccus* has not previously been reported from Madagascar, although the ubiquitous *Haplostylus indicus* (previously referred to as *Gastrosaccus indicus*) occurs offshore (Mauchline & Murano, 1977; Greenwood et al., 1991; Muller, 1993). The present species was collected from the surfzone adjacent to sandy beaches on the Masoala peninsula (unpublished data) on the east coast of Madagascar. The species was also collected in a later beach survey by Alexandre Soares (March 1996, unpublisbed data) in the southeastern region near Tolagnaro (formerly Fort Dauphin). No other regions have been sampled and it is probable that the species has a wider distribution on the island.

Systematics

Gastrosaccus madagascariensis sp nov.
Figures 1–4

Holotype

SAM-A43205. Adult male lodged in the South African Museum, Cape Town. Collected near Cap Est (15°15′ S), Masola Peninsula, 26 October 1993.

Paratypes

SAM-A43206. Males and females. Collection data as for holotype.

Description

The morphological characteristics described refer to both sexes, unless otherwise stated. Total length of adult females 7.5 mm (mean of 10 specimens); adult males, 7.2 mm (mean of 10 specimens). Carapace

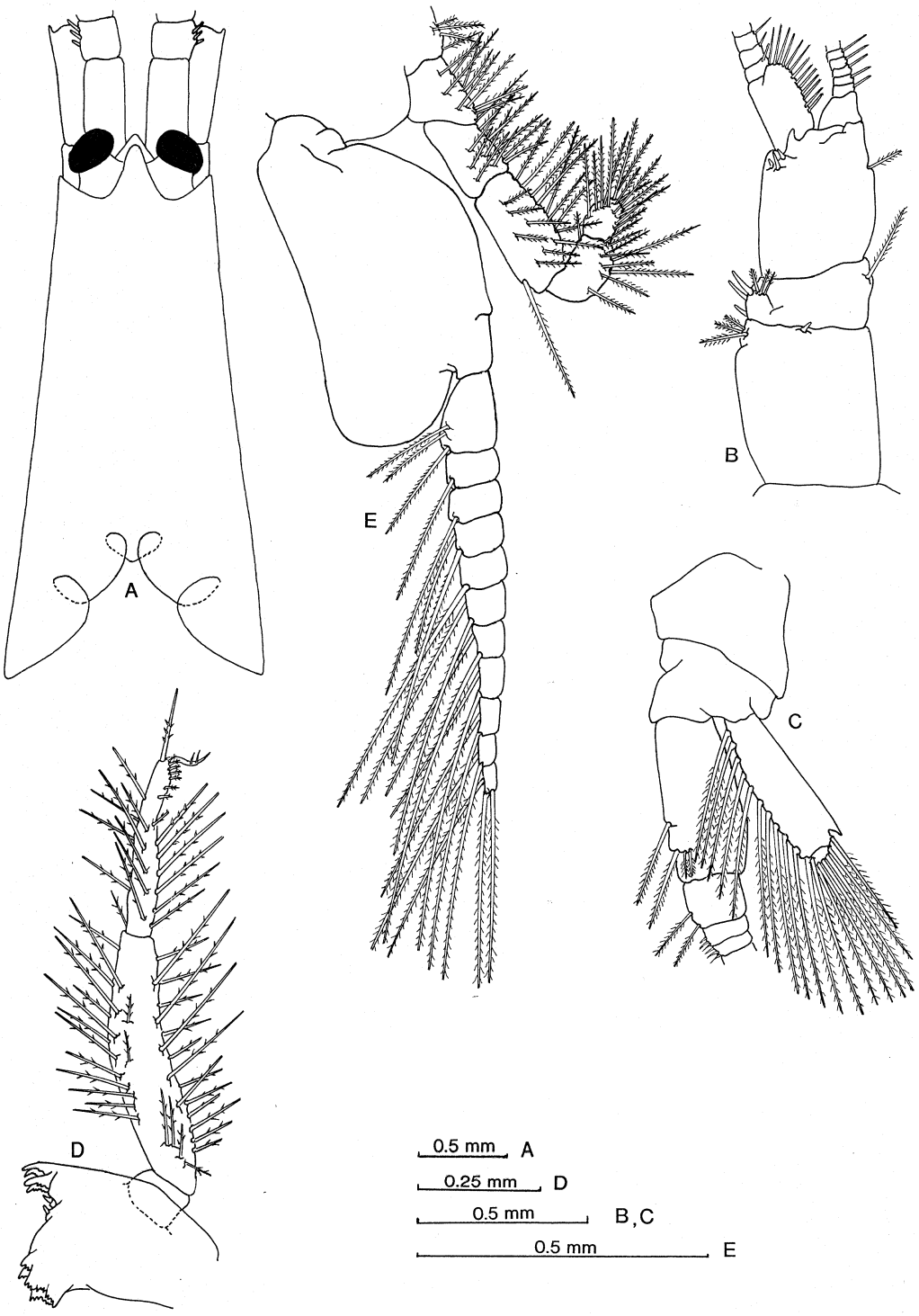

Figure 1. *Gastrosaccus madagascanensis* sp. nov. A. Carapace in dorsal view. B. Antennule. C. Antennal scale. D. Mandible. E. First thoracic appendage.

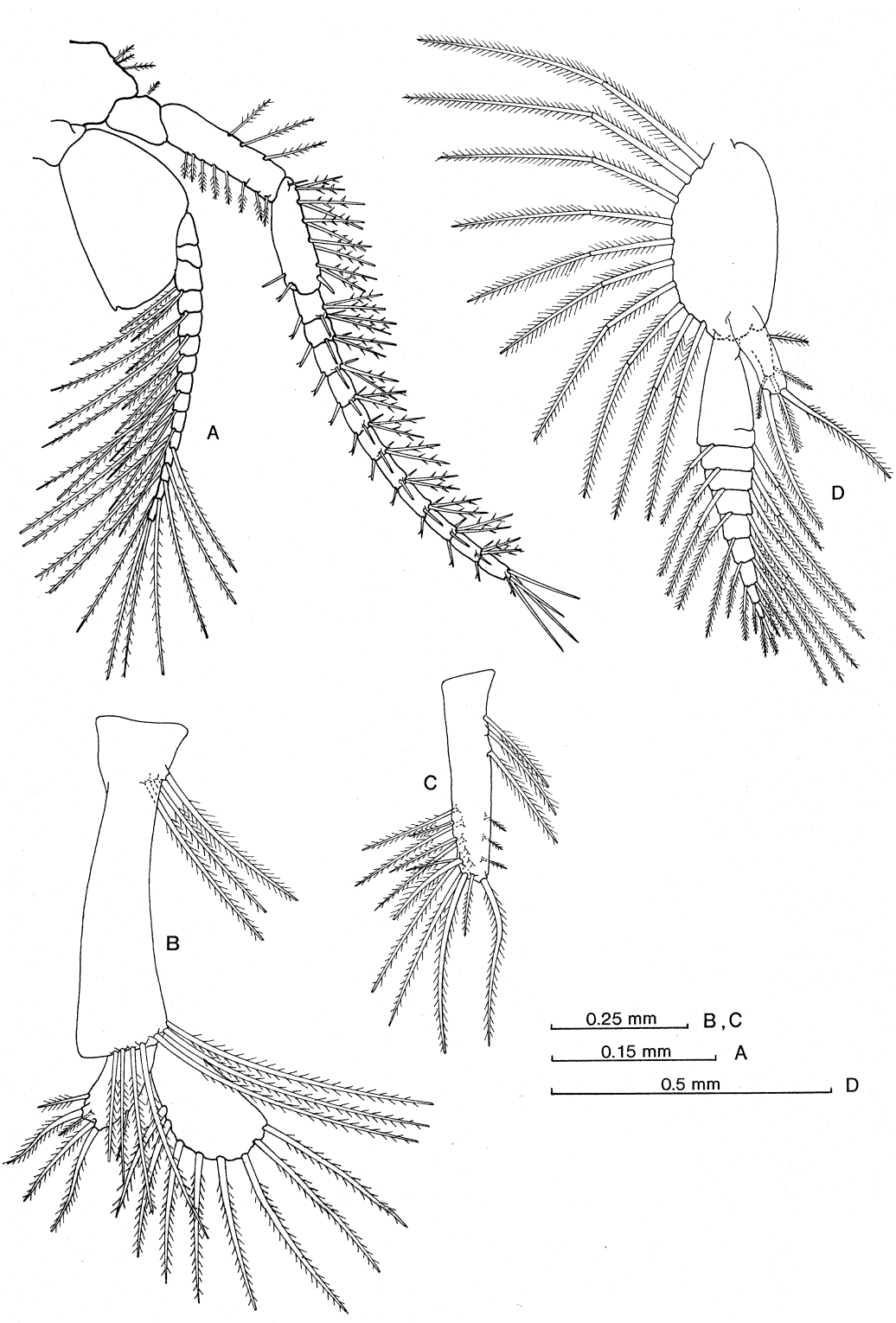

Figure 2. Gastrosaccus madagascariensis sp. nov. A. Eigth thoracic appendage. B. First pleopod of female. C. Second pleopod of female. D. First pleopod of male.

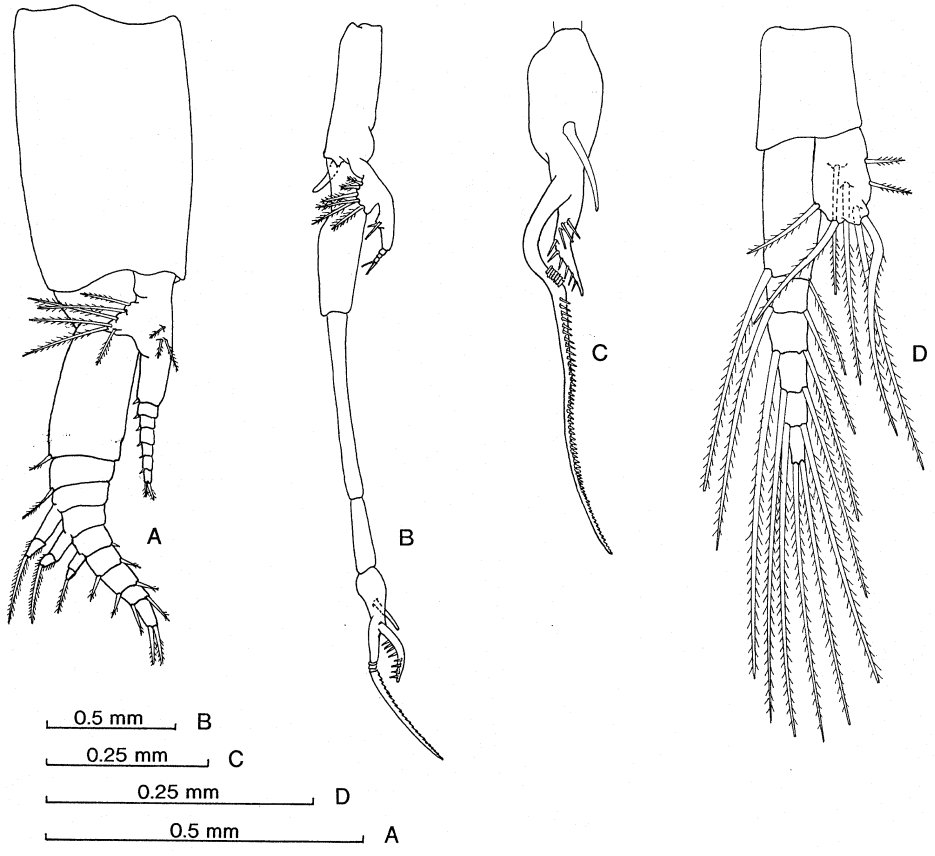

Figure 3. *Gastrosaccus madagascariensis* sp. nov. A. Second pleopod of male. B. Third pleopod of male. C. Terminal exopod segment of third pleopod of male. D. Fourth pleopod of male.

short, leaving last thoracic somite exposed in dorsal view. Anterior carapace margin produced into a blunt rostrum, extending beyond the base of the eyestalks (Figure 1A). Posterior dorsal margin of carapace deeply emarginate, each side of emargination split anteriorly and along the midlength to form two forwardly directed lobes that overlap the anterior. In lateral view carapace extends posteriorly to cover whole of thorax.

Antennule (Figure 1B), first segment of peduncle slightly longer than broad, subequal in length to second and third combined. Three short setae on outer distal angle. Second segment short with three strong spines set obliquely along outer lateral margin. Three small setae and one long seta set near outer and inner lateral margins respectively. Third peduncular segment equal in length to first, bearing a small finger-like process on dorsal side at the base of outer flagellum. Three minute spines near outer distal angle. Outer flagellum swollen at the base and in the female, fringed with a row of setae. In the male this lobe is hirsute.

Antennal scale (Figure 1C) about three times as long as broad, reaching midlength of second segment of its peduncle. Lateral margins of scale straight, outer edge terminating in strong spine that does not extend beyond the rounded apex. Inner margin with c. 18 plumose setae. Setation on peduncle as shown (Figure 1C).

Mandible (Figure 1D) with three-segmented palp, proximal segment short, unarmed. Second and third segments bearing spinose setae as illustrated, the third with a comb-like process at distal end.

Endopod of first thoracic limb (Figure 1E) short and densely setose, particularly along inner lateral margin. Dactylus without claw. First exopod segment expanded, outer distal angle without tooth. Flagellum 11-segmented, each segment with one or two long plumose setae.

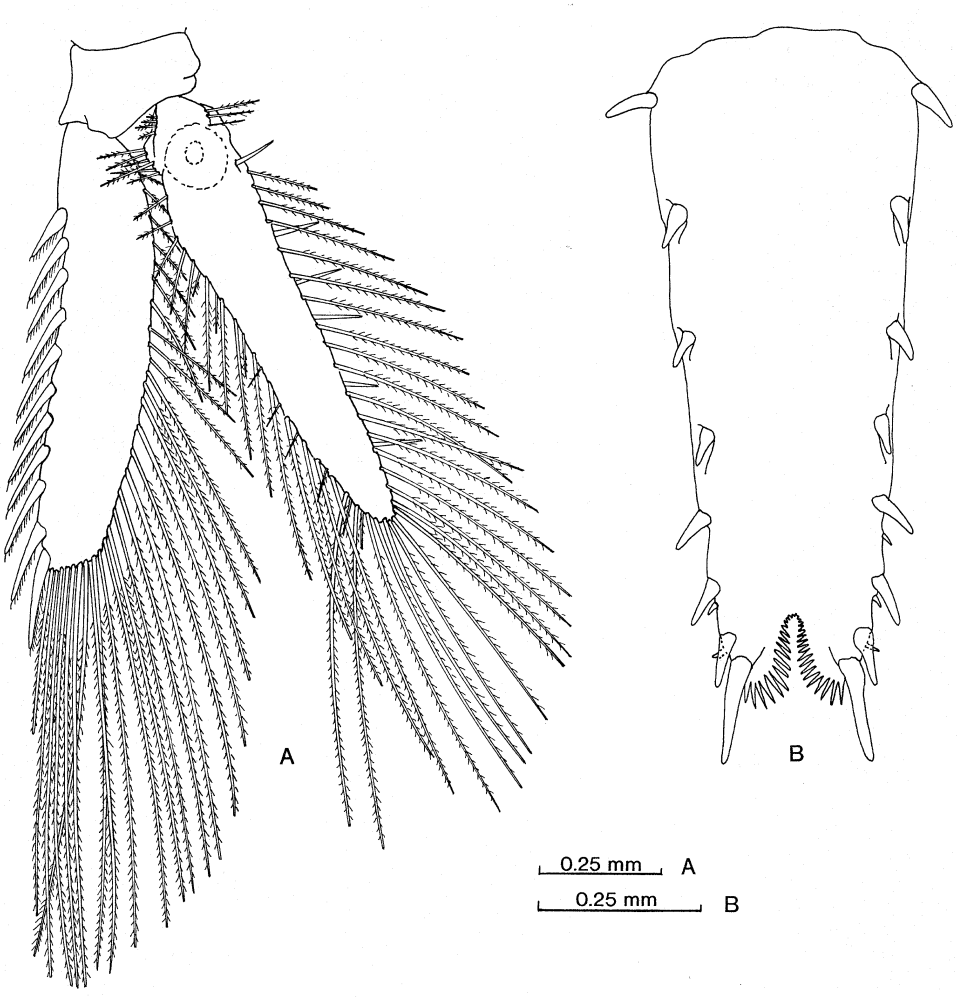

Figure 4. *Gastrosaccus madagascariensis* sp. nov. A. Uropod. B. Telson.

Second thoracic limb similar in form to first, the first exopod segment with a small tooth on outer distal angle (see Figure 2A). Flagellum with 14 segments.

Third to eighth (Figure 2A) thoracic limbs similar in form. Carpus and propodus of endopods fused and divided into subsegments that number 15 or 16. Each subsegment bears a brush of setae and a small spine on the inner distal angle and a small spine on outer distal angle. First exopod segment on each limb expanded, armed with a small tooth on the outer distal angle. Exopod flagella with c. 15 segments on eighth thoracic limb and eight to ten segments on the third to seventh limbs. Each segment with two long plumose setae. First female pleopod (Figure 2B) with long slender sympod armed proximally with three, and distally with seven, long plumose setae. Exopod c. two times as long as broad, bearing three long and robust setae, and two shorter setae distally. Endopod twice as long as wide, bluntly rounded at distal end and bearing row of eight plumose setae. Second female pleopod (Figure 2C) in the form of an unjointed plate, nearly five times as long as the mid-width and three plumose setae in proximal half, and c. 15 plumose setae in distal half. Remaining pleopods in female similar in form and size to second.

First male pleopod (Figure 2D) with swollen sympod, outer margin fringed with ten plumose setae. Endopod unsegmented, c. one-third length of exopod and three times as long as wide. Endopod armed with two terminal plumose setae and four shorter setae as illustrated. Exopod 10-segmented, each segment bearing two plumose setae.

Table 1. List of mysid species and their habitats presently known from the island of Madagascar. Data from Mauchline & Murano (1977) and Muller (1993).

Name	Habitat (depth in metres)
Anchialina latifrons Nouvel 1971	40–100 m
A. madagascariensis Nouvel 1969	no information
A. typica (Kroyer, 1861)	0–50 m
Caesaromysis hispida Ortmann 1893	50–3200 m
Eucopia sculpticauda Faxon 1893	850–6000 m
Haplostylus indicus (Hansen, 1910)	surface-oceanic
Hypererythrops elegantula Nouvel 1974	40 m
Katerythrops oceanae Holt & Tattersall 1905	200–3000 m
Lophogaster affinis Colosi 1930	50–180 m
Neognatophausia ingens (Dohrn, 1870)	225–3914 m
Acanthomysis quadrispinosa Nouvel 1965	coastal
Anisomysis hanseni Nouvel 1967	intertidal – 40 m
A. vasseuri Ledoyer 1974	10 m depth (cave)
Diamysis frontieri Nouvel 1965	littoral
Dioptromysis proxima Nouvel 1964	littoral – 25 m
Erythrops frontieri Nouvel 1974	littoral
Euchaetomera intermedia Nouvel 1942	no information
Hyperiimysis madagascariensis Nouvel 1966	littoral
Kainomatomysis foxi W. Tattersall 1927	coastal
Mesacanthomysis pygmaea Nouvel 1967	coastal
Mesopodopsis africana O. Tattersall 1952	littoral
Mysidopsis hellvillensis Nouvel 1964	littoral
Siriella brevicaudata Paulson 1875	coastal

Second male pleopod (Figure 3A) with rectangular sympod. Endopod seven-segmented and slender, subequal in length to sympod. A well developed pseudobranchial lobe near base of first endopod, armed with c. six plumose setae. Setation on remaining endopod segments indistinct. Exopod of nine segments and robust, almost twice as long as endopod. Setae on segments three to five large and distinctly flattened in proximal half. Remaining setae short, not exceeding twice length of succeeding segment.

Third male pleopod (3B) with four-segmented endopod, bearing a well-developed pseudobranchial lobe armed with six short plumose setae. Distal half of endopod with two small setae on inner lateral border and a second pair of small terminal setae. Endopod distinctly shorter than first exopod segment. Exopod four--segmented, extending posteriorly to proximal end of telson. First segment shorter than second, which is about 2.5 times length of the third. Fourth segment (Figure 3C) bulbous, armed with a long claw on outer distal margin. Apex bearing two strong barbed setae, the inner seta robust with c. nine spines set obliquely in distal half. Outer seta nearly four times length of inner seta, corrugated near base and armed with a row of fine spines that extend to apex.

Remaining pleopods in male similar in form. Endopod single-segmented, that of the fourth pair (Figure 3D) bearing eight setae as illustrated. Exopod six-segmented in third and fourth pair, seven segmented in fifth pair.

Uropods (Figure 4A) extending beyond telson, exopod subequal in length to endopod and bearing 11 strong regular spines along outer margin. These spines with curved tips and finely plumose along the posterior margins. Endopod more slender than exopod with six long slender spines spaced regularly among setae along inner margin, the first located opposite the posterior edge of the statocyst. Three groups of fine closely-set setae near base of endopod as illustrated. Outer margin of endopod with a row of plumose setae that increase in length posteriorly. A series of c. 10 fine plumose setae set irregularly among longer setae on outer endopod margin.

Telson (Figure 4B) c. 2.5 times longer than basal width. Lateral margins armed with seven strong spines, those of the second, third, fourth and seventh pairs more dorsal in origin. Apical spines c. twice length of lateral spines. Cleft one-seventh length of telson and armed with c. 18 graduated spinules on either side. Space between last two or three pairs of lateral and terminal spines occupied with a single spinule as illustrated.

Remarks

Gastrosaccus madagascariensis has closest affinities with *G. msangii* (Bacescu, 1975), *G. bispinosa* (Wooldridge, 1978) and *G. longifissura* (Wooldridge, 1978) from the east coast of the African continent (Table 2). *G. msangii* is recorded from Tanzanian waters only, and is widespread in sandy areas and among coral reefs (Bacescu, 1975). This species has six lateral spines along each margin of the telson compared to seven in *G. madagascariensis*. In *G. msangii*, spaces between the last three lateral and terminal spines are occupied with up to six spinules. Bacescu (1975) further describes the terminal spines as ‘very long and fine’. The cleft is relatively shallow, not exceeding one-tenth the telson length compared to the much deeper cleft in *G. madagascariensis*.

Table 2. Key characters that distinguish *Gastrosaccus madagascariensis* sp. nov., *G. msangii*, *G. bispinosa* and *G. longifissura*.

Character	*G. madagascariensis*	*G. msangii*	*G. bispinosa*	*G. longifissura*
Carapace:				
Rostrum	long, acute	medium, pointed	short, blunt	short, blunt
Pleopod 1, male				
Exopod segments	10	?	13–14	8
Pleopod 2, male				
Exopod segments	9	?	14	8
Exopod setal morphology	irregular	irregular	normal	normal
Endopod segments	7	?	8	5
Pleopod 3, male				
Exopod, length terminal spines	unequal	unequal	equal	unequal
Exopod, armature terminal spines	both barbed	longer barbed, shorter flagelliform	both barbed	both barbed
Telson				
No. lateral spines	7	6	6	7
Spinules	between 5th lateral spine and apex	between 4th lateral spine and apex	between 4th lateral spine and apex	between 5th lateral spine and apex
Max no. spinules between spines	1–2	6	6	4
Origin spines 2–4	dorso-lateral	lateral	lateral	lateral
Penultimate spines	dorso-lateral	lateral	dorsal	lateral
Terminal spines	long, robust	long, fine	long, robust	long, robust
Cleft-telson ratio	0.15	0.10	0.25	0.21
Uropod				
Lateral exopod spines	11	?	17	16
Lateral endopod spines	6	8–10	7	7
Body length (mm)	6.5–9.5	7.5–9.5	11–17.5	8–10.5

The terminal seta on the exopod of the third male pleopod is long and curved in both *G. madagascariensis* and *G. msangii*. However, in the latter species, the subterminal seta is fine and unarmed, about one-quarter the length of terminal seta. In *G. madagascanensis*, this seta is robust and armed along its length with a series of about 8–10 spinules. A relatively strong naked seta also occurs on the terminal segment in the new species from Madagascar; this is contrasted to the short seta, a ‘flagelliform’ seta and a short spinule, all located at the joint between the third and fourth exopod segment in *G. msangii*.

Gastrosaccus bispinosa is readily distinguished by having a strong spine on each side of the cleft and on the dorsal side of the telson (Wooldridge, 1978). In *G. madagascariensis*, the second, third, fourth and seventh pairs of spines on the telson are dorso-lateral in origin. The apex of the exopod on the third male pleopod is also distinctly different in *G. bispinosa*, in that the two terminal spines are about equal in length. In *G. longifissura*, these terminal spines broadly resemble those in *G. msangii*, although the armature on the longer terminal spine is only barbed in the proximal half. In the latter species, the fourth exopod segment is bulbous and distinctly different in shape compared to the other exopod segments. The exopod segments of the three species from the east coast of Africa are all similar in shape.

Acknowledgments

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