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A new species in the genus *Ophiomyxa* from South-west Australian waters (Echinodermata: Ophiuroidea: Ophiomyxidae)

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Abstract Franklin, A.M. and O'Hara, T.D. 2008. A new species in the genus *Ophiomyxa* from South-west Australian waters (Echinodermata: Ophiuroidea: Ophiomyxidae). *Memoirs of Museum Victoria* 65: 57–62.

A new species is described from the genus Ophiomyxa collected from south-west Australia. It is distinguished by the lack of marginal plates, three arm spines, the uppermost reaching up to 2 segments in length, and a characteristic pattern of reduced dorsal arm plates. Current evidence suggests it is endemic to waters around 400m deep off the coast of south-western Australia.

Keywords Echinodermata, Ophiuroidea, *Ophiomyxa*

Introduction

Knowledge regarding the diversity of ophiuroids from the south-west of Australia is rather limited. A recent survey coordinated by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 2005 sought to validate multiple use management frameworks and characterise marine ecosystems in this area. Epibenthic sleds were used to collect invertebrate epifauna. Through this sampling process, many ophiuroid specimens belonging to an undescribed species in the family Ophiomyxidae were collected.

The Ophiomyxidae are a small taxonomically problematic family of ophiuroids that were originally placed with basket and serpent stars in the order Phrynophiurida (Matsumoto 1915), but more recently with the other simple-armed brittle-stars in the order Ophiurida (Smith *et al*. 1995, Janies 2001). The characteristic covering of thick skin and reduction of skeletal plates have been considered a primitive (Matsumoto 1917) or derived trait (Byrne *pers. comm*.).

This paper is the formal scientific description of the new species of *Ophiomyxa* Müller & Troschel, 1842. A suite of morphological characteristics are used to distinguish the new species including the presence and shape of dorsal arm plates, the length and number of arm spines and the location of ossicles. The material examined in this study is lodged in the Museum of Victoria, Melbourne (MV) and the Western Australian Museum (WAM). The abbreviation d.d. is used for disc diameter.

Taxonomy

Ophiomyxa crinita sp. nov.

Figures 1 & 2

Material examined. (all from the RV Southern Surveyor expedition SS10/2005 to south-western Australia).

Holotype: Off Lancelin, 31º 0.75'S, 114º 49.5'E, 394-393m, 1 Dec 2005, (stn 75), WAM Z21290.

Paratypes: as holotype, MV F111566(n=199).

Other material: Off Zuytdorp, 27º 8.01'S, 112º 45.06'E, 414-405m, 5 Dec 2005, (stn 105), MV F111951, (2). Off Bunbury, 33º 0.504'S, 114º 34.26'E, 421-414m, 20 Nov 2005, (stn 13), F111561(103). D'Entrecasteaux, 35º 4.176'S, 115º 20.16'E, 378-379m, 21 Nov 2005, (stn 17), MV F111562(2). Off Albany, 35º 21.882'S, 118º 18.42'E, 398-407m, 23 Nov 2005, (stn 25), MV F111563(1). Two Rocks, 31º 37.08'S, 114º 58.32'E, 364-404m, 19 Nov 2005, (stn 4), MV F111559(15); 31º 36.528'S, 114º 58.86'E, 329-370m, 19 Nov 2005, (stn 6), MV F111560(2). Off Bunbury, 33º 0.582'S, 114º 34.2'E, 423-397m, 29 Nov 2005, (stn 67), MV F111564, (100). Perth Canyon, 31º 59.544'S, 115º 10.98'E, 508-478m, 29 Nov 2005, (stn 68), MV F111565(1). Off Jurien Bay, 29º 52.062'S, 114º 23.22'E, 414-401m, 2 Dec 2005, (stn 78), MV F111567(5); 29º 50.514'S, 114º 21.72'E, 408-427m, 2 Dec 2005, (stn 80), MV F111568(1); MV F111935(28). Off Abrolhos Islands, 28º 59.4'S, 113º 45.9'E, 389-407m, 3 Dec 2005, (stn 90), MV F111661(5).

Holotype description. 19 mm d.d. with slightly indented interradial margins. Disc covered with a thick, fairly smooth epithelium obscuring the limits of the radial shields, oral and adoral shields and oral plates (fig. 1C). No series of interradial marginal plates. Bursal slits 5 mm long, ending 1 mm before

the disc margin at the end of the 4th arm segment, not bordered by spines or papillae.

Arms are approximately 110 mm long and 3 mm wide at the base. The dorsal, ventral and lateral arm plates are hidden from view by a thick epithelium which extends to cover the arm spines but does not create any webbing (fig. 1B&C). Segments have 3 spines per side, reducing to 2 distally, positioned ventro-laterally. The dorsal-most spine resides on the lateral midline and is the widest (0.8 mm at the arm base). At the base of the arm the dorsal spine is longest (3.4 mm), about 2 segments long, the middle spine is just longer than a segment and the ventral spine is slightly shorter. Midway down the arm the dorsal spine shortens to about 1.5 segments long, the middle spine is slightly longer and the ventral spine equal to a segment. Distally, the ventral spine is longest; approximately a segment long. The dorsal spine is about 0.5 segments long and when the middle spine is present it is slightly shorter than a segment. Damage to the specimen has removed skin from some spines. Without skin, proximal spines are conical and smooth, gradually changing to become slightly serrated on 2 sides by mid-arm and becoming serrated and comb-like (but not hooked) on 1 side distally. No tentacle scales; the tube feet do not have a calcareous tube around the base.

Each side of the jaw angle has 3 oral papillae which are separate from each other. Two jaw angles also bear a 4th very small, triangular oral papilla, positioned distally. The middle papillae are 2 times higher than wide and generally triangular, sometimes rounded, in shape with denticulated tips. The innermost papillae are 2-3 times higher than wide, ovoid and also with a denticulated edge. The apical papillae are largest, generally about as high as they are wide, much rounder and not as denticulate. The distal oral tube feet are located in the mouth, near the ventral surface and are not covered by protecting scales.

Paratypes. Range from 11 mm – 22 mm in d.d., juveniles resemble small adults. Dorsal and ventral skin from a 19 mm d.d. paratype were partially dissolved in bleach. This disc epithelium contained 2-3 layers of transparent, overlapping oval plates, ranging in size from 182 μm – 303 μm wide and 136 μm – 409 μm long, flat and smooth, showing varying degrees of perforation (fig. 2E). Perforations usually cover the entire plate but some are only perforated in the middle. The perforated plates are more common near the radial shields and the bursal slits. C-shaped ossicles are scattered throughout the stomach wall, occasionally in small clusters, typically 76 μm long and 38 μm wide (fig. 2F).

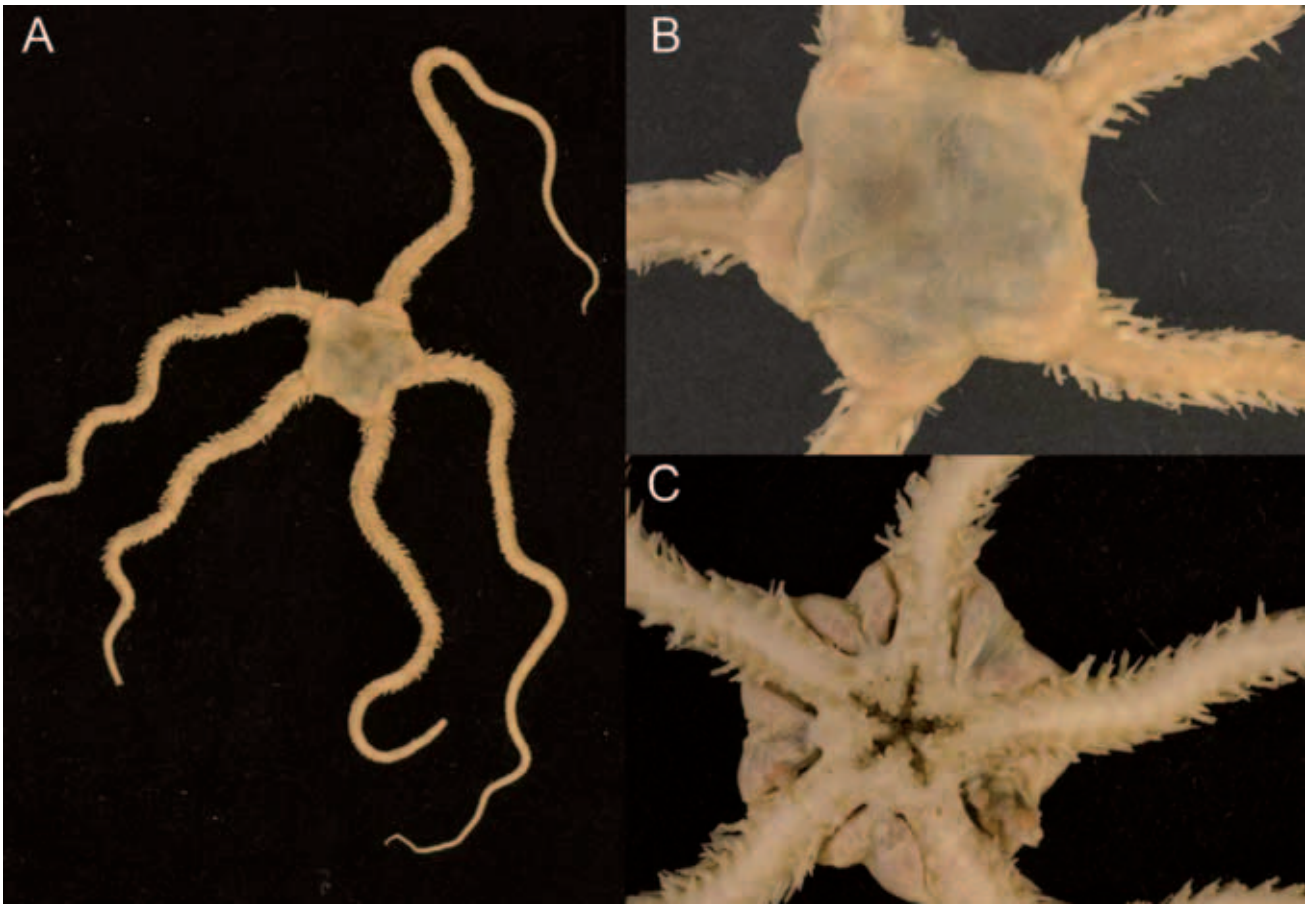

Figure 1: *Ophiomyxa crinita* sp. nov. holotype (19 mm d.d.) in A, dorsal view; B, detail of dorsal disc; C, detail of ventral disc and mouthparts.

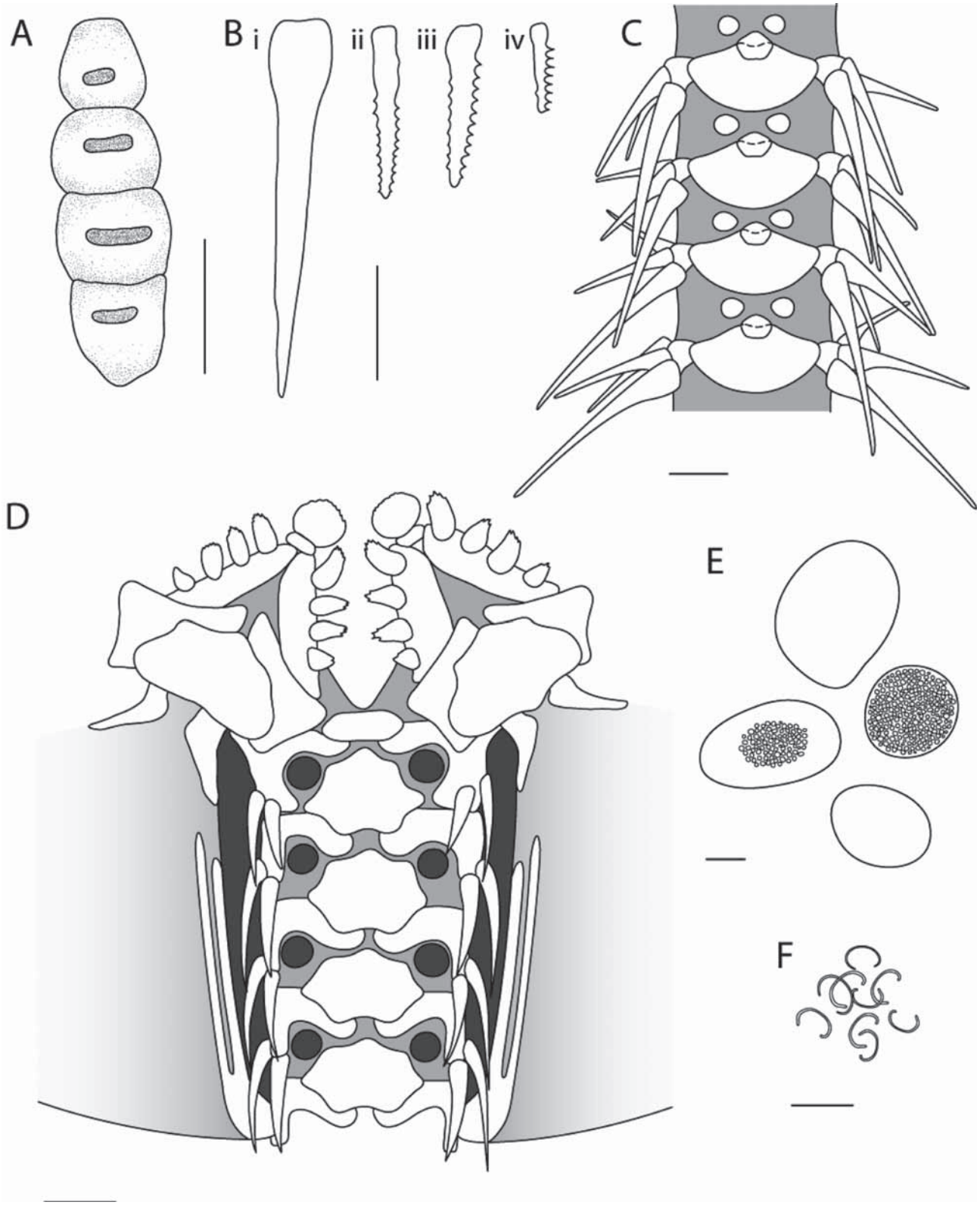

Figure 2. *Ophiomyxa crinita* sp. nov., A, dental plate; B, arm spines, i, dorsal at base of arm, ii, middle at proximal mid arm, iii, middle at distal mid arm, iv, ventral at tip of arm; C, dorsal view of arm, skin removed; D, ventral view of arm and mouth parts, skin removed; E, plates from disc skin; F, ossicles from stomach wall. Scale bars A-D: 1 mm, E&F: 0.1 mm.

Radial shields are approximately 2 mm long, 1/10 d.d., 3 times longer than wide, rectangular in shape, with curved edges and angled inwards at the proximal end. Ventrally, the adradial genital scale articulates with the radial shield, but it is not visible. The abradial genital scale is visible and shaped like a two pronged fork (fig. 2D). Proximal to the abradial scale is a line of small irregularly shaped, perforated plates terminating in an L-shaped plate partially overlapped by the oral shield.

The dorsal arm plates do not extend onto the disc, are rhombic in shape, 2.25 mm wide and 1.15 mm long proximally, about 2 times wider than long. The lateral corners are rounded, the distal edge is convex, the proximal edges are slightly concave and the proximal tip is indented and overlain by another pentagonal plate, 0.7 mm wide and 0.5 mm long (fig. 2C). Proximal to this plate are two small, round plates which are slightly pointed on their inner edges. Residing on either side of the midline, they do not touch any other plates.

Ventral plates, 1.20 mm long and 1.70 mm wide, are about 1.5 times wider than long, shaped like slightly flattened heptagons with proximal ends pointed and distal ends indented, the angles are rounded and edges slightly concave (fig. 2D). The proximal edge curves around the lateral plates and the tentacle pores. The 1st ventral plate is shaped like a flattened hexagon, 3 times wider than long. Lateral arm plates extend from near the ventral midline to just past the lateral midline touching the edge of the dorsal plates. They bear a slight dome on the edge of the arm, the distal edge of which has three small articulation ridges, one for each arm spine.

Oral shields are oval, with a small point proximally and slightly wider distally, about 2 times wider than long (fig. 2D). Adoral shields are pentagonal, about as wide as long, and follow the proximal and lateral edges of the oral shield and do not touch radially or interradially.

Dental plates are divided by transverse fissures into 4 pieces each supporting a tooth about the same size and shape as the apical papillae, or first tooth. The middle two pieces are square with rounded lateral edges, the end two pieces are triangular, and all have curved corners (fig. 2A). Each has a rectangular groove in the middle where the tooth sits and the ventral piece also supports the apical papilla. Oral plates are about two times longer than high and are axe shaped in lateral view with the ventral edge curving up as it nears the jaw apex. Vertebrae have a V-shaped aboral groove and a smooth aboral surface.

Variations from the holotype include a thicker, wrinklier epithelium, slightly pinker on the dorsal surface. Oral papillae number either 4 or 3 on all jaw angles and some may touch (fig. 2D). They vary in how triangular or broad they are, generally more broad apically. The dental plate may bear a 5th pointed, small tooth dorsally.

Colour (Live specimens). The dorsal disc is peach-brown in colour, slightly lighter on the arms and fading to cream at the tips. There are some tan and some cream spots on the dorsal disc surface, with the cream spots being smaller. The ventral disc surface, mouth frame and spines are a bright white and the tube feet are a transparent white. Tests for bioluminescence were negative (Mallefet & O'Hara, unpublished data).

Colour (Preserved in ethanol). The disc is pale pink-brown dorsally and white ventrally. The middle of the disc is pale grey due to the internal organs. The tube feet are tan whilst the mouth frame is cream. The spines when covered with skin are cream, but transparent and glassy where the skin has been removed.

Etymology. *crinita* (Latin, f.), long haired, in reference to the relatively long arm spines.

Distribution. South-western Australia from off Albany to Zuytdorp, 329-508 m.

Remarks. This species belongs to the genus *Ophiomyxa* due to the presence of a thick skin covering the disc and arms, denticulate glassy oral papillae, fragmented dorsal arm plates, and the second oral tentacle opening within the jaw slit (Matsumoto 1917; Fell 1960).

Within *Ophiomyxa*, the species falls into a group of species previously distinguished as the genus *Ophiodera* Verrill, 1899 that are characterised by the absence of a row of marginal interradial plates that run between the pairs of radial shields. *Ophiodera* is not currently recognised, as the designated type species *O. serpentaria* has the intermediate condition of a few rudimentary marginal plates near the radial shields (Mortensen 1927). However, there may be some merit in a grouping of these species, with other potential synapomorphies including similar shaped oral plates and long pointed arm spines that become serrated on distal segments. Whatever the status of *Ophiodera*, these characters are useful diagnostically within *Ophiomyxa*.

Of the species without marginal plates, *Ophiomyxa crinita* is most similar to *Ophiomyxa neglecta* (Koehler, 1904), sharing a similar number of arm spines, similar shaped dorsal and ventral plates and denticulate oral papillae. However, *Ophiomyxa neglecta* has small arm spines that are less than one segment long, ventral plates of similar length and width, radial shields about 1/5 of the disc diameter, and C-shaped ossicles in the disc and arm epithelium (Koehler 1922). *Ophiomyxa anisacantha* H.L. Clark, 1911, *Ophiomyxa bengalensis* Koehler, 1897, *Ophiomyxa compacta* (Koehler, 1905), and *Ophiomyxa punctata* (A.H. Clark, 1952) all have four, often five arm spines (see also Irimura 1982; Imaoka *et al*. 1990). The dorsal arm plates of *O. anisacantha, O. bengalensis* and *O. punctata* are divided into several small, oval scales whereas in *O. punctata* this only occurs on the first 2 segments and the other segments bear no plates. The arm spines of *O. anisacantha* are shorter than *O. crinita* and also differ in having the ventral arm spine of equal length to the dorsal spine. *Ophiomyxa punctata* has short black lines parallel to the genital slits and *O. compacta* has no genital scale and oral papillae that are not denticulated. All of these species are from the tropical Indo-Pacific region.

Two other species have been referred to *Ophiodera* from the Atlantic Ocean: *O. serpentaria* Lyman, 1883 and *O. stimpsonii* (Lyman, 1875). They both have at least a few marginal disc plates and lack dorsal arm plates (Verrill 1899; Paterson 1985). *Ophiomyxa stimpsonii* has more than four short arm spines and five oral papillae. *Ophiomyxa serpentaria* has lateral plates that may be fused to the ventral plates (Verrill 1899).

The new species is sympatric with the widespread Indo-Pacific species *Ophiomyxa australis* Lütken, 1869, which can be distinguished by the presence of the marginal row of disc

plates, up to seven short arm spines often webbed with skin, and a different pattern of dorsal plate fragmentation (Mortensen 1924; Irimura 1982).

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