Zootaxa 2372: 358–366 (2010)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

A new species of *Glyphocrangon* (Decapoda: Caridea: Glyphocrangonidae) from off the coast of western Mexico*

MICHEL E. HENDRICKX
Laboratorio de Invertebrados Bentónicos, Unidad Académica Mazatlán, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, P.O. Box 811 Mazatlán, Sinaloa, Mexico. E-mail: michel@ola.icmyl.unam.mx

* *In*: De Grave, S. & Fransen, C.H.J.M. (2010) Contributions to shrimp taxonomy. *Zootaxa*, 2372, 1–414.

Abstract

A new species of *Glyphocrangon* has been collected during deep-water sampling off western Mexico, in the east Pacific. The series of specimens, including both males and females, was found between 780 and 1879 m depth. *Glyphocrangon* sp. nov. is close to *G. sicaria* Faxon, 1893 and *G. vicaria* Faxon, 1896, both occurring in the east Pacific. It differs from both species, however, by the absence of tubercles between the lateral carinae, the presence of a large tooth at the anterior end of the second anterior lateral carina, the size of the eye (proportionally smaller in *G. vicaria*), and the presence of two large rostral lateral teeth (one obsolete in *G. sicaria*). The new species is, however, strikingly similar to *G. fimbriata* Komai & Takeuchi, 1994, from the Mid-Pacific Mountains. It differs from the later species by the shape of the male endopod of first pleopod, the relative size and spination of the appendices interna and masculina, the presence of a large lateral tooth on pleura of abdominal somites 3–5, and the absence of curved setae on distal part of the dactyl of pereiopods 3–5.

Key words: Crustacea, Decapoda, Caridea, Glyphocrangonidae, *Glyphocrangon*, new species, western Mexico

Introduction

In his key to species of the genus *Glyphocrangon* A. Milne-Edwards, 1881, Chace (1984) included the 38 species that were known at that time. Since he studied the material collected during the "Albatross" Philippine Expedition, a large series of contributions have been published on this group of deep-water shrimp, particularly by T. Komai and collaborators. Consequently, today a total of 84 species of *Glyphocrangon* are known from around the world, most described after 1994 (Komai & Takeuchi 1994; Takeda & Hanamura 1994; Brand & Takeda 1995; Burukovsky 2004; Komai 2004a, 2004b, 2005, 2006, 2007; Komai & Chan 2008; S. De Grave pers. comm.). In the case of the east Pacific, however, no species of this genus has been added since Burukovsky (1990) described *G. waginii* Burukovsky, 1990, based on material collected from the Sala-y-Gómez Ridge, off Chile.

The glyphocrangonid fauna of the east Pacific remains poorly known. In the course of history, the most important captures were those performed by the "Albatross". In his study of the material collected during this cruise, Faxon (1893, 1895, 1896) recognized five new species (*G. alata* Faxon, 1893; *G. loricata* Faxon, 1895; *G. sicaria* Faxon, 1893; *G. spinulosa* Faxon, 1893, and *G. vicaria* Faxon, 1896). Another species, *G. rimapes* Bate, 1888, described from the West Atlantic, has also been reported for the east Pacific, from Juan Fernandez Islands (Wicksten, 1989). According to Komai (2004a: 378), an additional species of *Glyphocrangon*, erroneously included in the type series of *G. rimapes* (ov. female paratype, collected by the "Challenger" off Juan Fernández, Chile), belongs to a different species awaiting description. Additional information related to the east Pacific *Glyphocrangon* is provided by Wicksten (1979) and Méndez (1981) who reported additional material and new distribution ranges for some species of this genus, and by Hendrickx (2001) who reported

 Accepted by S. De Grave: 18 Sept. 2009; published: ?? Feb. 2010

two species collected off western Mexico, and provided some biological data on *G. spinulosa* (Hendrickx 2004).

Material and methods

During 2000–2008, an extensive survey of the deep-water fauna associated with the upper slope off the coast of western Mexico was organized by the Mazatlán unit of the Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, aboard the R/V "El Puma". The study of decapod crustaceans revealed the presence of several undescribed species, among which a series of specimens of the genus *Glyphocrangon* appeared to be different from all other species recorded in the area. Because deep-water species often have a very wide geographic distribution, the material was compared to description of species of *Glyphocrangon* world-wide. Based on this comparison, a new species is described and illustrated herein. Abbreviations used are: cl carapace length (mm); tl total length (mm); TALUD name of the series of cruises made on the continental slope, off western Mexico; EMU acronym of the Regional Invertebrate Collection where the material examined in this study is deposited. Environmental parameters were measured with a Seabird CTD-O_2 probe (temperature and dissolved oxygen) and the Winkler method (dissolved oxygen) using water samples collected with opening-closing bottles. Depth was measured with a digital echo-sounder.

Systematics

***Glyphocrangon* A. Milne-Edwards, 1881**
***Glyphocrangon taludensis* n. sp.**
(Figs. 1–3)

Material examined. Holotype: ov. female (cl 34.3, tl 128.1), TALUD XII, St. 25 (18°26'45"N, 104°16'10"W) 1.IV.2008, 1858–1879 m depth, benthic sledge, muddy bottom (EMU–8595). Allotype: 1 male (cl 21.2, tl 85.2), TALUD VII, St. 13B (23°30.3'N, 107°44.0'W) 6.VI.2001, 1400–1450 m depth, benthic sledge, muddy bottom (EMU–8596). Paratypes: 2 ov. females (cl 32.4–35.1, tl 124.2–128.2), TALUD XII, St. 25 (18°26'45"N, 104°16'10"W) 1.IV.2008, 1858–1879 m depth, benthic sledge, muddy bottom (EMU–8597; 1 ov. female (cl 39.3, tl 141.5), TALUD XII, St. 25, (18°26'45"N, 104°16'10"W) 1.IV.2008, 1858–1879 m depth, benthic sledge, muddy bottom (EMU–8598) (preserved in ethanol).

Additional material examined. One female (cl 27.5, tl 104.5), 2 ov. females (cl 28.1–28.4, tl 107.0–107.6) (EMU–8601, 8604), TALUD VII, St. 13B (23°30.3'N, 107°44.0'W) 6.VI.2001, 1400–1450 m depth, benthic sledge, muddy bottom; 1 ov. female (cl 28.3, tl 104.9), TALUD VII, St. 25 (24°51.8'N, 108°58.0'W) 8.VI.2001, 780–850 m depth, benthic sledge, muddy bottom (EMU–8602); 1 male (cl 19.0, tl 79.9) (EMU–8600), 3 ov. females (cl 26.5–29.4, tl 106.3–111.6) (EMU–8599, 8603), TALUD XII, St. 29 (19°19'37"N, 105°26'20"W) 2.IV.2008, 1609–1643 m depth, benthic sledge, muddy bottom.

Type locality. Off Guerrero, Mexico (18°26'45"N, 104°16'10"W), 1858–1879 m depth.

Description. Body (Figs. 1–2) robust, integument firm, with very short pubescence, not visible to naked-eye. Rostrum slightly upturned anteriorly, overreaching anterior margin of scaphocerite (0.57 times as long as carapace in holotype, 0.62 in allotype and 0.60–0.67 in paratypes), dorsally concave, not septate; dorsolateral margins with 2 pairs of subequal teeth, anterior pair at proximal 1/3 of rostrum, posterior pair at posterior margin of orbit; median carina extending from apex of rostrum to between the two pairs of lateral teeth, low, not higher than lateral carinae; dorsolateral and ventrolateral margins ridged; ventral surface flattened, with short distal, median carina.

Submedian (first) carina on carapace composed of blunt tubercles, slightly pointing forward, 7 or 8 anterior and 5 or 6 posterior to cervical groove, area between submedian carinae smooth except for few anterior tubercles. Anterior intermediate (second) carina composed of 3 strong tubercles and strong triangular tooth continuous with dorsolateral carina of rostrum; posterior intermediate carina strong, not entire, margin

divided into 5 or 6 lobes, a pair of small, rounded tubercles anterior to carina. Anterior antennal (third) carina very short, not continuous with antennal tooth, reduced to row of close-set 2 or 3 small eroded tubercles; posterior antennal carina entire, strong, eroded, except for lower anterior portion, without anterior lobe or tooth, a couple of strong tubercles oblique to carina beyond cervical groove. Anterior lateral (fourth) carina not continuous with antennal tooth, a distinct notch at about midlength, anterior section forming large tooth not reaching level of posterior margin of orbit, posterior section terminating anteriorly in low, blunt tooth; posterior lateral carina entire, eroded. Anterior sublateral (fifth) carina prominent, eroded; posterior sublateral carina less distinct. Submarginal carina less distinct, separated into some sections. Fifth and sixth carinae margins beyond cervical groove subparalel to lower margin of carapace, ending in a strong posterior, triangular lobe just above posterolateral angle of carapace. Space between anterior first and second carinae with a few tubercles; space between posterior first and second carinae with scattered tubercles; spaces between posterior parts of second, third and fourth carinae smooth. Antennal teeth unarmed, about 3/4 as long as, and diverging more than branchiostegal teeth. Branchiostegal teeth not overreaching anterior margin of cornea, falling short of proximal segment of antennular peduncle, slightly divergent, two low lateral and one ventral carinae.

First abdominal somite with some obscure tubercles along posterior margin, 1 strong flattened tubercle slightly produced beyond anterolateral margin of tergum; median carina thick, dorsal margin ridged, overhanging anterior section of first somite. Median carina on each somite posterior to first sharp, divided into anterior and posterior sections by shallow notch (somites 2–4) or v-shaped incision (somites 5–6). Fifth somite with posteriorly divergent submedian carina on posterior half. Posterior margins of fourth to sixth somites convexly produced. Pleuron of somites 2–5 with mesial, vertical protuberance, bearing several irregular tubercles, the lower one sharper, tooth-like in somites 3–4. Pleuron of first somite tapering anteroventrally to blunt point, and those on somites 2–5 with 2 ventral teeth; teeth on somite 2 directed ventrally, anterior slightly larger than posterior tooth; teeth on somites 3–5 directed posteroventrally, anterior stronger than posterior in somites 3–4, weaker than posterior one in fifth somite. Pleuron of sixth somite with strong posteroventral tooth directed posteriorly. Telson (Fig. 1) elongate, triangular, gradually tapering to sharp point, 0.63 times as long as carapace, posterior part slightly uptumed; dorsolateral margin sharply ridged; dorsal surface concave, with strong, acute median tubercle proximally.

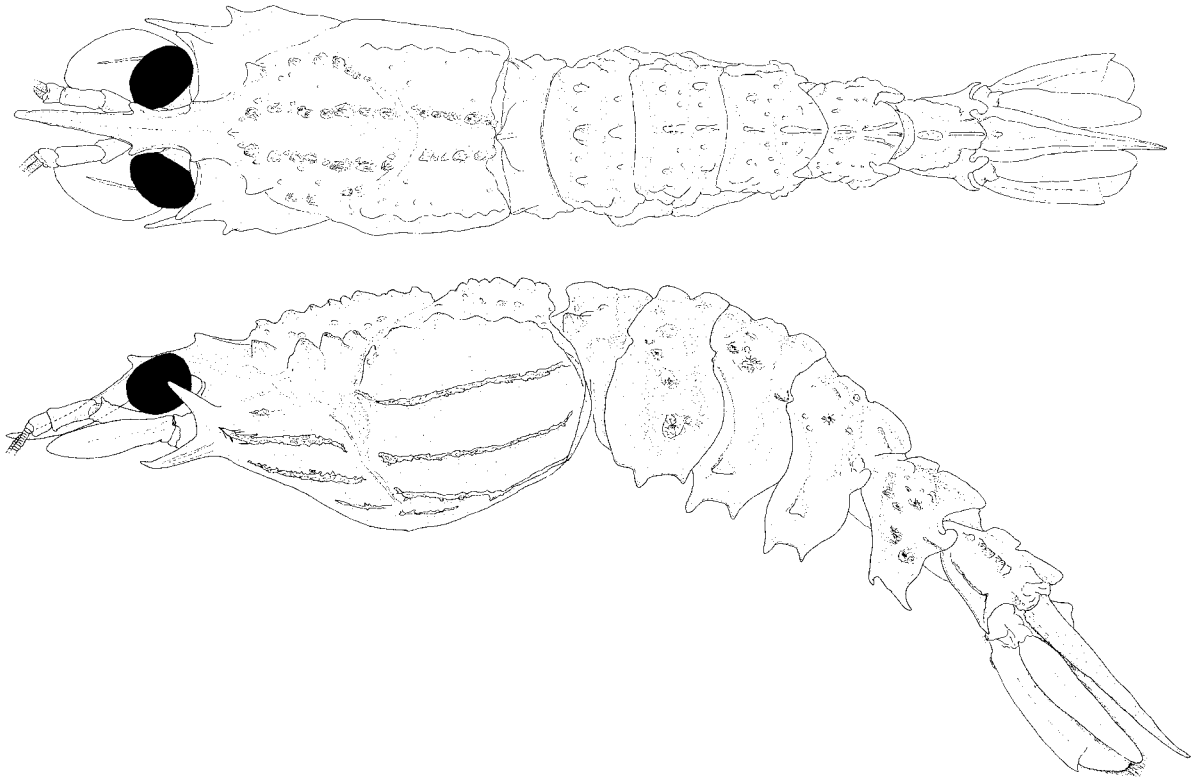

FIGURE 1. *Glyphocrangon taludensis* sp. nov.: Holotype, ov. female (cl 34.3), latera**l** and dorsal views.

FIGURE 2. *Glyphocrangon taludensis* sp. nov: Holotype, ov. female (cl 34.3), lateral and dorsal views. Photographs from preserved specimen.

Eye moderately large, about 1.28 rostral width at its base, about 0.25 carapace length, with dark cornea.

Antennule with peduncle falling slightly short of anterior margin of scaphocerite; proximal segment with stylocerite showing as acute lobe; combined length of 2 distal segments less that 2/3 length of proximal segment. Antennular flagella about as long as peduncle.

Scaphocerite (Fig. 4D–E) ovate, 1.55 times as long as wide, less than half the length of carapace, with minute lateral tooth at about midlength, lateral margin proximal to lateral tooth bearing short setae. Carpocerite not reaching distal margin of blade.

Third maxilliped (Fig. 4A–B) stout, reaching anterior margin of scaphocerite; distal 2 segments with strong spines on ventromesial margin and mesial face, mesial face concealed by long setae; ultimate segment terminating in sharply pointed apex; exopod with articulated distal lash.

First pereopod (Fig. 3A–B) incompletely subchelate; palm narrowing distally in dorsal view, with row of tufts of stout setae mesially; carpus short, bearing setae dorsomesially; ischium with wide ventral laminar expansion, distally pointed. Right second pereopod slightly longer than left (Fig. 3C) and with more carpal articles (28 vs. 25) (in paratypes, right with 25–27, left with 20–23); chela (Fig. 3E–D) about as long as ultimate article of carpus; fixed finger short, terminating in corneous spine; dactyl broad, terminating in 2 unequal corneous spines; ischium distinctly longer than merus, ventral margin somewhat expanded. Third pereopod (Fig. 3F) with dactyl flattened, simple, less than 1/3 propodus length, without setae except for a few terminal setae on propodus; carpus 0.5–0.6 times as long as propodus. Fourth (Fig. 3G) and fifth pereopods (Fig. 3H) with dactyl similar to that of third pereopod, proportionally slightly longer, without setae; propodus

without setae, except for terminal and subterminal tufts of setae; carpus 0.6 times as long as propodus, without setae. Male dactyl of fourth and fifth pereiopods bifid (Fig. 3I).

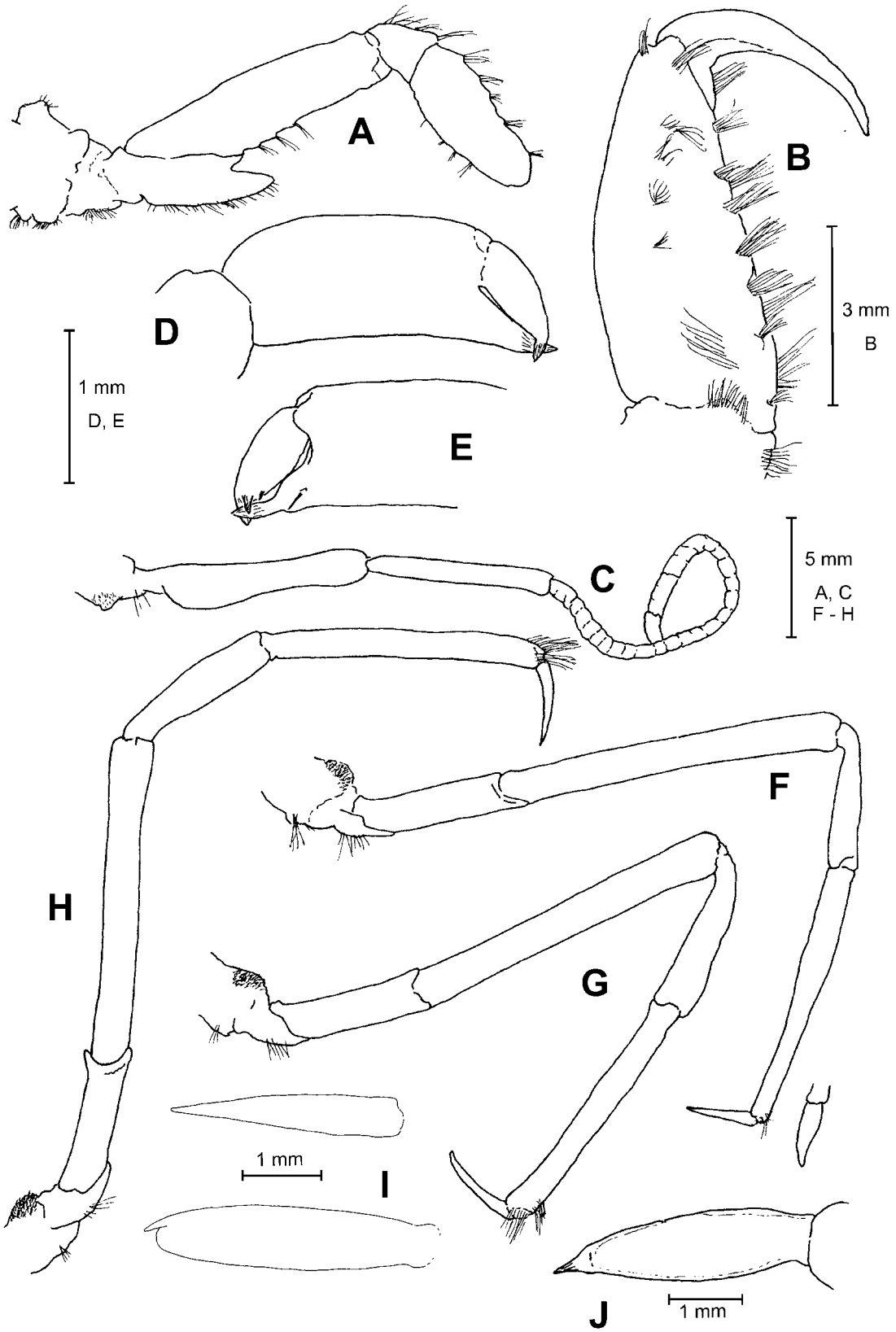

FIGURE 3. *Glyphocrangon taludensis* sp. nov. A, right first pereiopod, lateral view; B, same, detail of chela; C, right second pereiopod, lateral view; D–E, same, chela, detail of both lateral faces; F, right third pereiopod, lateral view; G, fourth pereiopod, lateral view; H, right fifth pereiopod, lateral view, and detail of dactyl; I, dactyl of third (up) and fourth (down) pereiopods, posterior view; J, dactyl of fourth pereiopod, posterior view. A–H, J, holotype, ov. female (cl 34.3); I, allotype, male (cl 21.2).

Male first pleopod with endopod (Fig. 4F–G) slightly less than half length of exopod, mesial margin concave; appendix interna defined mesially by wide V-shaped sinus, oval. Male second pleopod (Fig. 4H) with appendix masculina longer than appendix interna, by over 1/3 appendix interna length, bearing about 40 long spines.

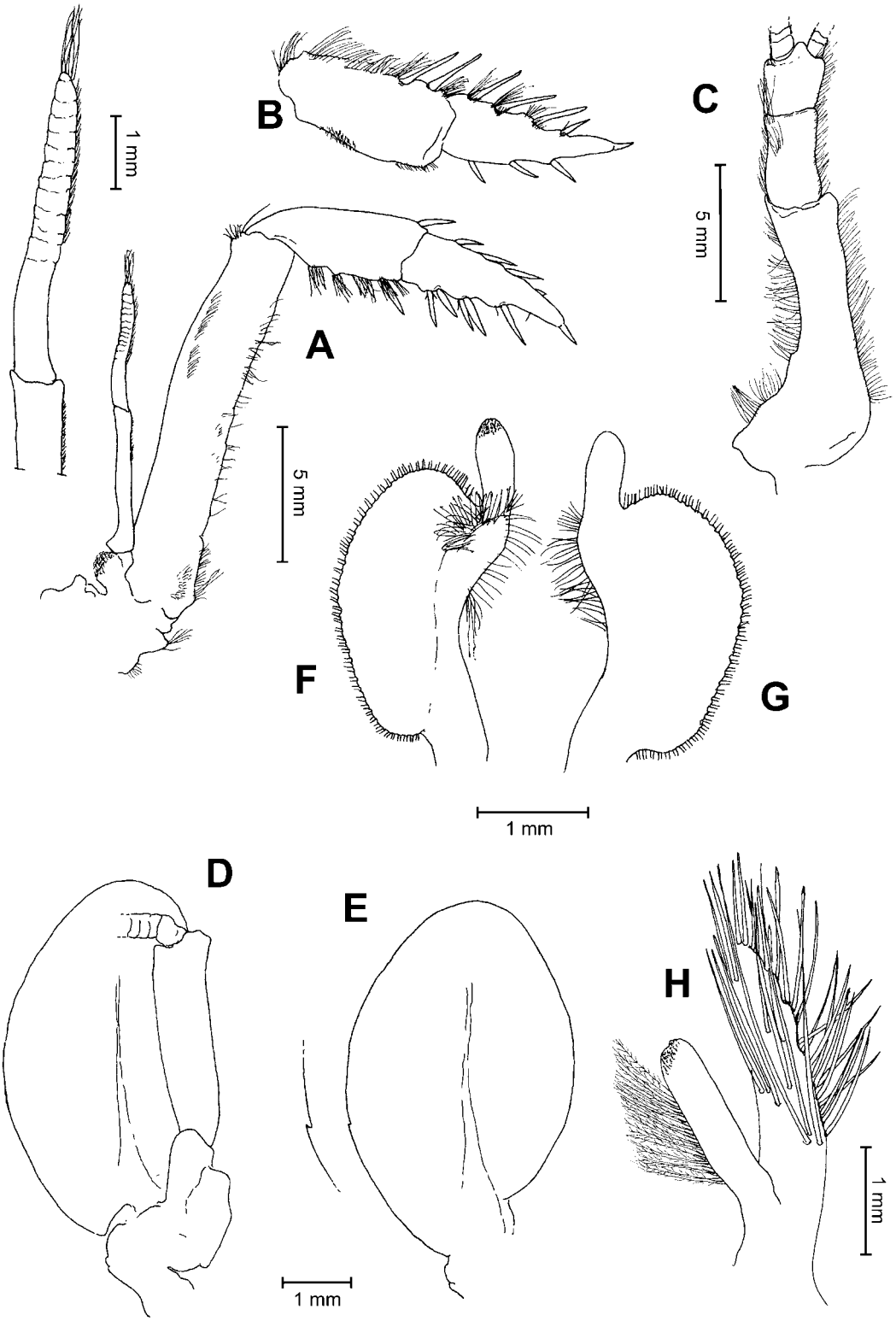

FIGURE 4. *Glyphocrangon taludensis* sp. nov. A, right third maxilliped, lateral view and detail of exopod; B, same, detail of last two segments, frontal view; C, right antennule, ventral view; D, antenna, ventral view; E, same, dorsal view of scaphocerite and detail of outer margin; F, right endopod of male first pleopod, posterior view; G, same, frontal view. A–E, holotype, ov. female (cl 34.3); F–H, allotype, male (cl 21.2).

Uropod (Fig. 1) not reaching posterior end of telson; exopod equal in length to endopod, with transverse suture, lateral margin convex, terminating posteriorly in acute tooth.

Eggs large, ovate. Number of eggs increasing with carapace size: 110 (cl 28.1, EMU–8601); 134 (holotype, cl CL); 172 (cl 39.3, EMU–8598). Size of eggs increasing with embryonal development (estimated by direct microscope observation): 2.30 × 2.97 in eggs with no sign of embryo; 2.60 × 3.29 in eggs with small embryo; 2.83 × 3.71 in eggs with large embryo.

Etymology. The species is named after the name of the cruises and the research project during which it was collected (TALUD cruises).

Ecology. The material examined was collected in depths between 780 and 1879 m. Epibenthic temperature and dissolved oxygen concentration values varied from 2.4 to 4.7°C and from 0.10 to 1.85 ml O_2/l. The lowest oxygen value was measured at station 25 of the TALUD VII cruise, in depths of 780–850 m, a bathymetric fringe where severe hypoxy is known to occur in the southern Gulf of California and off the coast of western Mexico (see Hendrickx 2001; Hendrickx & Serrano 2007).

Remarks. *Glyphocrangon taludensis* sp. nov. is morphologically close to *G. sicaria* Faxon, 1893 and *G. vicaria* Faxon, 1896, both occurring in the east Pacific. It differs from both species, however, by the absence of tubercles between the lateral carinae, the presence of a large tooth at the anterior end of the second anterior lateral carina, the size of the eye (proportionally smaller in *G. vicaria*), the presence of a deep V-shaped notch on dorsal carina of somites 5–6 (absent in *G. vicaria*, little pronounced in *G. sicaria*), and the presence of two large rostral lateral teeth (proximal obsolete in *G. sicaria*, reduced in *G. vicaria*). The absence of tubercles between the lateral carinae also distinguish *G. taludensis* sp. nov. from two other species similar to *G. vicaria*, namely *G. saintlaurentiae* Komai, 2004 (West Pacific), and *G. atlantica* Chace, 1939 (Atlantic Ocean). The characters used by Komai (2004a: key) to distinguish the Indo-Pacific species and comparison of other species subsequently described by this author (Komai 2006, 2007; Komai & Chan 2008) allow for the distinction of *G. taludensis* sp. nov. from all other known species in the genus, by the following characters: the carapace and abdomen feature very short, sparse setae, not visible to the naked-eye; the intercarinal regions on the carapace are devoid of rows or clusters of tubercles (except for occasionally a few, isolated tubercles); there is a single lateral rostral tooth above the orbital margin and the rostrum is not septate; the pterygostomial tooth is distinctly longer than the antennal tooth; the eye is large, about 0.25 times length of carapace; the first (submedian) carina harbours blunt tubercles; the anterior lateral (fourth) carina is divided into teeth or lobes and does not reach the orbital margin; the anterior (third) carina is confined to the antennal spine, with small tubercles forming a reduced row on the upper hepatic region; the dactylus of pereiopods 4–5 is subspatulate, terminating in a single; acuminate unguis, there is no median carina on ventral face of the fourth pereiopod dactylus, the later being about 0.4 times the length of the propodus.

The new species, however, is strikingly similar to *G. fimbriata* Komai & Takeuchi, 1994, from the Mid-Pacific Mountains. It differs from the latter species by the presence of a conspicuous lateral tooth or tubercle on the pleura of abdominal somites 3–5; a shorter branchiostegal spine; by pereiopods 3–5 and antennal peduncle segments somewhat different in their respective proportion when compared to similar proportions in *G. fimbriata*; and the absence of curved setae on the distal part of the dactylus of pereiopods 3–5. When comparing the male pleopods 1–2 (but see below) of both species, the shape of the male endopod of first pleopod is oval in *G. taludensis* vs. tapering in *G. fimbriata*; the relative size (proportionally shorter in *G. fimbriata*) and spination of the appendix interna (a row of 20 plumose setae in *G. taludensis* sp. nov., vs. only 4 in *G. fimbriata*) and appendix masculina (ca 40 spines in *G. taludensis* sp. nov., vs. ca 20 spines in *G. fimbriata*) also allow to separate the two species.

In his study of the Indo-West Pacific species of *Glyphocrangon*, Komai (2004a: 487) also compared *G. fimbriata* to *G. megalophthalma* De Man, 1918, reported from Indonesia, and which it closely ressembles. Among differences noted between these two species by Komai (2004a), *G. megalophthalma* features a conspicuous pubescence on carapace, and an antennular peduncle that clearly overeaches the anterior margin of the scaphocerite. In both *G. fimbriata* and *G. taludensis* sp. nov. pubescence is very much reduced and the antennular peduncle is shorter than the scaphocerite. In addition to this, the presence of a simple, acuminate dactylus on pereiopods 4-5 of mature females and of a bifid dactylus in males and young females of *G.*

taludensis sp. nov. provides easy separation between the latter and both *G. fimbriata* and *G. megalophthalma* (see below).

Komai & Takeuchi (1994: 463) noted the similarity between *G. fimbriata* and the two species described by Faxon (1893, 1896) *G. sicaria*, and *G. vicaria*, but they separated them on roughly the same criteria as those used in the present contribution. A large specimen of *G. vicaria* (tl 160) was illustrated by Wicksten (1979: Fig. 4) and it is clearly distinct from both *G. fimbriata* and *G. taludensis* sp. nov., and also from *G. megalophthalma*. The specimen of *G. sicaria* illustrated by Faxon (1895: Plate 34) also was a large specimen (tl 124), very distinct from *G. taludensis* sp. nov. As all were large, mature specimens, confusion due to examination of characters in immature specimens was avoided.

Closeness of *G. fimbriata* and *G. taludensis* sp. nov. merits attention. As related taxa (see Komai 2004a, 2006), these two species probably represent a case of vicariance for the Pacific Ocean.

All large females (cl 32.4–39.3) used herein as type material feature a simple dactylus on pereiopods 3–5, uncleft, without bifurcation (Fig. 3F). The additional material examined includes 2 males (cl 19.0–21.2) and 7 smaller females (cl 21.2–29.4). These specimens and the male allotype feature a bifid dactyl on pereiopods 4–5 (Fig. 3I). A very close examination of these smaller specimens, reveals the spines and tubercles to be sharper compared to the large females used as type material, but no other significant difference could be found between the external morphology of these two series of specimens. Sex-related variation of the dactylus of pereiopods 4–5 in some *Glyphocrangon* species has been reported by Komai (2004a, 2004b). In mature and spawning females of *G. caecescens* Wood-Mason, 1891 [in Wood-Mason & Alcock, 1891a], *G. rimapes*, *G. dimorpha* Komai, 2004, and *G. unguiculata* Wood-Mason & Alcock, 1891b, for instance, the dactyl is deeply cleft or bifid while it is simple and acuminate in males and young, non-spawning females (see Komai 2004a, 2004b for further details). As noted earlier, the presence in *G. taludensis* sp. nov. of a bifid dactyl in pereiopods 4–5 of young females and males further provides separation between the new species and both *G. fimbriata* and *G. megalophthalma* (dactyl simple in both males and non-spawning females).

Other small variations were noted. In smaller specimens the posterior sublateral and submarginal carinae of the carapace are almost obsolete. In some specimens, there are a few tubercles between the posterior first and second carinae.

Acknowledgements

The author thanks all scientists, crew members and students who provided assistance during the research cruises. The author is also thankful to an anonymous reviewer and to Sammy De Grave for their usefull and very constructive suggestions; and to the IRSNB/KBIN, Brussels, and DGAPA, UNAM, Mexico, for their support during his sabbatical leave. This project was partly supported by DGAPA grant IN-217306-3. Mercedes Cordero provided assistance with the final manuscript.

Literature cited

Bate, C.S. (1888) Report on the Crustacea Macrura collected by the "Challenger" during the years 1873–1876. *Reports on the scientific results of the Voyage of H.M.S. Challenger during the years 1873-1876*, 24, 1–942, plates 1–157.

Brand, T. & Takeda, M. (1996) *Glyphocrangon* shrimps from the western Pacific collected by the R/V Hakuho-maru during the KH-72-1 cruise. *Bullletin of the National Science Museum, Tokyo*, Series A, 22(4), 263–281.

Burukovsky, R.N. (1990) Shrimps from the Sala-y-Gomez and Nazka Ridges [in Russian]. *Trudy Instituta Okeanologii*, 124, 187–215.

Burukovsky, R.N. (2004) The Glyphocrangonidae (Crustacea, Decapoda) from Aden Gulf [in Russian]. In: Nekotorie Problemi Gidrobiologii I Mikrobiologii. Kaliningradskii Goschdarstvennii Tekhicheskii Universitet, pp. 70–87.

Chace, F.A. Jr. (1984) The caridean shrimps (Crustacea: Decapoda) of the "Albatross" Philippine Expedition, 1907-1910, Part. 2: Families Glyphocrangonidae and Crangonidae. *Smithsonian Contributions to Zoology*, 397, 1–63.

Faxon, W. (1893) Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U.S. Fish

Commission steamer “Albatross”, during 1891, lieut. Commander Z.L. Tanner, U.S.N., commanding. VI. Preliminary descriptions of new species of Crustacea. *Bulletin of the Museum of Comparative Zoology Harvard University*, 24(7), 149–220.

Faxon, W. (1895) Reports on an exploration off the west coast of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, carried on by the U.S. Fish Commission steamer “Albatross”, during 1891, lieut. Commander Z.L. Tanner, U.S.N., commanding. XV. The stalk-eyed Crustacea. *Memoirs of the Museum of Comparative Zoology at Harvard College*, 18, 1–292, plates 34–51.

Faxon, W. (1896) Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico and the Caribbean Sea, and on the east coast of United States, 1877 to 1880, by the U.S. coast survey steamer “Blake”, lieut. Commander C.D. Sigsbee, U.S.N., and commander J.R. Bartlett, U.S.N., commanding. XXXVII. Supplementary notes on the Crustacea. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 30(3), 153–168, plates 1–2.

Hendrickx, M.E. (2001) Occurrence of a continental slope decapod crustacean community along the edge of the minimum oxygen zone in the southeastern Gulf of California, Mexico. *Belgian Journal of Zoology*, 131(Suppl. 2), 95–109.

Hendrickx, M.E. & Serrano, D. (2007) Efecto de la zona de mínimo oxígeno sobre los corredores pesqueros a lo largo del Pacífico mexicano. Pp. 1–2. *In*: Memorias XIV Congreso Nacional de Ciencia y Tecnología del Mar. Nuevo Vallarta, Nay. Secretaría de Educación Pública.

Komai, T. (2004a) A review of the Indo-West Pacific species of the genus *Glyphocrangon* A. Milne Edwards, 1881 (excluding the *G. caeca* species group) (Crustacea: Decapoda: Caridea: Glyphocrangonidae). *Mémoires du Muséum national d'Histoire Naturelle*, 191: 375–610.

Komai, T. (2004b) Deep-sea shrimps of the genus *Glyphocrangon* A. Milne-Edwards (Crustacea, Decapoda, Caridea, Glyphocrangonidae) from off southeastern coast of Brazil collected during the Revizee program. *Arquivos do Museu Nacional, Rio de Janeiro*, 62(1), 31–44.

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. (2006a) Revision of the *Glyphocrangon caeca* species group (Crustacea, Decapoda, Glyphocrangonidae). In: Richer de Forges, B. & Justine, J.-L. (Eds.) Tropical Deep-Sea Benthos, volume 24. *Mémoires 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, 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*, Suppl. 19, 39–62.

Komai, T. & Takeuchi, I. (1994) *Glyphocrangon fimbriata*, a new species of caridean shrimp (Crustacea: Decapoda: Glyphocrangonidae) from Sio Guyot, mid-Pacific mountains. *Proceedings of the Biological Society of Washington*, 107(3), 458–464.

Man, J.G. de (1918) Diagnoses of new species of macrurous decapod Crustacea from the Siboga-Expedition. *Tijdschrift van de Nederlandse Dierkundige Vereeniging*, series 2, 16, 293–306.

Méndez, M. (1981) Claves de identificación y distribución de los langostinos y camarones (Crustacea: Decapoda) del mar y ríos de la costa del Perú. *Boletín del Instituto del Mar de Perú*, 5, 1–170.

Milne-Edwards, A. (1881) Description de quelques crustacés macroures provenant des grandes profondeurs de la Mer des Antilles. *Annales des Sciences Naturelles*, 6e serie, 11, 1–15.

Takeda, M. & Hanamura, Y. (1994) Deep-sea shrimps and lobsters from the Flores Sea collected by the R.V. Hakuho-maru during KH-85-1 cruise. *Bulletin of the National Science Museum*, Series A (Zoology), 20(1), 1–37.

Wicksten, M.K. (1979) New records of the species of *Glyphocrangon* in the northeastern Pacific Ocean (Caridea: Glyphocrangonidae). *Proceedings of the Biological Society of Washington*, 92, 217–224.

Wicksten, M.K. (1989) Ranges of offshore decapod crustaceans in the eastern Pacific Ocean. *Transactions of the San Diego Society of Natural History*, 21(19), 291–316.

Wood-Mason, J. & Alcock, A. (1891a) Natural history notes from H.M. Indian marine survey steamer "Investigator", Commander R.F. Hoskyn, R.N., commanding. Series II, No. 1. On the results of deep-sea dredging during the season 1890-1891. *The Annals and Magazine of Natural History*, series 6, 8, 353–362.

Wood-Mason, J. & Alcock, A. (1891b) Natural history notes from H.M. Indian marine survey steamer "Investigator", Commander R.F. Hoskyn, R.N., commanding. No. 21. Note on the results of the last season's deep-sea dredging. *The Annals and Magazine of Natural History*, series 6, 7, 186–202.