

A new stomatopod (Crustacea: Malacostraca) of the genus *Harpiosquilla* Holthuis, 1964 from Taiwan and Australia

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Abstract.—A new stomatopod, *Harpiosquilla ocellata*, is described from Taiwan and Australia. *Harpiosquilla ocellata* is closely related to *H. annandalei* (Kemp, 1911), but differs in bearing unarmed submedian carinae on the fifth abdominal somite and in reaching a much larger size. The two species closely resemble each other in color pattern, but differ in the markings of the telson and uropods.

The genus *Harpiosquilla* Holthuis, 1964, includes large squilloids bearing erect spines on the opposable margin of the propodus of the raptorial claw, and a deeply excavate posterolateral margin of the carapace. All species of *Harpiosquilla* are restricted to the tropical Indo-West Pacific and are associated with soft, level substrates. Manning (1995) recognized 11 species of *Harpiosquilla* and provided a key to the species. As part of ongoing study of the stomatopod faunas of Taiwan and Australia, we independently discovered a new species of *Harpiosquilla* from these two regions, which is described below.

Specimens are deposited at the National Taiwan Ocean University, Keelung (NTOU), The Taiwan Museum, Taipei (TMCS) and the Australian Museum, Sydney (AM). All measurements are in millimeters (mm). Terminology and size descriptors generally follow the conventions of Manning (1969b, 1977), supplemented by some abbreviations proposed by Makarov (1979). Total length (TL) is measured along the midline between the apex of the rostral plate and the apices of the submedian teeth of the telson. Carapace length (CL) is measured along the midline and ex-

cludes the rostral plate. Corneal index (CI) is given as $100CL/\text{cornea width}$. Uropod segments are measured dorsally, along the midline. Dorsal carinae are abbreviated as follows: median (MD); submedian (SM); intermediate (IM); lateral (LT); and marginal (MG). The following abbreviations are also used: collector (coll.); antennule (A1), antenna (A2), abdominal somite (AS); thoracic somite (TS); maxilliped (MXP); Fisheries Research Vessel (FRV).

Systematic Account

Harpiosquillidae Manning, 1980

Harpiosquilla Holthuis, 1964

Harpiosquilla ocellata, new species

Figs. 1a–g, 2a–b.

Harpiosquilla annandalei.—Graham et al. 1993a:69; 1993b:73 [not *H. annandalei* (Kemp, 1911)].

Material examined.—Holotype. Taiwan, southwestern coast, Tong-Kong, Ping-Tong County, on sandy mud substrate, depth about 200 m, commercial trawler, 2 Dec 1995, male TL 157 mm (NTOU H-1995-12-2).

Paratypes. Taiwan: on sandy-mud substrate, depth about 200 m, commercial

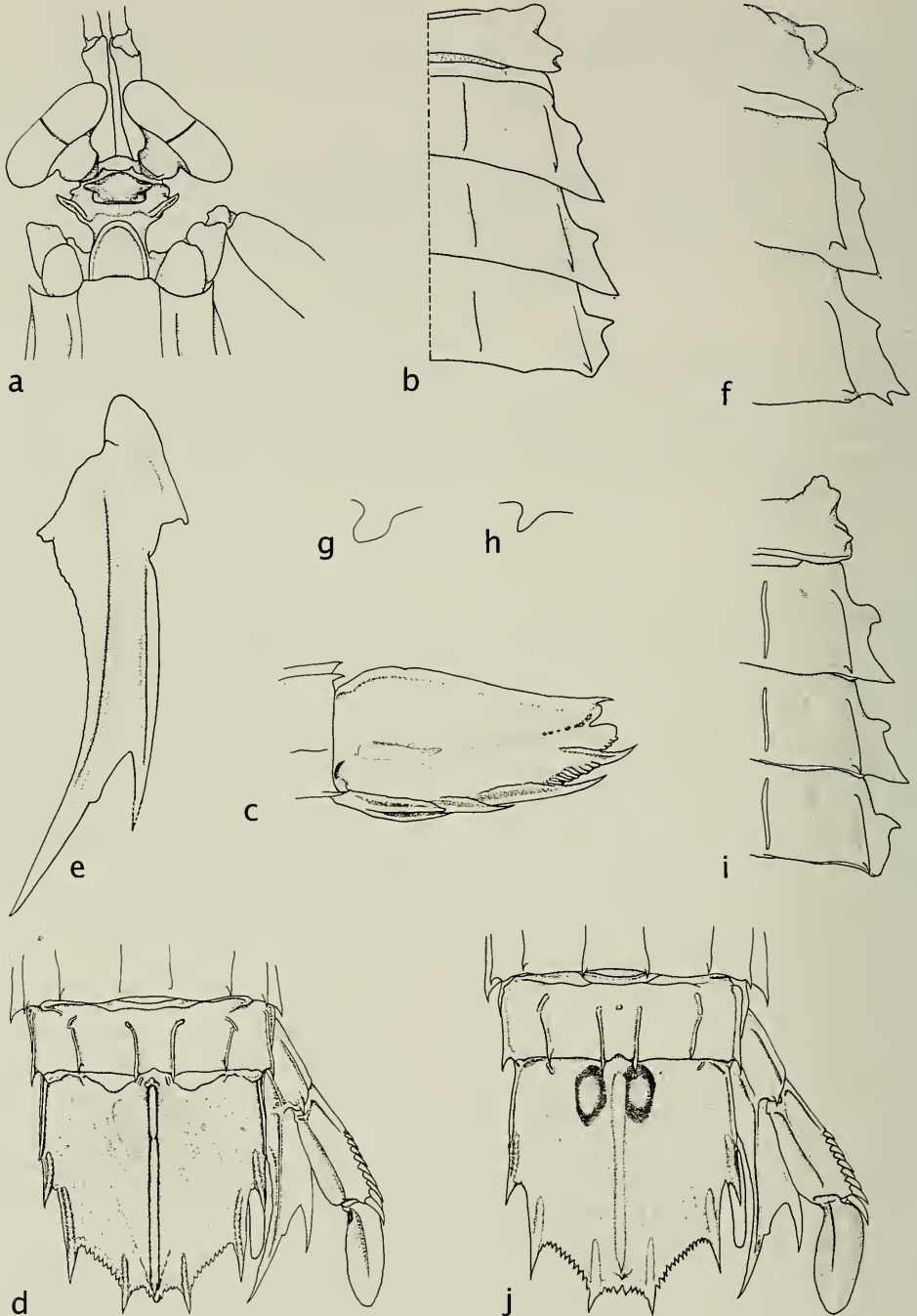


Fig. 1. a-g: *Harpiosquilla ocellata*, new species: a-e, holotype male, TL 157 mm, Taiwan, (NTOU H-1995-12-2); f, male, TL 159 mm, Australia (AM P41823); g, paratype male TL 200 mm, Taiwan (AM P51185). h-j: *H. annandalei* (Kemp, 1911): h-i, male, TL 111 mm, Taiwan (AM); j, male, TL 128 mm, Taiwan (NTOU). a, anterior cephalon; b, i TS5-8, right dorsal; c, telson, left lateral view; d, j, posterior abdominal somites and telson e, uropodal protopod, left ventral view; f, TS5-7 right dorsal; g, h, TS8 sternal keel, right lateral view.

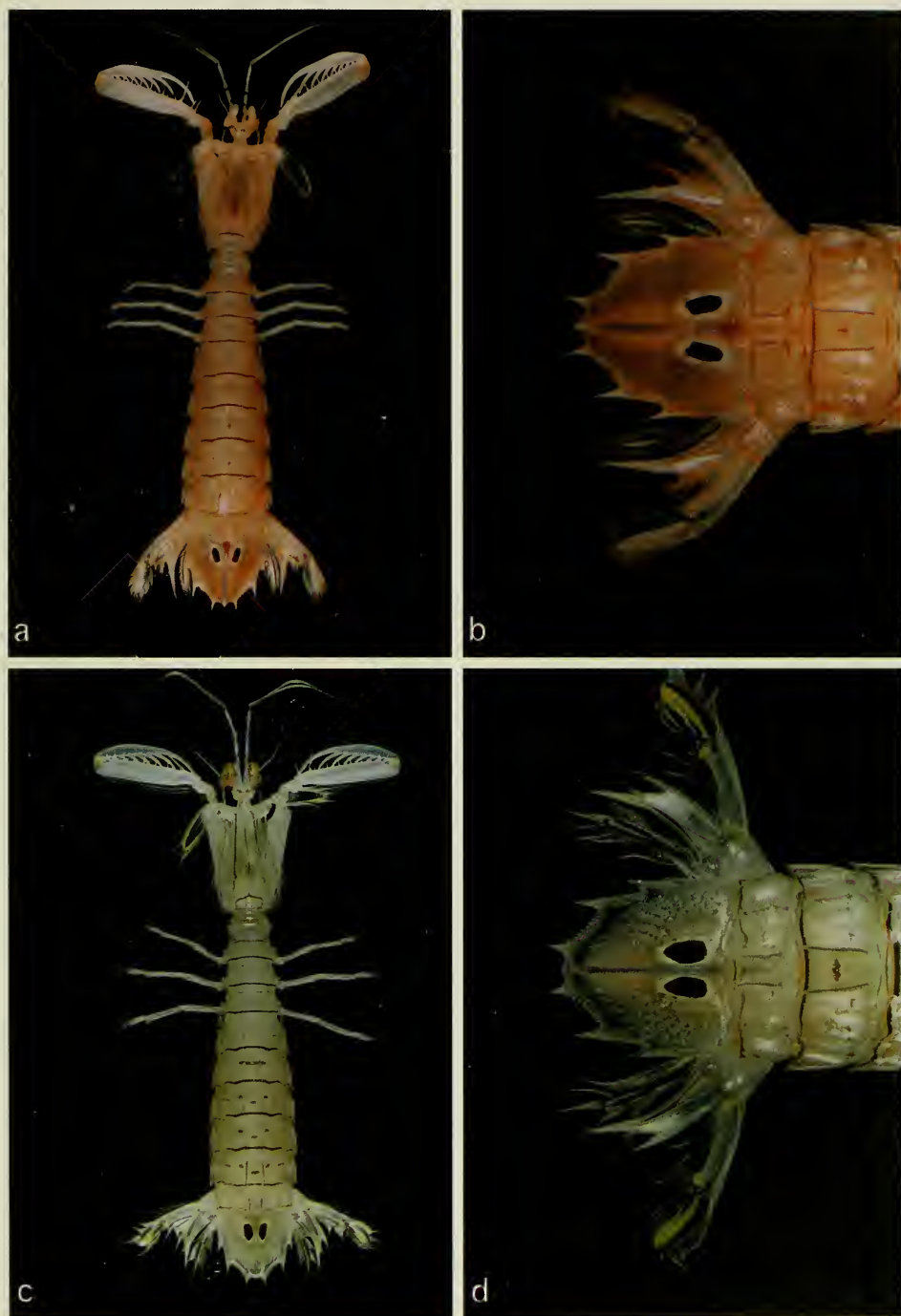


Fig. 2. a-b: *Harpiosquilla ocellata*, new species, male paratype, Taiwan; c-d: *H. annandalei* (Kemp, 1911), Taiwan. a, c. dorsal view; b, d. posterior abdominal somites and telson.

trawlers. Northeastern coast, Su-Aou, I-Lan County, 16 May 1991, 1 female TL 198 mm (TMCS-0103); 9 Nov 1995, 1 male TL 154 mm, 1 female TL 195 mm (NTOU P-1995-11-9), 1 male TL 155 mm (AM P51184).—Northeastern coast, Ta-Shi, I-Lan County, 25 May 1998, 1 female TL 176 mm (AM P53156).—Southwestern coast, Tong-Kong, Ping-Tong County, 26 Jan 1994, 1 female TL 232 mm (NTOU P-1994-1-26); 2 Dec 1994, 2 males TL 157–180 mm (NTOU P-1995-12-2); 5 Aug 1996, 1 male TL 197 mm (NTOU P-1996-8-5), 1 male TL 200 mm (AM P51185).

Other material. Australia: East of Port Hunter, Newcastle New South Wales, FRV Kapala, coll. K. Graham, [32°55'S, 151°57'], depth 72 m, 13 Apr 1992, 1 male TL 145 mm (AM P41785); [32°55'S, 151°57'], depth 65–72 m, 2 Nov 1995, 1 female TL 148 mm (AM P49681); [32°54'S, 151°59'E], depth 73 m, 5 Sep 1991, 1 male TL 159 mm (AM P41823).—East of Swains Reef, Queensland, commercial trawler, coll. J. K. Lowry & K. Dempsey [22°28.34'S, 152°59.45'E to 22°26.75'S, 153°09.17'E], depth 137 m, 8–9 Sep 1995, 4 females TL 171–206 mm (AM P49682-49685).

Diagnosis.—A1 peduncle longer than CL, but shorter than CL and rostral plate combined. Rostral plate apex broadly rounded, lacking anterior projection. Carapace with MD carina. Raptorial claw dactylus with 8 teeth. TS5 intermediate carina produced to a single short spine, directed laterally. TS6–8 (rarely only 7–8) with distinct SM and armed IM carinae. TS8 sternal keel broad with angular apex, inclined posteriorly. AS1–6 SM carinae distinct. Abdominal carinae spined posteriorly as follows: SM 6; IM 1–6; LT 1–6; MG 1–5. Telson MG carina approximately twice length of carina of lateral tooth; MD carina with pair of large, dark, white-margined “eye spots” proximally. Exopod of uropod with distal segment black on inner half only.

Description.—TL of adults to 232 mm. Dorsal surface lightly pitted.

Eye large, cornea strongly bilobed; CI 278–362 (294–311 in Taiwanese material, 278–336 in Australian material). Ophthalmic somite with anterior margin broadly rounded.

A1 peduncle 0.99–1.07 CL, but shorter than CL and rostral plate combined. A1 somite with slender dorsal processes, with acute apices, directed anterolaterally. A2 scale length 0.71–0.80 CL.

Rostral plate slightly broader than long; apex broadly rounded; margins convex; lacking anterior projection or dorsal carina.

Carapace anterior width 0.40–0.45 CL; anterolateral spines not extending to base of rostral plate; with MD, IM, LT and MG carinae; MD carina distinct, lacking branches of anterior bifurcation; posterior margin medially concave.

Raptorial claw dactylus with 8 teeth; outer margin broadly curved, slightly angular in adult males; propodus opposable margin with 1–2 smaller spines and several minute denticles between largest spines.

Mandibular palp 3-segmented. MXP1–5 with subcircular epipod. MXP5 basal segment unarmed.

Pereiopods 1–3 basal segment unarmed; endopod 2-segmented, distal segment styliform.

TS6–8 (rarely only 7–8) with distinct, divergent SM and armed IM carinae.

TS5 intermediate carina produced to a single short spine, spinular or triangular, directed laterally; ventral spine triangular, directed anteroventrally.

TS6–7 lateral process bilobed; anterior lobe very small and low, apex blunt; posterior lobe broad and triangular, apex acute or secondarily bifurcate.

TS8 anterolateral angle triangular; sternal keel broad with angular apex, inclined posteriorly.

AS1–6 with normal complement of carinae; SM carinae distinct, subparallel or faintly divergent. AS6 posterior margin faintly crenulate adjacent to submedian spines; with sharp ventrolateral spine anterior to uropodal articulation. Abdominal ca-

rinae spined as follows: SM 6; IM 1–6; LT 1–6; MG 1–5.

Telson longer than broad; submedian, intermediate and lateral teeth slender, with tuberculate dorsal carinae and apices deflected dorsally. MG carina approximately twice length of carina of lateral tooth. Submedian and intermediate denticles triangular; some apices spiniform; lateral denticle rounded. Denticles: 5–9, 9–15, 1. MD carina high, uninterrupted proximally; posteriorly armed with short apical spine overhanging several blunt tubercles; with pair of large, dark, white-margined “eye spots” proximally. Telson dorsolateral surface rugose, with curved rows of very shallow pits. Telson ventral surface with tuberculate postanal carina, extending half distance between anus and posterior margin.

Uropod protopod with small, flattened, ventral lobe anterior to endopod articulation; inner margin crenulate. Terminal spines of uropod protopod with blunt lobe on outer margin of inner spine, margin concave. Uropod exopod proximal segment outer margin with 8–9 (usually 9) graded movable spines, distalmost longest, not exceeding midlength of distal segment; distal margin with stout ventral spine. Uropod exopod distal segment slightly longer than proximal segment; black on inner half only.

Color in life.—(Fig. 2a, b) Eye with cornea metallic green. Overall dorsal color light golden brown. Second and third segments of A1 peduncle with one proximal and one distal black spot. Black transverse bar present between A1 and ophthalmic somites. Carapace with anterolateral and posterior margins, carinae and grooves outlined in dark pigment. Merus of raptorial claw with inner distal black spot and yellow meral depression. Propodus of raptorial claw yellow distally. Posterior margin of thoracic and abdominal somites black. AS2 with black median transverse bar. AS1 and AS3–5 with traces of broken transverse bar. SM carinae of thoracic and abdominal somites pale purple. Telson with pair of large, dark, white-margined, “eye spots” proximally; MD car-

rina and carinae of marginal teeth maroon. Spines of uropodal protopod pinkish. Uropodal endopod yellowish, blackish distally. Uropodal exopod distal segment yellow on outer half and black on inner half.

Size.—Taiwanese material: males ($n = 7$) TL 154–200 mm; females ($n = 4$) TL 176–232 mm. Australian material: males ($n = 2$) TL 145–159 mm; females ($n = 5$) TL 148–206 mm.

Etymology.—Latin, *ocellata*, marked with spots, from *ocellus*, diminutive of *oculus*, eye, in allusion to the large, eye-like pigment spots of the telson.

Remarks.—With the exception of *Harpiosquilla annandalei* (Kemp, 1911), *H. ocellata* can be immediately distinguished from all known species of the genus by the combination of the short, apically rounded rostral plate and armed IM carinae of the exposed thoracic somites (Fig. 1b, f, i).

This new species closely resembles *H. annandalei* in most characters, including coloration. Comparison of *H. ocellata* with the accounts of *H. annandalei* in Manning (1969a, 1995) and 20 Taiwanese specimens in the collections of the NTOU (2 specimens transferred to AM) show the following differences between the two species: in *H. ocellata* the SM carinae of AS5 are unarmed (Fig. 1d) whereas they are always armed in *H. annandalei* (Fig. 1j); in *H. ocellata* the TS8 sternal keel is broad with an angular apex (Fig. 1g) whereas in *H. annandalei* the keel is hooked (Fig. 1h); *H. ocellata* attains a much larger size (TL to 232 mm) than *H. annandalei* (TL to 150 mm (Manning, 1969a), and to TL 130 mm in the 20 Taiwanese specimens examined). Although coloration of the two species is very similar, the body of *H. annandalei* is generally lighter, the margins of the “eye spots” on the telson of both the white and black circles are more sharply defined (Fig. 2c, d) and the MD carina of the telson is colored like the rest of the telson. In contrast, the body of *H. ocellata* is light golden brown, the margins of the “eye spots” are somewhat diffuse, and the MD carina of the

telson is purplish (Fig. 2a, b). In addition, in *H. annandalei* the distal segment of the uropodal exopod is blackish with a yellowish madrib (Fig. 2d), whereas it is blackish on the inner half and yellowish on the outer half in *H. ocellata* (Fig. 2b). Although, *H. ocellata* could easily be confused with *H. annandalei*, the aforementioned differences will readily separate the two species.

Secondary sexual dimorphism is much less evident in *H. ocellata* than most other species of the genus. As in *H. annandalei*, the margins of the telson and MD carina are not inflated, the outer margin of the dactylus of the raptorial claw is faintly sinuous and the bases of the dactylar teeth are only slightly inflated.

Meristic counts and corneal indices overlap between Taiwanese and Australian material. Only minor morphological differences were noted between Taiwanese and Australian material of *H. ocellata*. Thus, the apices of the posterior lobes of the lateral processes of TS6–7 usually terminate in an acute spine, but are secondarily bifurcate in two specimens from Australia, resembling the condition reported by Manning (1969a) for some specimens of *H. annandalei*. In all Australian specimens, the IM carinae of TS6–8 are armed posteriorly, whereas in three of the 11 Taiwanese specimens, the IM carinae of TS6 are unarmed. Nevertheless, TS7–8 are armed in all Taiwanese specimens.

The precise habitat of *H. ocellata* is unknown although all material was taken on sand and mud substrates with benthic trawls. *Harpiosquilla ocellata* is presently known only from Taiwan and eastern Australia in relatively deep water. This, apparently disjunct distribution, likely reflects sampling effort but may also result from confusion of *H. ocellata* with *H. annandalei* by previous workers, especially in preserved material lacking pigmentation. Further, the bathymetric range of *H. ocellata* (63 to about 200 m) coincides with that reported by Manning (1969a) for *H. annandalei* (15–206 m).

Distribution.—Western Pacific. Known

with certainty from Taiwan (eastern and southern coasts) and eastern Australia (central Queensland south to the Newcastle Bight, New South Wales) at depths of 63 to about 200 m, on soft substrata.

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Literature Cited

- Graham, K. J., G. W. Liggins, J. Wildforster, & S. J. Kennelly. 1993a. Kapala Cruise Report No. 110. New South Wales Fisheries.
- , ———, ———, & ———. 1993b. Kapala Cruise Report No. 112. New South Wales Fisheries.
- Holthuis, L. B. 1964. Preliminary note on two new genera of Stomatopoda.—*Crustaceana* 7(2): 140–141.
- Kemp, S. 1911. Preliminary descriptions of new species and varieties of Crustacea Stomatopoda in the Indian Museum.—*Records of the Indian Museum* 6(2):93–100.
- Makarov, R. R. 1979. A collection of stomatopod crustaceans of the genus *Clorida* Eydoux & Souleyet, 1842, from Tonkin Bay, Vietnam.—*Crustaceana* 37(1):39–56.
- Manning, R. B. 1969a. A review of the genus *Harpiosquilla* (Crustacea, Stomatopoda), with descriptions of three new species.—*Smithsonian Contributions to Zoology* 36:1–41.
- . 1969b. Stomatopod Crustacea of the western Atlantic. *Studies in Tropical Oceanography* 8:

viii + 380 pp. University of Miami Press, Miami.

- . 1977. A monograph of the West African stomatopod Crustacea.—*Atlantide Report* 12:25–181.
- . 1980. The superfamilies, families, and genera

of Recent stomatopod Crustacea, with diagnoses of six new families.—*Proceedings of the Biological Society of Washington* 93(2):362–372.

- . 1995. Stomatopod Crustacea of Vietnam: the legacy of Raoul Serène.—*Crustacean Research, Special Number* 4:339 pp.