**Lipkemera iejima**, a new cavernicolous crab (Brachyura: Xanthidae) from a submarine cave at Ie Island, central Ryukyu Islands, Japan

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**Abstract.**—A new species of the genus *Lipkemera* Davie, 2010, is described from a submarine cave at Ie Island, Ryukyu Islands, Japan. *Lipkemera iejima*, new species, can be distinguished from congeners by the characters of ambulatory legs and the regionation of the dorsal surface of the carapace. The present study brings the number of *Lipkemera* species to five. A key to species of *Lipkemera* is also provided.

**Key words:** Taxonomy, description, new species, Liomerinae

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**Introduction**

The liomerine genus *Lipkemera* Davie, 2010, is a replacement name of *Meriola* Davie, 1993, which was established to accommodate *M. rufomaculata* Davie, 1993, and *Neoliomera acutidens* Sakai, 1969. *Meriola* Davie, 1993, is a junior homonym of a spider genus *Meriola* Banks, 1895 (Araneae: Corinnidae). Subsequently, *M. corallina* Takeda & Marumura, 1997, and *L. holtthuii* Mendoza, 2010, has been added to the genus. *Lipkemera* species appear to inhabit relatively deeper waters; *L. rufomaculata* from depths of 240 and 270 m of Tuamotu Archipelago; *L. acutidens* and *L. corallina* from depths of 30–50 m and 60–80 m, respectively, off Wakayama, Honshu, Japan; while *L. holtthuii* was from depths of 50–200 m, off Panglao Island, central Philippines. Recently an undescribed liomerine species that is referable to *Lipkemera* was found inhabiting a submarine cave with a depth of only 17 m at Ie Island, adjacent to Okinawa Island, Ryukyu Islands, Japan. The present study describes the species and compares it with congeners.

The measurements provided, in millimetres, are carapace length (CL) and width (CW) respectively. The abbreviations P2–P5, G1 and G2 are used for pereopods 2–5, male first and second gonopods, respectively. Specimens examined are deposited in the Ryukyu University Museum, Fujukan (RUMF), University of the Ryukyus, Okinawa, Japan.

**Taxonomy**

Family Xanthidae MacLeay, 1838
Subfamily Liomerinae Sakai, 1976

*Lipkemera* Davie, 2010

*Lipkemera iejima*, new species (Figs. 1–4)

http://zoobank.org:pub:B1CA1918-0546-45E6-B1F4-3F9E273EA3F2

**Material examined**

Holotype: RUMF-ZC-1717, male, 11.0 × 17.5 mm, point "Ohoba No. 2", Ie Island, Ryukyu Islands, Japan, 17 m, submarine cave, coll. K. Yunokawa, 28 Jul. 2011. Paratype: RUMF-ZC-2468, 1 female, 15.8 × 25.3 mm, same locality as holotype, coll. K. Yunokawa, 18 May 2013.

**Comparative material**

*Lipkemera corallina* Takeda & Marumura, 1997: ZRC, 4 males, 15.3 × 24.8–20.4 × 33.4 mm, Panglao Island, central Philippines, 80–140 m, tangle net, coll. J. Arbasto, 2004–
2005. *Lipkemera holthuisi* Mendoza, 2010: ZRC, 1 male, 16.0 × 25.9 mm, Doljo, Panglao Island, central Philippines, ca. 50 m, rocky bottom, tangle net, coll. J. Arbasto, 1 Jul. 2011.

**Diagnosis**

Carapace oval, dorsal surface covered with microscopic granules, regions poorly defined, one longitudinal groove from frontal margin bifurcated posteriorly, 3M (meso- and metagastric regions) barely discernible anteriorly; groove indiscernible in female paratype. External orbital corner not angulated. Corner followed laterally by 4 lobes, 1 stout tooth; first lobe short, oblong protuberance, second to fourth lobes continuous, rimmed; first, second lobes subequal in length, second most produced laterally among all lobes (although relatively low), third longest. Junction between antero- and posterolateral margins marked by stout tooth just posterior to fourth lobe, directed outwards, representing widest part of carapace.

Antennular articles folding almost transversely, inter-antennular septum narrow. Basal antennal segment rectangular, placed almost vertically, filling gap between ventral extention of lateral corner of front and inner orbital tooth.

Posterior margin of epistome nearly straight, with median notch.

Third maxilliped (Fig. 2) rectangular, mid-length of ischium about twice of merus, with longitudinal groove on mesial two-fifths.

Male thoracic sternite 3 markedly divided from sternite 4 by posteriorly arched groove. Male sterno-abdominal cavity reaching level of posterior third of cheliped bases. Vulvae obliquely oval, with small triangular sternal cover, placed close to each other on anterior half of thoracic sternite 6.

Chelipeds subequal (Fig. 1), surface appearing smooth, but covered with tiny granules. Carpus rounded, inner angle with 2 rounded teeth, posterior tooth longer than anterior tooth (Fig. 3b). Chela (Fig. 3a) relatively long, palm (along lower margin) twice of height. Fingers nearly straight, with curved distal portion, slightly hoof-like distally, occlusal margins lined with lamellar, triangular teeth. Immovable finger lined with 1 row of pits each on outer and inner surfaces. Movable finger with 1 groove on inner and outer surface each, and 2 grooves on upper surface (Fig. 3b), regions between grooves rim-like. Ambulatory legs relatively long (Figs. 1, 4a, b), relatively slender, meri with weakly convex anterior, posterior margins, lined with long setae and granules, especially on distoanterior margin of meri and outer margin of carpi to dactyli. Dactylo-prop-
odal articulation of each leg forming specialized locking mechanism consisting of distoflexor semicircular extension with distoextensor concavity of propodus and basal tubercle on either side of dactylus. Dactylus straight, tip only slightly curved inwards.

Abdomen (Figs. 1b, 4c) relatively narrow. First somite with proximal part partially concealed under posterior margin of carapace. Second somite slightly narrower than first somite. Third to fifth somites fused, with lateral short fissures between fourth and fifth somites; fused somites widest proximally, gradually narrowed distally. Sixth somite as long as telson, only slightly narrower than telson.

G1 (Fig. 4d, e) slender, distally curved distal-
ward; distal end spatulate, dorsal side of distal part lined with about 15 long plumose setae along inner part of distolateral margin, followed proximally by 1 row of small spinules over distal half. G2 (Fig. 4f) small, shorter than one-third of G1.

Etymology
The new species is named after its type locality, Ie Island (Ie-jima in Japanese). The name is used as a noun in apposition. A standard Japanese name Yunokawa-hira-ougigani is also proposed here.

Ecological note
Lipkemera iejima, new species, was collected from a submarine cave. Lipkemera iejima, new species, was observed not from the bottom of the cave with silty substratum but from holes on walls of the cave. Catoptrus iejima Fujita & Naruse, 2011 (Portunidae) and Bresilia rufioculus Komai & Yamada, 2011 (Bresiliidae) were also recorded from the same cave (Fujita &
Fig. 4. *Lipkemera iejima*, new species. Holotype, RUMF-ZC-1717, male, 11.0 × 17.5 mm. a, right P3 (second ambulatory leg), upper view; b, right P5 (fourth ambulatory leg), upper view; c, abdomen, ventral view; d, left G1, ventral view; e, distal part of left G1, ventral view; f, left G2, ventral view. Setula of G1 and G2 are not drawn. Scales: a, b = 5 mm; c, d, f = 1 mm; e = 0.5 mm.

Naruse, 2011; Komai & Yamada, 2011).

Remarks

Davie (1993) distinguished *Lipkemera* (as *Meriola*) from allied genera including monotypic *Bruciana* Serène, 1977, which was established as a subgenus of *Liomera* Dana, 1851, to accommodate *Carpilodes pediger* Alcock, 1898. The former was distinguished from the latter by only moderately defined regions of the carapace (*vs.* well defined carapace regions), not clearly marked first anterolateral tooth (*vs.* distinct tooth present), and only slightly oblique basal antennal segment (*vs.* obliquely; ca. 45°) positioned basal antennal segment in *Bruciana*, and with long, slender and straight ambulatory legs (those of *Bruciana* are relatively longer than those of typical *Liomera*, but still shorter than *Liomera* and with convex meri margins). The present new species is best
assigned to Lipkemera in its carapace characters.

Lipkemera iejima, new species, has relatively wide ambulatory meri with more convex margins (Figs. 1a, 4a, b) when compared with Lipkemera species (Sakai, 1969: fig. 11a; Davie, 1993: pl. 12, fig. A; Takeda & Marumura, 1997: fig. 4; Mendoza, 2010: fig. 1A), and in this respect, resembles Bruciana. The new species also differs from all Lipkemera and Bruciana species in the poorly defined regions of the carapace (Fig. 1a; Sakai, 1976: pl. 141(3); Takeda & Marumura, 1997: figs. 4, 5A, C, D; Davie, 1993: fig. 12 (A); Mendoza, 2010: figs. 1A, 2A; Serène, 1977: pl. 3, fig. A; Odhner, 1925: pl. 2(5)). However, how well defined the carapace regions are varies even within Lipkemera; the 2Ms of L. rufomaculata and L. corallina are opened posteriorly (Davie, 1993: pl. 12(A); Takeda & Marumura, 1997: fig. 4), whereas those of L. acutidens and L. holtensis are closed (Sakai, 1976: pl. 141(3); Mendoza, 2010: fig. 1A). In any case, L. iejima, new species, shares with Lipkemera species in possessing a slightly oblique basal antennal segment (Figs. 2; Davie, 1993: fig. 11A; Takeda & Marumura, 1997: fig. 5B; Mendoza, 2010: fig. 1B, C).

Other than the above-mentioned characters, L. iejima is perhaps morphologically closest to L. holtensis in having a regularly convex anterolateral margin of the carapace (Mendoza, 2010: figs. 1A, 2A). However, the new species can be distinguished from the latter by the shape of the distal end of G1 (slightly bent distalward, Fig. 4d, e vs. bent proximal-ward, Mendoza, 2010: fig. 3A–C).

Key to species of Lipkemera Davie, 2010
1. Frontal, epigastric and hepatic regions of carapace granular ... 2  
   —. Dorsal surface of carapace smooth ... 3  
2. Carapace relatively wide (CW 1.74 times CL), relatively shorter ambulatory legs, with meri just exceeding widest extent of carapace ... L. acutidens (Sakai, 1969)
   —. Carapace relatively narrow (CW 1.6 times CL), relatively longer ambulatory legs, with most meri greatly exceeding widest extent of carapace ... L. holtensis Mendoza, 2010
3. Margins between external orbital angle and second anterolateral tooth of carapace regularly convex anterolaterally ... L. iejima, new species  
   —. Margins between external orbital angle and second anterolateral tooth of carapace not well convex anterolaterally, ... 4  
4. Posterior two anterolateral teeth of carapace less developed; level of widest part (between fourth anterolateral tooth) placed anterior to middle of carapace ... L. rufomaculata (Davie, 1993)
   —. Posterior two anterolateral teeth of carapace well developed; level of widest part (between fourth anterolateral tooth) placed at middle of carapace ... L. corallina (Takeda & Marumura, 1997).

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