

A new species of the deep-sea shrimp genus *Glyphocrangon* A. Milne-Edwards (Crustacea: Decapoda: Caridea: Glyphocrangonidae) from the southeastern Atlantic off southern Africa

Tomoyuki Komai

Natural History Museum and Institute, Chiba, 955-2 Aoba-cho, Chuo-ku, Chiba, 260-8682 Japan
E-mail: komai@chiba-muse.or.jp

(with 4 figures)

Received 18 February 2010. Accepted 1 April 2010

A new species of the deep-water shrimp genus *Glyphocrangon* A. Milne-Edwards, *G. africana*, is described from the southeastern Atlantic off Cape Point, South Africa. It had been previously confused with *G. sculpta* (Smith), but the presence of a covering of short setae on the body, antennal scale, and the last three pairs of pereopods and the different shape of the dorsolateral carinae on the second and third abdominal somites easily distinguishes the new species from *G. sculpta*. From another close relative *G. podager* Bate, *G. africana* is separated by the same set of the characters, as well as the sharp, spiniform intercarinal tubercles on the carapace.

Key words: Crustacea, Decapoda, Caridea, Glyphocrangonidae, *Glyphocrangon*, new species, southern Africa, southeastern Atlantic.

CONTENTS

Abstract	83	Taxonomic account	84	Acknowledgements	89
Introduction	83	<i>Glyphocrangon africana</i> sp. nov.	84	References	89
Materials and methods	83	Remarks	89		

INTRODUCTION

Thanks to the works by Holthuis (1971), Rice (1981) and Komai (2004a), the Atlantic fauna of the caridean shrimp genus *Glyphocrangon* A. Milne-Edwards, 1881, is reasonably well documented. At present 12 species are known, of which only four species have been recorded from the eastern Atlantic, viz., *G. atlantica* Chace, 1939, *G. longirostris* (Smith, 1882), *G. rimapes* Bate, 1888 and *G. sculpta* (Smith, 1882). No endemic elements to the eastern Atlantic are known so far (Komai 2004a). However, Komai (2004a) noted that the specimens from the area referred to *G. sculpta* differed from those from the western Atlantic in having a covering of short setae on the body.

In this study, a new species of *Glyphocrangon* is described and illustrated on the basis of two specimens from off Cape Point, South Africa. It closely resembles *G. sculpta* and *G. podager* Bate, 1888, the latter known only from the holotype from the southwestern Indian Ocean. Morphological differences among the three taxa are discussed. Variation in the new species, including sexual dimorphism, is also briefly described. The new species is the first species of *Glyphocrangon* possibly endemic to the southeastern Atlantic.

MATERIALS AND METHODS

The type specimens of the new species are deposited in the Iziko South African Museum, Cape Town (formerly South African Museum; SAM). Other specimens used for comparison are deposited in the Museu Nacional, Rio de Janeiro (MNRJ), Nationaal Natuurhistorisch Museum, Leiden (NNM), and the Natural History Museum, London (NHM). The terminology generally follows Komai (2004b). Postorbital carapace length (cl) represents specimen size, measured from the level of the posterior margin of the orbit to the midpoint of the posterodorsal margin of the carapace.

For comparison, the following material was examined:

Glyphocrangon sculpta: 1 ovigerous female (cl 19.4 mm), NNM 29854, RV Iselin, stn 93, Bahamas, 24°24.8'N, 76°11.4'W, 1757 m, 13 February 1974; 2 females (cl 12.5, 17.3 mm), NNM 29858, stn 177, Bahamas, 24°22.9'N, 76°08.9'W, 1767 m; 1 female (cl 15.6 mm), NNM 29859, stn 187, Bahamas, 23°59.5'N, 75°49.0'W, 1880 m, 12 February 1974; 1 female (cl 22.5 mm), MNRJ 14889, RV *Thalassa*, stn E-520, off Brazil, 13°21.837'S, 38°16.683'W, 2137 m, June 2000; 1 ovigerous female (cl 22.8 mm), stn E-549, 21°25.738'S, 39°43.946'W, 1718 m, 7 July 2000.

Glyphocrangon podager: Holotype, female (cl 20.2 mm),

BMNH 1888: 22, Challenger, stn 146, southern Indian Ocean between Prince Edwards and Crozet Islands, 46°46'S, 45°31'E, 2514 m, 29 December 1873.

TAXONOMIC ACCOUNT

Glyphocrangon africana sp. nov.

Figs 1–4

Glyphocrangon sculptus Stebbing, 1908: 37; Barnard 1950: 719, fig. 134a–d; Kensley 1968: 318. Not *Glyphocrangon sculpta* A. Milne-Edwards, 1881.

Glyphocrangon sculpta Kensley, 1981: 29; Komai 2004a: 39 (part).

Material examined

Holotype: ovigerous female (cl 25.7 mm), SAM 46784, off Cape Point, South Africa, RV *Africana* II, stn A190, 2269 m, 1959.

Paratype: 1 male (cl 21.0 mm), same data as holotype.

Description

Female holotype. Body (Fig. 1) moderately robust. Integument of carapace and abdomen firm, surface covered with short setae except for spines or tubercles; setae numerous but not very dense, not forming pubescence.

Rostrum (Figs 1, 2A) moderately narrow, slightly overreaching distal margin of antennal scale, 0.56 times as long as carapace, slightly descending at base, but slightly upturned in distal half, deepest at base; armed with two pairs of slightly unequal, acute teeth on moderately raised dorso-lateral ridges; mid-dorsal carina conspicuous throughout length of rostrum, higher than dorsolateral ridges in distal part, extending nearly to anterior groove of carapace; dorsal surface without sculpture; dorsolateral ridge between lateral teeth bluntly edged; ventral surface with shallow median groove flanked by ventrolateral carinae; midventral carina absent (Fig. 2B).

Carapace (Fig. 1) with lateral and cervical grooves moderately deep. Tubercles on intercarinal spaces various in shape, but prominent ones erect, spiniform. First (submedian) carina composed of moderately small, erect, acute or subacute teeth, eight on anterior part, four on posterior part, posterior end of carina overhanging posterodorsal margin of carapace. Anterior second (intermediate) carina composed of four acute teeth, increasing in size anteriorly, anteriormost tooth prominent; one conspicuous tooth inferior to base of anteriormost tooth of anterior second carina; posterior second carina nearly straight in lateral view, composed of seven moderately large acute teeth. Anterior third (antennal) carina confined to antennal spine; posterior third carina moderately high, parallel to plane of dorsal margin of carapace, terminating anteriorly in small acute tooth directed anterolaterally, and with row of one or two small denticles. Anterior fourth (lateral) carina strongly compressed vertically, divided into two acute teeth by a large U-shaped notch, both teeth not particularly enlarged, posterior one slightly smaller than anterior one; distance between tips subequal to distance between tips of anterior teeth of posterior third carinae; posterior fourth carina moderately high, faintly tuberculate, subparallel to posterior third carina, its anterior end not forming tooth or angle. Anterior

fifth (sublateral) carina rather thick, surface roughly eroded; posterior fifth carina roughly eroded, followed posteriorly by one tubercle. Sixth (submarginal) carina showing as broad, eroded elevation, not extending to posterolateral angle. Submarginal posteroventral ridge reduced in small tubercle. Posterolateral carina consisting of three unequal tubercles. Orbital margin slightly elevated, without submarginal groove. Postorbital region unarmed. Median part of gastric region slightly concave, bearing small spiniform tubercles arranged in irregular longitudinal rows; posterior median region with row of seven small spiniform tubercles. Lateral part of gastric region with scattered spiniform tubercles on space between first and second carinae; space between second carina and lateral groove also with some spiniform tubercles. Posterior dorsolateral region with several spiniform or blunt tubercles arranged in irregular longitudinal rows. Hepatic region with upper part bearing some spiniform or blunt tubercles, no trace of anterior third carina (Fig. 2C); lower part concave, nearly smooth. Branchial region with upper part bearing scattered tiny spiniform tubercles (no more than 20) (Fig. 2D); middle part with about 10 tiny spiniform tubercles; lower part with few rounded tubercles. Antennal spines long, markedly diverging anteriorly in dorsal view, strongly ascending in lateral view (angle about 60° against horizontal plane of carapace), nearly straight; somewhat compressed dorsoventrally, without accessory tubercle basally. Branchiostegal spines partially visible in dorsal view, diverging in similar degree to antennal spines in dorsal view, slightly curved dorsally in lateral view, exceeding antennal spines, just reaching midlength of antennal scale; lateral face with two faint carinae, not in contact with anterior fourth carina. Posterolateral corner forming light angle.

Abdomen (Fig. 1) covered with numerous small tubercles, those tubercles conical, subacutely or acutely pointed; major carinae high, in general strongly compressed laterally, their edges sharp. First abdominal somite with median elevation defined by deep surrounding groove, bearing some small tubercles on either side of median carina; median carina crested, not extending to posterodorsal margin of somite, terminating anterodorsally in large, subacute tooth; posterior end of median carina abruptly truncate. Dorsolateral carina terminating anterodorsally in acute tooth; dorsal margin smooth. Lateral carina composed of two prominences (anterior one acute tooth, posterior one short ridge). Pleuron with posterior depression abruptly delimited; anterolateral margin with conspicuous sinus formed by distinct prominence and acutely produced anteroventral corner.

Second to fourth abdominal somites with crested median carinae each deeply divided into two sections by U-shaped notch, those on anterior section of second somite and posterior section of third somite particularly prominent, acutely or subacutely pointed (Fig. 2E). Dorsolateral carinae on anterior sections of second and third somites spiniform, those on posterior sections acutely or subacutely pointed (second) or low, unarmed (third); submedian carinae on fourth somite not clearly defined, reduced to small conical tubercle (anterior section) or to low small ridge (posterior section). Posterior transverse grooves on terga deep. Ventral lobe of pleural elevation on second somite irregularly tuberculate, but without conspicuous spine; none of the anterior ridges of

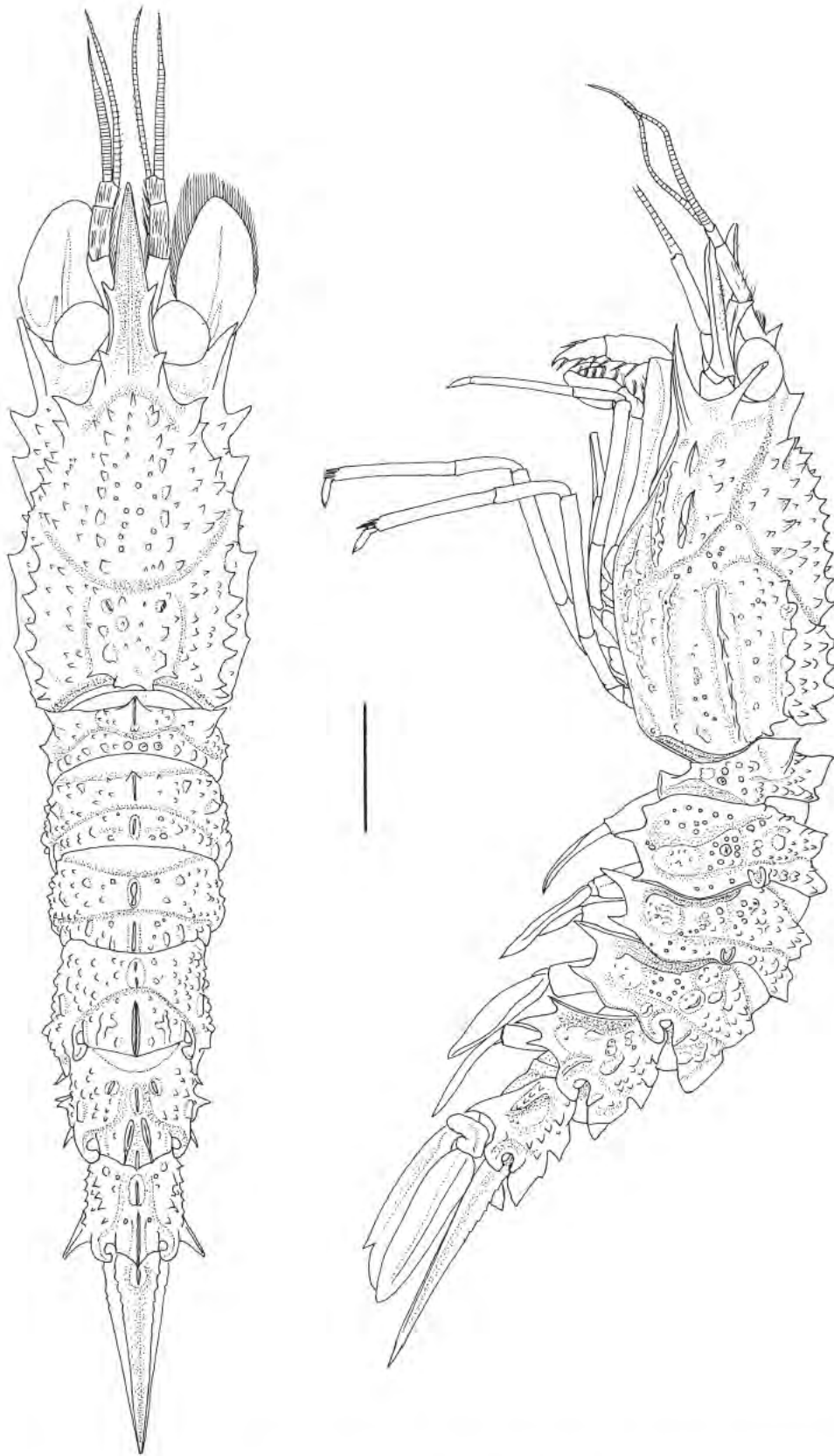


Fig. 1. *Glyphocrangon africana* sp. nov., holotype, ovigerous female (cl 25.7 mm), SAM 46784. Entire animal in dorsal and lateral views. Scale bar = 10 mm.

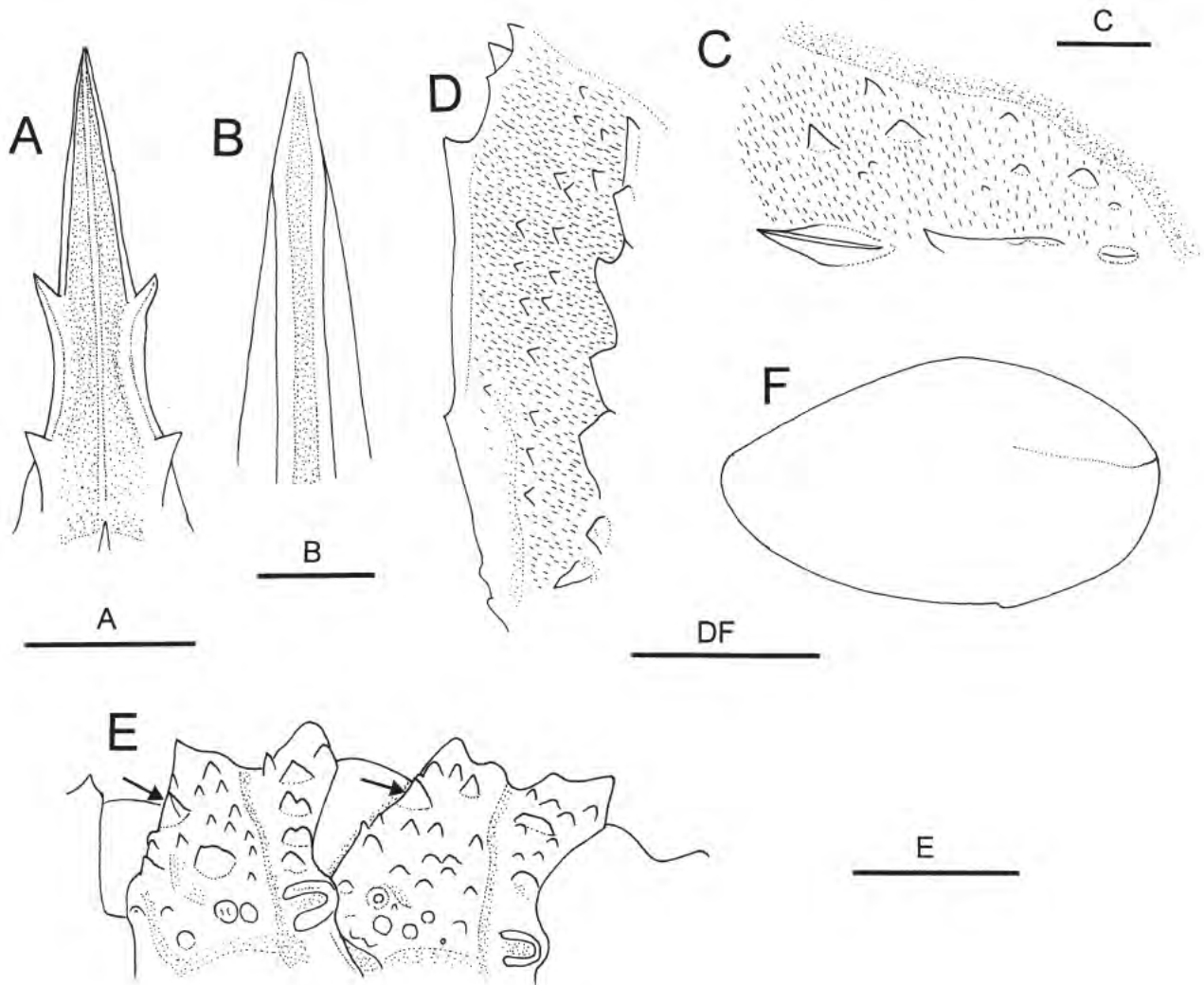


Fig. 2. *Glyphocrangon africana* sp. nov., holotype, ovigerous female (cl 25.7 mm), SAM 46784. A, rostrum, dorsal view; B, same, ventral view; C, upper part of hepatic region, lateral view; D, upper part of branchial region, dorsal view; E, tergites of second and third abdominal somites, lateral view (covering of short setae omitted; arrows indicating spiniform dorsolateral carinae on anterior sections); F, left antennal scale, dorsal view (setae omitted). Scale bars: 5 mm for A, C, E, F; 2 mm for B, D.

pleural elevations terminating ventrally in acute spine; pleural teeth distinctly unequal with anterior tooth longer than posterior tooth in each somite, all teeth acuminate. Anteroventral margin of second pleuron produced in blunt triangular tooth.

Fifth abdominal somite with anterior part of median carina terminating posteriorly in acute tooth directed dorsally, posterior part also forming subacute tooth directed posterodorsally. Tergum with deep transverse groove; anterior submedian carinae forming dentiform prominence; posterior submedian carinae crested, moderately diverging in dorsal view, not reaching posterodorsal margin of somite, each dorsal margin with conspicuous angle at middle. Lateral carina showing as dentiform prominence. Pleuron with one prominent spiniform lateral process arising from anterior ridge; three ventral teeth present, middle one largest.

Sixth abdominal somite with crested median carina

becoming higher posteriorly, divided into two sections by deep, V-shaped notch; anterior section of median carina forming acute tooth posterodorsally directed tip and sinuous dorsal margin; posterior section also forming strong acute tooth, with small accessory denticle on dorsal margin. Tergum with few small tubercles on either side of midline; lateral carina composed of four acute teeth. Pleuron generally concave, with few tiny spiniform tubercles; lateroventral carina with row of small spiniform tubercles; posteroventral tooth strong, faintly carinate on lateral surface.

Telson (Fig. 1) about 0.7 times as long as carapace; anterior prominence strongly compressed laterally, forming acute tooth directed posteriorly; dorsolateral carina high, tuberculate in anterior 0.3, smooth in posterior 0.7; ventrolateral carina only slightly tuberculate in anterior 0.2.

Cornea (Fig. 1) moderately large, maximal diameter about

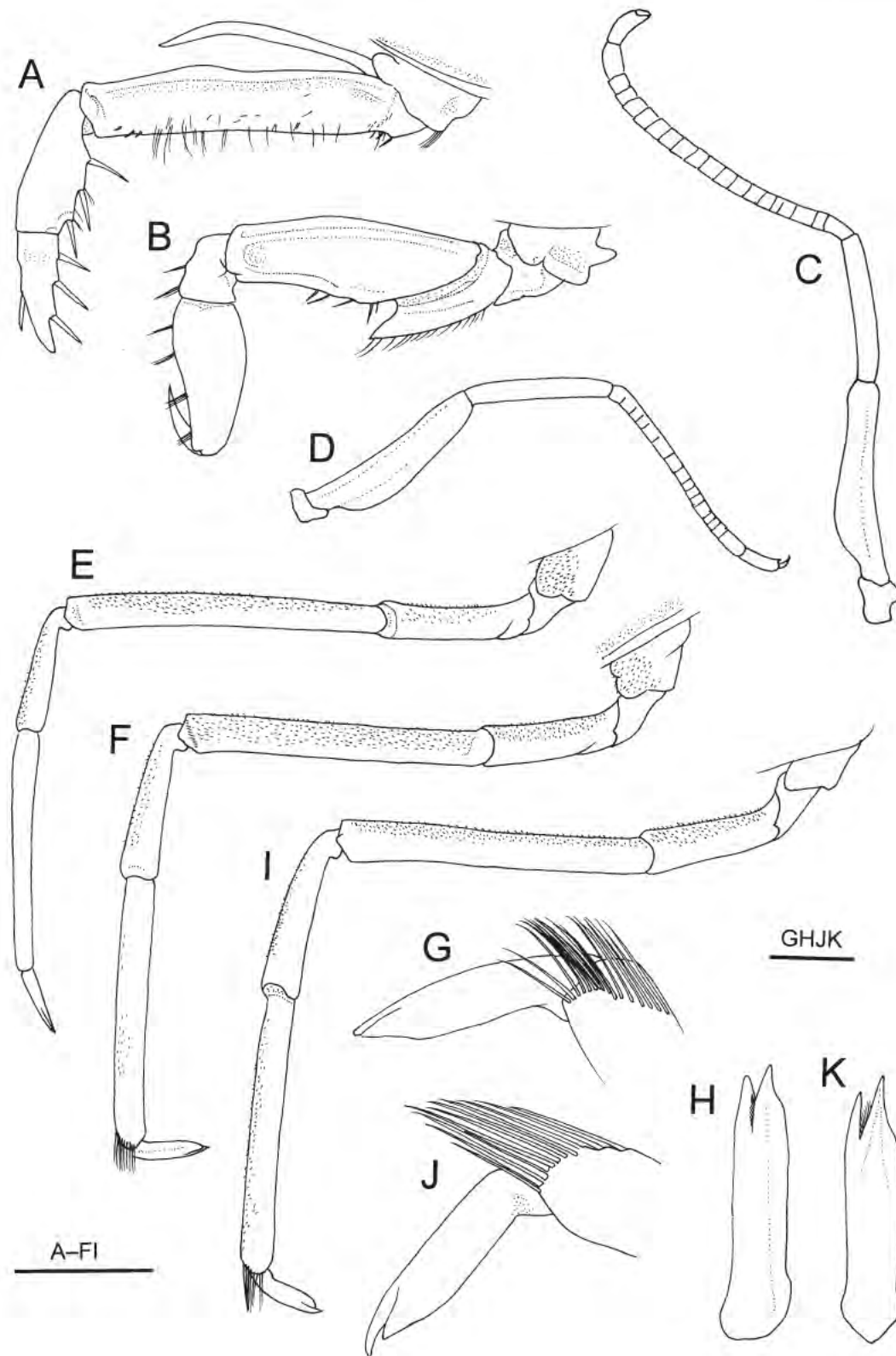


Fig. 3. *Glyphocrangon africana* sp. nov., holotype, ovigerous female (cl 25.7 mm), SAM 46784. A, Left third maxilliped, lateral view; B, left first pereopod, lateral view; C, left second pereopod, lateral view; D, right second pereopod, lateral view; E, left third pereopod, lateral view; F, left fourth pereopod, lateral view; G, same, dactylus and distal part of propodus, lateral view; H, same, dactylus, dorsal (extensor) view; I, left fifth pereopod, lateral view; J, same, dactylus and distal part of propodus, lateral view; K, same, dactylus, dorsal view. Scale bars: 5 mm for A–D, E, F, I; 1 mm for G, H, J, K.

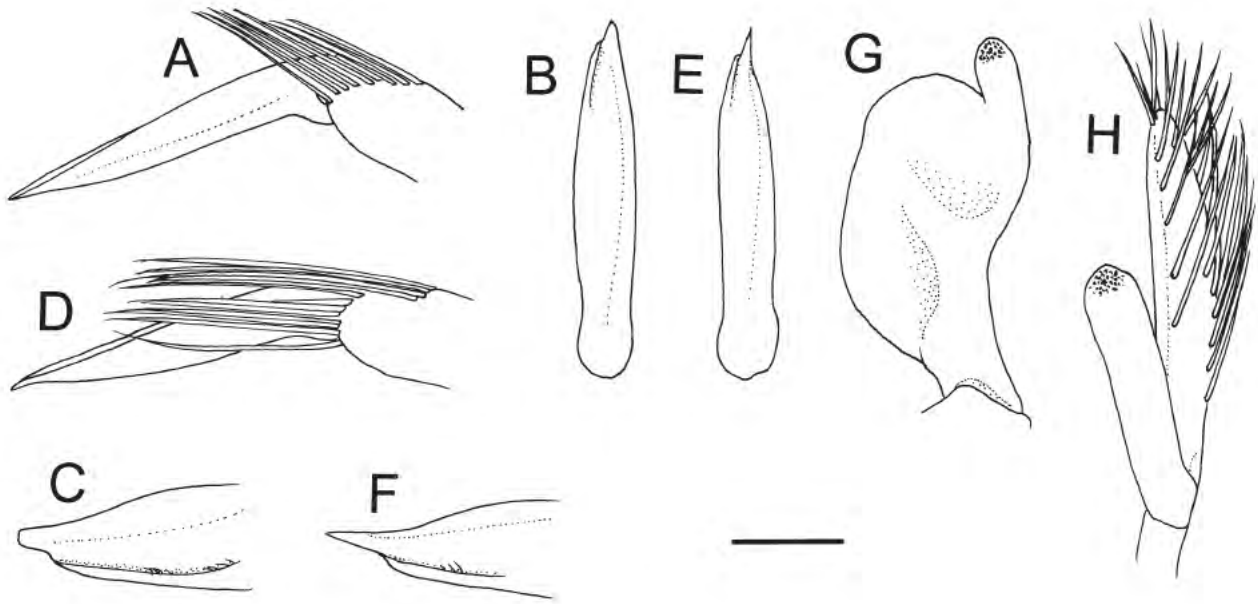


Fig. 4. *Glyphocrangon africana* sp. nov., paratype, male (cl 21.0 mm), SAM 46784. A, Dactylus and distal part of propodus of left fourth pereopod, lateral view; B, dactylus of fourth pereopod, dorsal (extensor) view; C, same, close-up of distal part; D, dactylus and distal part of propodus of left fifth pereopod, lateral view; E, dactylus of left fifth pereopod, dorsal view; F, same, close-up of distal part; G, endopod of left first pleopod, dorsal view; H, appendices interna and masculina of left second pleopod, mesial view. Scale bar: 1 mm for A, B, D, E, G, H; 0.5 mm for C, F.

0.20 of carapace length, lacking dark pigmentation in preservative; eyestalk lacking small papilla on mesial face.

Antennular peduncle (Fig. 1) overreaching distal margin of antennal scale by third segment; second segment about 2.5 times longer than wide. Outer flagellum with aesthetasc-bearing portion about 0.3 times as long as carapace.

Antennal scale (Figs 1, 2F) generally oval, somewhat narrowed distally, about 0.40 times as long as carapace, 1.8 times longer than wide; dorsal surface with scattered, very short setae (particularly numerous on central part), and with obsolete longitudinal ridges; lateral margin convex, with trace of lateral tooth located at 0.45 of length of antennal scale. Carapocerite far falling short of distal margin of antennal scale.

Third maxilliped (Figs 1, 3A) just reaching distal margin of antennal scale by tip of ultimate segment; ultimate segment terminating in sharp spine; marginal spines on distal two segments moderately slender; antepenultimate segment with distinct dorsolateral ridge and with three small movable spinules arranged in longitudinal row adjacent to distoventral margin; exopod well developed.

First pereopod (Figs 1, 3B) prehensile, devoid of fixed finger; palm naked on lateral surface, with row of tufts of setae dorsomesially; merus with distinct longitudinal ridge on lateral surface dorsally; ischium with prominent ventral lobe terminating in acute tip. Second pereopods (Figs 1, 3C, D) slightly unequal (left longer than right), both not reaching distal margin of antennal scale; left chela slightly larger than right chela; left carpus composed of 19 articles (Fig. 3C), right carpus of about 16 articles (Fig. 3D). Poste-

rior three pairs of pereopods moderately long and slender for genus. Third pereopod (Figs 1, 3E) reaching distal margin of antennal scale by tip of dactylus; dactylus compressed laterally, 0.30 of propodal length. Fourth pereopod (Figs 1, 3F) falling slightly short of distal margin of scaphocerite; dactylus (Fig. 3G, H) 0.30 of propodal length, subcylindrical, terminating distally in two horizontally cleft, acute processes, lateral process shorter than mesial process, groove separating these process with row of short setae. Fifth pereopod (Figs 1, 3I) not reaching distal margin of antennal scale; dactylus (Fig. 3J, K) 0.29 of propodal length, generally similar to that of fourth pereopod in structure.

Gill formula typical of *Glyphocrangon spinicauda* group (cf. Komai 2004b).

Egg size about 3.9×2.9 mm; number not counted.

Male paratype. Generally similar to female except for: rostrum slightly longer, 0.69 times as long as carapace; anteriormost tooth of anterior second carina on carapace more slender; mid-dorsal carina on abdomen slightly lower; no prominent spiniform projection arising from anterior ridge of fifth abdominal somite; outer flagellum of antennule elongate, 1.5 times as long as carapace, thickened aesthetasc-bearing portion about half length of carapace; carpus of right second pereopod divided into 21 articles; dactyli of fourth and fifth pereopods (Fig. 4A, B, D, E) subconical, terminating in acuminate tip, but having trace of lateral lobe subterminally, dorsal surface with short groove distolaterally (Fig. 4C, F). Endopod of first pleopod (Fig. 4G) suboval with strongly convex lateral and strongly sinuous mesial margins, appendix interna located

distomesially, bearing adhesive hooks; second pleopod with appendix masculina distinctly longer than appendix interna (Fig. 4H), somewhat flattened, bearing numerous long spiniform setae along margins on mesial face.

Distribution

Known only from off Cape Point, South Africa; at depths of 1970–2782 m.

Variation

As is apparent from the above description, the female holotype significantly differs from the male paratype in the structure of the dactyli of the fourth and fifth pereopods. In the female, the dactyli are subcylindrical in general with horizontally cleft tips, whereas in the male, they are subconical with acuminate tips and traces of lobes subterminally on the lateral margin. Pronounced modification of the dactyli of the posterior two pairs of pereopod in the spawning molt of females is also known for *G. caecescens* Wood-Mason, in Wood-Mason & Alcock, 1891, *G. dimorpha* Komai, 2004, *G. granulosis* Bate, 1888, *G. podager* and *G. sculpta*. Further, other significant differences between female and male include: the mid-dorsal carina on the abdomen is slightly higher in the female than in the male; the fifth abdominal somite bears a prominent spiniform process arising from the anterior ridge in the female, whereas such a prominent process is absent in the male. These differences could also be attributable to sexual dimorphism, because it is known that the sculpture of the body is generally stronger in females than in males in *Glyphocrangon* (see Komai 2004b). On the other hand, no significant differences are seen between the two specimens in the shape and the number of the intercarinal tubercles on the carapace and abdomen, and the setation on the body, antennal scale and posterior three pairs of the pereopods.

Remarks

This new species is very similar to *Glyphocrangon sculpta*, and indeed the present two specimens were identified as that species by Kensley (1968). Nevertheless, it differs from *G. sculpta* in the presence of a covering of short setae on the body, dorsal surface of the antennal scale and the ischia and meri of the third to fifth pereopods. In *G. sculpta*, these parts are naked or only the carapace bears very sparse short setae. Furthermore, the shape of the submedian carinae on the anterior sections of the second and third abdominal somites is different between the two species. In *G. africana*, these carinae are spiniform, whereas in *G. sculpta* they are rounded crests. Intercarinal tubercles on the branchial region may be fewer in *G. africana* than in *G. sculpta*. *Glyphocrangon podager* is also very similar to *G. africana* sp. nov. and *G. sculpta* in the general ornamentation and armature of the body and the structure of the dactyli of the last two pairs of pereopods. Komai (2004b) discussed morphological differences between *G. podager* and *G. sculpta*. The new species can be easily separated from *G. podager* by the spiniform intercarinal tubercles on the carapace, spiniform dorsolateral carinae on the anterior sections of the second and third abdominal somite and the possession of a prominent lateral spiniform process on the fifth abdominal somite. In *G. podager*, the intercarinal

tubercles on the carapace are low, blunt; the dorsolateral carinae on the second and third abdominal somites are non-spiniform, but crested lobes; and the fifth abdominal somite is devoid of a prominent process on the pleuron. Furthermore, there are short setae on the body integument in *G. podager*, but their density is less than in *G. africana* sp. nov.

Records of *Glyphocrangon sculpta* from southern Africa by Stebbing (1908), Barnard (1950) and Kensley (1968; 1981) are referred to the present new species. Distributional records of *G. sculpta* in the eastern Atlantic range from the Bay of Biscay to off Nigeria (Holthuis 1971), and there have been no records of the species from the southwestern coast of Africa, in spite of active scientific investigations in the area (e.g. Crosnier & Forest 1973; Macpherson 1983, 1984). This would seem to suggest that the southern African population is geographically separated from the northeastern Atlantic population of *G. sculpta*.

Komai (2004a) pointed out that there were no endemic species of *Glyphocrangon* in the eastern Atlantic, although the western Atlantic and the Indo-Pacific each have many species with very limited geographical ranges (Holthuis 1971; Komai 2004a; Komai 2004b, 2005, 2006, 2007; Komai & Chan 2008). The present new species is so far only known from the southeastern Atlantic off South Africa and it might represent the first endemic species in the eastern Atlantic.

ACKNOWLEDGEMENTS

I thank Elizabeth Hoenson and Michelle van der Merwe (Iziko Museums of Cape Town), Paul F. Clark (The Natural History Museum, London) and the late Paulo Young (Museu Nacional, Rio de Janeiro) for loaning the material used in this study. Sincere thanks are also extended to Sammy De Grave (Oxford University Museum of Natural History), Charles H.J.M. Franssen (Nationaal Natuurhistorisch Museum, Leiden), and Joanne Taylor (Museum Victoria, Melbourne) for reviewing the manuscript and for offering suggestions for improvements.

REFERENCES

- BARNARD, K.H. 1950. Descriptive catalogue of South African decapod Crustacea (crabs and shrimps). *Annals of the South African Museum* **38**: 1–837.
- CROSNIER, A. & FOREST J. 1973. Les crevettes profondes de l'Atlantique orientale tropicale. *Faune Tropicale* **19**: 1–409.
- HOLTHUIS, L.B. 1971. The Atlantic shrimps of the deep-sea genus *Glyphocrangon* A. Milne Edwards, 1881. *Bulletin of Marine Science* **21**(1): 267–373.
- KENSLEY, B.F. 1968. Deep sea decapod Crustacea from west of Cape Point, South Africa. *Annals of the South African Museum* **50**(12): 283–323.
- KENSLEY, B. 1981. On the zoogeography of southern African decapod Crustacea, with a distributional check list of the species. *Smithsonian Contributions to Zoology* **338**: 1–64.
- KOMAI, T. 2004a. Deep-sea shrimps of the genus *Glyphocrangon* A. Milne-Edwards (Crustacea: Decapoda: Caridea: Glyphocrangonidae) from off southeastern coast of Brazil collected during REVISEE Program. *Arquivos do Museu Nacional, Rio de Janeiro* **62**(1): 31–44.
- KOMAI, T. 2004b. A review of the Indo-West Pacific species of the genus *Glyphocrangon* A. Milne-Edwards, 1881 (excluding the *G. caeca* Wood-Mason, 1891 species group) (Crustacea: Decapoda: Caridea: Glyphocrangonidae). In: MARSHALL, B. & RICHER DE FORGES, B. (eds) *Tropical Deep Sea Benthos* Vol. 23.

- Memoires du Museum national d'Histoire naturelle, Paris* **191**: 375–610.
- KOMAI, T. 2005. A distinctive new species of the deep-water shrimp genus *Glyphocrangon* A. Milne-Edwards (Crustacea: Decapoda: Caridea: Glyphocrangonidae) from southern Australia. *Records of the Western Australian Museum* **22**: 253–258.
- KOMAI, T. 2006. A review of the *Glyphocrangon caeca* Wood-Mason & Alcock, 1891 species group, with descriptions of six new species (Crustacea: Decapoda: Caridea: Glyphocrangonidae). In: RICHER DE FORGES, B. & JUSTINE, J.-L. (eds) *Tropical Deep Sea Benthos 24. Memoires du Muséum national d'Histoire naturelle* **193**: 243–264.
- KOMAI, T. 2007. A new species of *Glyphocrangon* (Crustacea: Decapoda: Caridea: Glyphocrangonidae) from the Austral Islands, French Polynesia. *Zoosystema* **29**(3): 565–573.
- KOMAI, T. & CHAN T.-Y. 2008. Further records of deep-sea shrimps of the genus *Glyphocrangon* A. Milne-Edwards, 1881 (Crustacea: Decapoda: Caridea) from the Philippines, with descriptions of three new species. *The Raffles Bulletin of Zoology, Supplement* **19**: 39–62.
- MACPHERSON, E. 1983. Crustáceos decápodos capturados en las costas de Namibia. *Resultatos Expediciones Cientificas, Investigaciones Pesqueras, Supplement* **11**: 3–79.
- MACPHERSON, E. 1984. Crustáceos decápodos del Banco Valdivia (Atlántico suboriental). *Resultatos Expediciones Cientificas, Investigaciones Pesqueras, Supplement* **12**: 39–105.
- RICE, A.L. 1981. The status of *Glyphocrangon rimapes* Bate, 1888 (Crustacea, Decapoda, Glyphocrangonidae). *Bulletin of the British Museum of Natural History (Zoology)* **40**: 275–285.
- STEBBING, T.R.R. 1908. South African Crustacea, Part 4. Marine investigations in South Africa. *Annals of the South African Museum* **6**: 1–96.