

## The Endemic Hawaiian Mantis Shrimp, *Parvisquilla sinuosa* (Edmondson, 1921) (Crustacea: Stomatopoda: Squillidae)

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**Abstract.** The endemic Hawaiian mantis shrimp, *Parvisquilla sinuosa* (Edmondson, 1921), is redescribed based on the holotype and additional specimens. The new material includes the first known male of the species, whose morphology confirms the presence of sexual dimorphism in uropodal protopod length, as observed in other species of *Parvisquilla*. Of the three known species of *Parvisquilla*, *P. sinuosa* is unique in having a dorsally carinate rather than dorsally tuberculate telson characteristic of its congeners, *P. multituberculata* (Borradaile, 1898) and *P. dominguez* Ahyong & Erdmann, 2003.

### Introduction

Twenty species of mantis shrimp (Stomatopoda) are currently known from the Hawaiian Islands (Eldredge & Miller 1997, Ahyong 2002), of which one species, *Parvisquilla sinuosa* (Edmondson, 1921), is apparently endemic. *Parvisquilla sinuosa*, however, is poorly documented, having neither been adequately described nor figured. The species is redescribed and figured here based on the holotype and other material. The present study is dedicated to the memory of Lu Eldredge for his major contributions to Hawaiian zoology and for making the holotype of *P. sinuosa* available for study before his unfortunate passing.

### Methods

Morphological terminology largely follows Ahyong (2001, 2012a). Measurements are given in millimeters. Total length (TL) is measured from the apex of the rostral plate to the apices of the submedian teeth of the telson. Carapace length (CL) is measured along the dorsal midline and excludes the rostral plate. Corneal Index is given as 100CL divided by the cornea width. Specimens examined are deposited in the Bernice P. Bishop Museum, Honolulu (BPBM); and Zoological Museum, University of Copenhagen (ZMUC).

### Systematics

#### Squillidae Latreille, 1802

#### *Parvisquilla* Manning, 1973

#### *Parvisquilla sinuosa* (Edmondson, 1921)

*Coronida sinuosa* Edmondson, 1921: 295–297, fig. 2. — Edmondson, 1946: 243. — Townsley, 1953: 419–421, figs. 16–17. — Hiatt, 1954: 20, pl. 4: fig. 8h. — Manning, 1963: 322. — Eldredge, 1965: 17. — Holthuis, 1967: 8.

*Parvisquilla sinuosa*. — Manning, 1973: 299. — Manning, 1995: 22. — Ahyong, 2002b: 838. — Ahyong & Erdmann, 2003: 347. — Schram & Müller, 2004: 184.

*Paravisquilla* [sic] *sinuosa*. — Eldredge & Miller, 1997: 11.

**Holotype.** BPBM S526, female (TL 17 mm), Waikīkī Reef, Honolulu, O‘ahu, among dead coral, coll. C.H. Edmondson, 1921.

**Other material examined.** ZMUC CRU20560, 1 damaged male, 2 females (TL 11–12 mm), Honolulu, 20–80 m, in coral, coll. Th. Mortensen, 5 May 1915.

**Diagnosis.** Abdominal somite 6 and telson with numerous slender, straight and curved, dorsal carinae, without upright tubercles. Telson median carina single, undivided along midline. Uropodal protopod, exopod and endopod without dorsal spines or tubercles.

**Description of holotype.** Dorsal integument smooth, polished. Eye elongate, length twice width; cornea broadened, bilobed, not extending beyond antennular peduncle segment 1; corneal index 459–568. Ophthalmic somite anterior margin triangular. Ocular scales broad, truncate, anterior margin oblique to midline. Antennular somite elongate, extending anteriorly well beyond apex of rostral plate. Antennular peduncle as long as CL. Antennular somite dorsal processes low, angular. Antennal protopod unarmed, without spines or papillae. Antennal scale slender, 0.3CL; entire margin setose.

Rostral plate triangular, length about half width; apex rounded; lacking carinae. Carapace strongly narrowed anteriorly; without dorsal carinae; anterolateral angles blunt; gastric grooves distinct; cervical groove indistinct; posterior margin unarmed.

Raptorial claw dactylus with 4 teeth; outer proximal margin with three, triangular lobes, proximal two acute, distal slightly inflated, blunt. Carpus dorsal margin with short distal tooth. Propodus pectinate; occlusal margin fully pectinate, with 3 movable spines proximally. Merus outer inferodistal margin rounded.

Mandibular palp absent. Maxillipeds 2 and 3 with epipod. Maxilliped 5 basal segment unarmed; merus with broad convex flange on inner margin.

Pereopods 1–3 basal segment unarmed; endopod segments fused, slender, setose distally.

Thoracic somites 5–8 lacking dorsal carinae. Thoracic somite 5 lateral process a short lobe produced diagonally; with blunt triangular ventrolateral lobe. Thoracic somites 6–8 lateral processes broadly rounded. Thoracic somite 8 without sternal keel.

Male pleopod 1 endopod distal 'endite' without lateral lobe; hook process elongate, with pointed apex, as long as tube process.

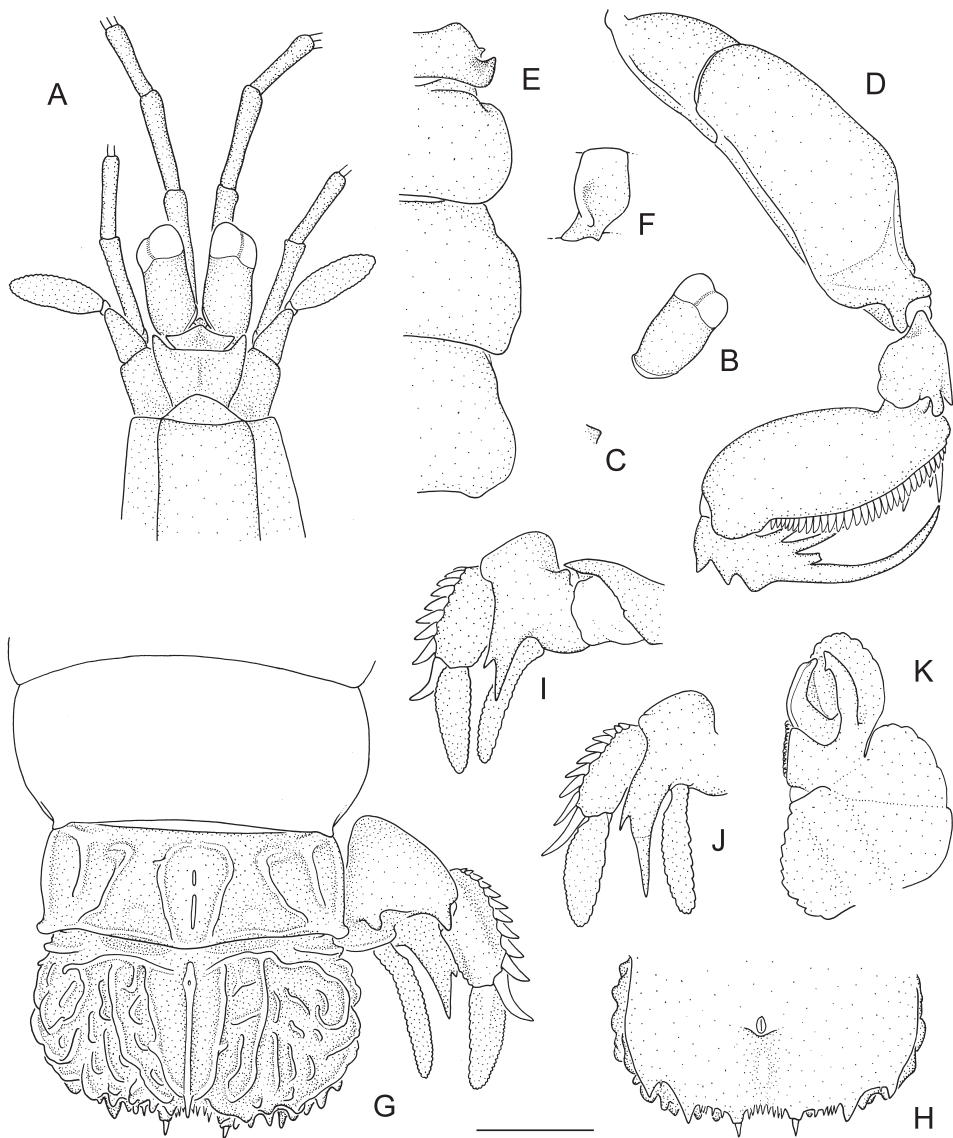
Abdominal somites 1–5 smooth dorsally, without carinae or spines, pleura blunt posterolaterally. Abdominal somite 6 with slender, unarmed dorsal carinae, otherwise smooth; median carina entire or interrupted; submedian carinae irregularly curved; intermediate carinae irregular, oblique to midline, anteriorly curved laterally; oblique carina between intermediate and lateral carinae; lateral carina straight; posterolateral angle blunt, rounded produced posterolaterally; posterior margin unarmed; triangular ventrolateral projection anterior to uropodal articulation; sternum posterior margin unarmed.

Telson thick, inflated, almost twice as wide as long; dorsal surface with numerous slender carinae; median carina with proximal dorsal pit and short posterior spine; accessory median carinae converging at base of posterior spine of median carina; dorsolateral surface with numerous curved, occasionally interconnected and recurved carinae; margins of dorsal surface irregularly carinate and lobulate posteriorly, partially overhanging primary marginal teeth; submedian, intermediate and lateral teeth stout, distinct, acute; submedian teeth with movable apices; prelateral lobe absent; denticles spiniform, submedian 5–8, intermediate 4–9, lateral 1. Telson ventral surface with low postanal swelling.

Uropodal protopod anterior margin produced anteriorly, blunt, rounded; posteriorly terminating in distally bifid, flattened spine, extending posteriorly slightly beyond midlength of endopod (female) or almost to distal three-fourths of endopod (male); with blunt angular projection above exopodal articulation and rounded projection above endopod articulation, otherwise without dorsal spines or tubercles; without ventral spine or tubercle anterior to endopod articulation; protopod inner margin smooth, unarmed.

Uropod exopod proximal segment unarmed dorsally; inner margin straight; outer margin with 10 or 11 movable spines, distalmost reaching almost to midlength of distal segment; distal margin unarmed; Endopod unarmed dorsally.

**Colour in life.** Transparent white with dark corneas (Edmondson 1921, Townsley 1953).



**Fig. 1.** *Parvisquilla sinuosa* (Edmondson, 1921): **A–I**, holotype female, TL 17 mm (BPBM S526); **J–K**, male (ZMUC CRU20560). **A**, anterior cephalothorax; **B**, right eye; **C**, right dorsal process of antennular somite, lateral view; **D**, right raptorial claw; **E**, thoracic somites 5–8, right dorsal view; **F**, right thoracic somite 5, lateral view; **G**, abdominal somites 5–6, telson and right uropod, dorsal view; **H**, telson, ventral view; **I–J**, right uropod, ventral view; **K**, right male pleopod 1 endopod, anterior view. Scales: A–J = 1.0 mm, K = 0.5 mm.

**Measurements of holotype.** TL 17 mm, CL 2.7 mm, antennal scale length 0.8 mm, antennular peduncle length 2.7 mm, cornea width 0.5 mm.

**Remarks.** *Parvisquilla sinuosa* was originally described in the genus *Coronida* Brooks, 1886, and subsequently transferred to *Parvisquilla* Manning, 1973, alongside *P. multituberculata* (Borradaile, 1898) (type locality: Lifou). A third species, *Parvisquilla dominguez* Ahyong & Erdmann, 2003, was

described from Guam. *Parvisquilla* was thought to be a lysiosquilloid (Manning 1978, 1980, 1995), most closely related to the coronidids largely on the basis of the heel on the outer margin of the dactylus of the raptorial claw and elaborate dorsal telson ornamentation. Ah Yong (2001) and Ah Yong & Erdmann (2003), however, showed that *Parvisquilla* belongs in the Squillidae based on mouthpart, pleopodal and postlarval features.

Variation within the present series is slight. The smallest specimen examined (female, TL 11 mm) may be a juvenile, having less pronounced dorsal telson ornamentation in addition to more numerous and more spiniform submedian and intermediate telson denticles (submedian 7 or 8, intermediate 9 compared to submedian 4–6, intermediate 4 or 5). The present series includes the first known male of the species; it exhibits sexual dimorphism in the more elongate uropodal protopod as reported for the two other species of the genus (Ah Yong & Erdmann 2003, Ah Yong 2012b).

*Parvisquilla sinuosa* is unique in the genus for having the dorsal surface of the telson covered with sinuous carinae rather than tubercles as in *P. multituberculata* and *P. dominguez*. *Parvisquilla sinuosa* and *P. dominguez* are presently known only from their respective type localities, whereas *P. multituberculata* ranges widely in the Indo-West Pacific, from the Maldives to the South China Sea, Okinawa, Lifou, Tonga, Samoa, and French Polynesia (Manning 1978, Đuriš 1987, Ah Yong 2002a 2012).

Species of *Parvisquilla* are transparent-white in life, living in crevices and holes in and around the base of corals (Ah Yong & Erdmann 2003). All known specimens of *P. sinuosa* were collected from among dead coral heads on Waikīkī Reef, O‘ahu, Hawai‘i (Edmondson 1921, 1946; Townsley 1953).

**Distribution.** Presently known only from Hawai‘i.

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