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SUMMARY

Thirty species of ophiuroids collected at the Swain Reefs, north-east of the Capricorn Channel near the southern limit of the Great Barrier Reef are discussed. The ophiocomid genus *Ophiopsila* Forbes is newly recorded for Australian waters with the description of a new species. In addition, there are six new species records for Australia and a further two species are newly reported for the Great Barrier Reef itself. Extensive colour notes for the living brittlestars are reported together with new extensions of species' ranges.

INTRODUCTION

The echinoderm fauna of the Great Barrier Reef has formed the focus of several expeditions (reviewed in Gibbs *et al.*, 1976). For the most part, the echinoderms of its northern region have been the most intensively documented (for example H. L. Clark, 1921, 1938, 1946; Gibbs *et al.*, 1976) but in comparison those of its southern region have been rather neglected. In 1962, the Swain Reefs, lying to the north-east of the Capricorn-Bunker group (21°43'S: 152°25'E), were surveyed and sampled by a party from The Australian Museum. The large and diverse collection of echinoderms obtained by the 1962 expedition was placed in The Australian Museum: the majority of the ophiuroid species presently reported are derived from that collection. The crinoids collected by the Swain Reefs Expedition have been described previously (A. M. Clark, 1975).

A total of thirty species, mostly representing ophiuroid genera commonly found in coral-reef environments, is recorded (A. M. Clark, 1976). The ophiocomid genus *Ophiopsila* Forbes is reported for the first time from Australian waters with the description of a new species, *Ophiopsila gilletti*. New records for Australian waters comprise: *Amphiura* (*Amphiura*) *luetkeni* Duncan; *Ophiomastix luetkeni* Pfeffer; *Ophionereis intermedia* A. M. Clark; *Ophiarachnella macracantha* H. L. Clark; and *Ophiodyscrita pacifica* Murakami. *Ophioconis cincta* (Brock) and *Amphioplus* (*Amphichilus*) *ochroleuca* (Brock) are newly recorded for the Great Barrier Reef. Of the remaining species reported, fourteen represent further southward extensions of their ranges from the northern part of the Great Barrier Reef.

An important feature of the Swain Reefs collection is the numerous colour notes and colour transparencies of the living brittlestars that accompany the preserved material. This has permitted a comparative study of the colouration of the living and preserved specimens to be made, a study that is particularly relevant to those ophiuroid taxa in which infrageneric diagnoses are made on the criterion of colour patterns (for example the family Ophiotrichidae). H. L. Clark frequently recorded the colour of live echinoderms and the colour changes associated with preservation, notably in his discussion of the Torres Strait fauna (H. L. Clark, 1921) with its accompanying lithographs. Where applicable, these data have been included in the systematic account for comparative purposes, as have the recent colour photographs of living, *in situ* ophiuroids presented by Coleman (1977).

For each species, the station and number of specimens are given; further details of the stations appear in Table 1. The prefix 'off Gillett Cay' refers to material collected prior

to the main Swain Reefs Expedition of 1962. Further echinoderms were collected from the Swain Reefs in 1974 by Mr Neville Coleman, Marine Associate of The Australian Museum; these are identified by the prefix '1974'. J numbers refer to the registration numbers of specimens located in The Australian Museum's collection.

Kodachrome colour transparencies (taken by Anthony Healy, 9-126 Shirley Road, Crows Nest, Sydney, NSW 2065) are available for ten of the ophiuroid species. Colour data in the text for the live specimens have been taken from these slides and from colour notes accompanying the other specimens.

SYSTEMATIC ACCOUNT

OPHIOMYXIDAE

Ophiomyxa australis Lütken

Ophiomyxa australis Lütken, 1869:99.—H. L. Clark, 1938:201, pl. 13, figs. 1,2; 1946: 170.—A. M. Clark & Rowe, 1971: 78, 92, pl. 13, figs. 3, 4.—Gibbs *et al.*, 1976: 114.

MATERIAL

Station 6-1 (J.8861).

A colour slide of the living specimen (disc diameter, 7.5 mm) is available: the disc and arms are finely speckled with pink and white and, in addition, prominent brown spots which remain in the dried material are present over the dorsal disc surface. The wide diversity of colouration exhibited by this species over its extensive distribution range has been described by H. L. Clark (1938) and, more recently, noted and illustrated by Coleman (1977:162).

AMPHIURIDAE

Amphioplus (Amphioplus) didymus H. L. Clark

Amphioplus didymus H. L. Clark, 1938: 252, pl. 14, fig. 3, text-fig. 17; 1946: 206.

Amphioplus (Amphioplus) didymus. — A. M. Clark, 1970: 56. — A. M. Clark & Rowe, 1971: 78, 101, text-figs. 27g, 48d, e. — Gibbs *et al.*, 1976: 115, text-fig. 1a.

MATERIAL

Station 5-1 (J.8856); Station 6-1 (J.8885) (both lacking the dorsal disc surface).

This species has recently been recorded from the northern part of the Great Barrier Reef (Gibbs *et al.*, 1976) and the present material from the Swain Reefs represents a southward extension of its range.

Although the dorsal disc surface of both specimens is missing, several features readily identify this material as *A. (Amphioplus) didymus* in contrast to other closely related amphiurid species, particularly *A. (Amphioplus) stenaspis* H. L. Clark and *A. (Lymanella) bocki* Koehler (Gibbs *et al.*, 1976). These include: (1) the presence of four or five arm spines proximally, rapidly reducing in number to three; (2) the second from lowermost arm spine in each series beyond the arm base is abruptly squared off and provided with two glassy hooks, one directed towards the mouth and the other to the arm tip. It has been suggested that the bihamulate shape of the middle arm spines is the only

reliable diagnostic criterion (Gibbs *et al.*, 1976).

A colour slide of the Station 5 specimen is available. The arms are bright yellow with very dark irregular markings along their dorsal surface and the arm spines are dark with pale tips. These colour notes accord with those reported for the holotype and paratype of the species with the exception that H. L. Clark (1938) described the dark markings as 'vermilion'.

***Amphioplus (Amphichilus) ochroleuca* (Brock)**

(Fig. 1,2)

Amphiura ochroleuca Brock, 1888: 484. — Koehler, 1904: 63, text-figs. 12, 13.

Amphiura brocki Döderlein, 1896: 286, pl. 15, figs. 6, 6a.

Amphiodia mesopoma H. L. Clark, 1915: 247, pl. 6, figs. 11, 13; 1918: 287, pl. 3, fig. 7.

Amphiodia ochroleuca. — H. L. Clark, 1915: 250. — Koehler, 1930: 105. — H. L. Clark, 1938: 247; 1946: 203.

Amphioplus (Amphichilus) ochroleuca A. M. Clark, 1970: 49, text-fig. 8t. — A. M. Clark & Rowe, 1971: 78, 100, text-fig. 48f, g.

MATERIAL

Station 6-1 (J.8884).

Amphioplus (Amphichilus) ochroleuca was first described from Amboina, East Indies (Brock, 1888). It has also been described under two synonyms: firstly, as *brocki*, from Thursday Island, Torres Strait (Döderlein, 1896) and later, as *mesopoma*, from Badu, Torres Strait (H. L. Clark, 1915). H. L. Clark (1915) also reported *mesopoma* from Spencer and St. Vincent Gulfs, South Australia, and Westernport, Victoria. The same author (H. L. Clark, 1938), having synonymized *brocki* and *mesopoma* with *ochroleuca*, reported the species from Darwin and Broome. Material in the West Australian Museum extends the species range along the west Australian coast as far south as Dunsborough. Along the east Australian coast, *ochroleuca* has now been recorded from the Swain Reefs and from off Port Hacking, NSW (Kingston, in preparation): the species thus has a practically circum-Australian distribution.

The genus *Amphichilus* was erected by Matsumoto (1917:175) for the Japanese species *trichoides* Matsumoto. A. M. Clark (1970), in her revision of the Amphiuridae, reduced *Amphichilus* to a subgenus of *Amphioplus* and, in addition, assigned the species *ochroleuca* to it. *Amphichilus* is very close in terms of its oral armament to *Unioplus* (another subgenus of *Amphioplus*), in that both taxa possess three oral papillae. Indeed in this regard there seems to be some confusion in the subgeneric allocation of *ochroleuca*. In A. M. Clark & Rowe's key (A. M. Clark & Rowe, 1971: 100), *Amphichilus* is distinguished from *Unioplus* using two criteria: (a) the relative size of the middle oral papilla; (b) the degree of contiguity of the radial shields. In *Amphichilus* the two distal oral papillae are similar in size but in *Unioplus* the middle oral papilla is described as the largest: the oral papilla referred to is the third oral papilla in that it attaches either wholly or partially to the edge of the adoral shield (the designation of jaw areas and explanation of amphiurid dental formulae is described in detail by A. M. Clark, 1970:5). In both *Amphichilus* and *Unioplus*, the second oral papilla is absent (A. M. Clark, 1970: 48, 49) but its place may appear to be taken by the first oral tentacle scale which may be placed at a

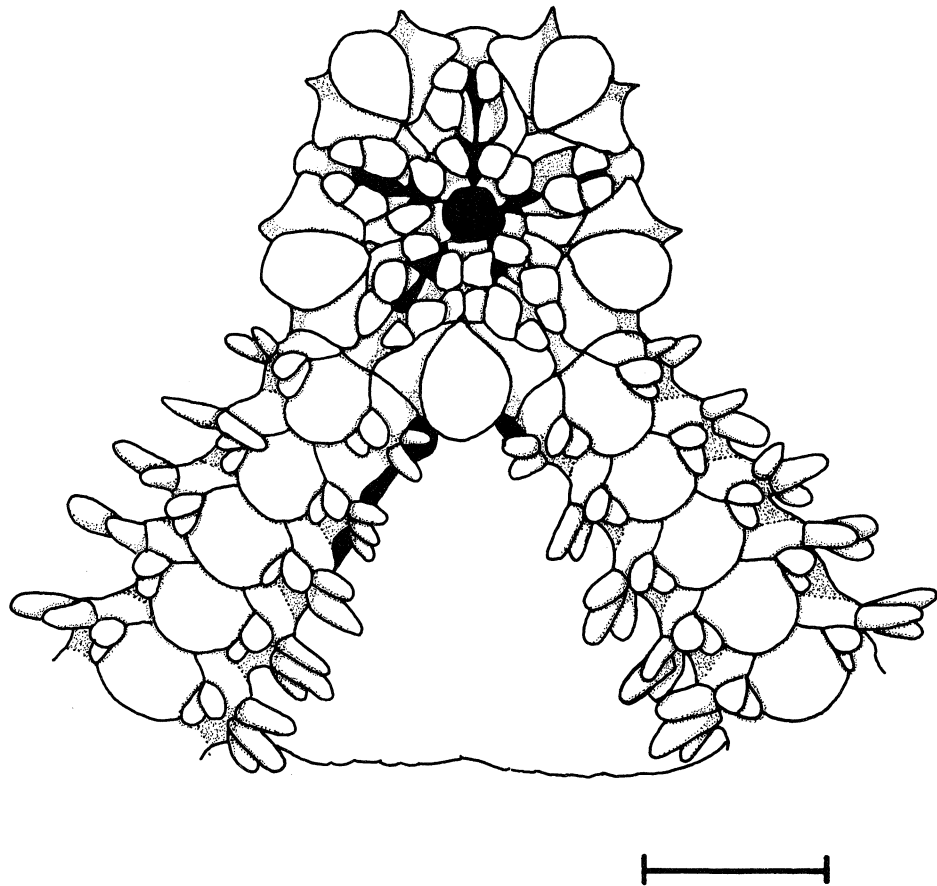


Fig. 1. *Amphioplus (Amphichilus) ochroleuca* (Brock). Ventral surface of the disc. Scale represents 1.0 mm.

relatively superficial level in the jaw such that it appears in line with the other oral papillae. In *ochroleuca*, both the position of the third oral papilla and the degree of prominence of the first oral tentacle scale is variable, even within Australian material. Thus, A. M. Clark (1970: 39, text-fig. 8f) describes the dental formula of *ochroleuca* as $m, m, m, +t$ and illustrates prominent oral tentacle scales whilst in other Australian material examined, the dental formula is $m, \overline{N, N}, m + t$ and the oral tentacle scales may not be as superficially placed in the jaw (Fig. 1) (where $\overline{N, N}$, indicates that the third oral papilla partially arises from both the side of the oral plate and the edge of the adoral shield and is enlarged). The relative enlargement of the third oral papilla pertains in only three of the thirteen species assigned to *Unioplus* (see the dental formulae given by A. M. Clark 1970: 37) yet it appears to be a consistent feature in *ochroleuca* formally assigned to *Amphichilus*. Thus Koehler (1904) who figured Brock's (1888) type of *ochroleuca* noted that 'la papille buccale moyenne (is) plus large que les autres'. It is also relevant that H. L. Clark (1925:247) described the middle oral papilla in *mesopoma* as the 'largest and lid-like'.

Unioplus and *Amphichilus* are further distinguished by the degree of contiguity of the radial shields: in *Unioplus*, the radial shields are separated or at least divergent whilst in *Amphichilus*, they are completely contiguous. Again, *ochroleuca* corresponds to *Unioplus* rather than *Amphichilus*. Koehler (1904) illustrated Brock's (1888) type specimen of *ochroleuca* as possessing radial shields separated by a narrow strip of somewhat enlarged scales, a condition that compares with material described as *mesopoma* by H. L. Clark (1915) and with other Australian material examined (Fig. 2). H. L. Clark (1938), in describing growth changes in this species, noted that at disc diameters of 4 mm or less the radial shields may be more or less in contact. Since the type specimen with a disc diameter of 9 mm is the largest specimen of *ochroleuca* presently recorded and the Australian material examined have disc diameters ranging from 4-6 mm, the degree of contiguity of the radial shields may be an ontogenetically related variable and not of strict taxonomic significance in this species. A. M. Clark (in A. M. Clark & Rowe, 1971:132, text-fig. 48f) in illustrating the dorsal disc surface of a 6 mm disc diameter specimen suggested that the partial contiguity of the radial shields may be an unusual feature.

The two subgenera are further distinguished by the degree of contiguity of the dorsal arm plates: in *Unioplus*, the arm plates are barely, if at all, in contact whilst in *Amphichilus* they are (A. M. Clark, 1970: 48). In this regard, *ochroleuca* can be assigned without doubt to *Amphichilus*.

Whilst the specific identity of the Swain Reefs specimen as *ochroleuca* is not in doubt, particularly when Koehler's (1904) notes and illustration of the type and H. L. Clark's (1915) description of *mesopoma* are considered, its subgeneric allocation appears to be rather tenuous. It is suggested that these subgenera may require re-evaluation perhaps using internal morphological features such as the dental and oral plates which do indicate generic relationships in other ophiuroid families, for example the Ophiotrichidae (Kingston, in preparation).

In the present material from the Swain Reefs, the disc (disc diameter, 5 mm) is marked with pale yellow and the arms are narrowly cross-banded with the same colour. Colour notes for the living specimen describe it as 'pinkish-cream with narrow red bands on the arms'. The considerable diversity in colouration shown by this species (discussed by H. L. Clark, 1938: 248) may be the result of the fugacity of these pigments under different conditions of preservation.

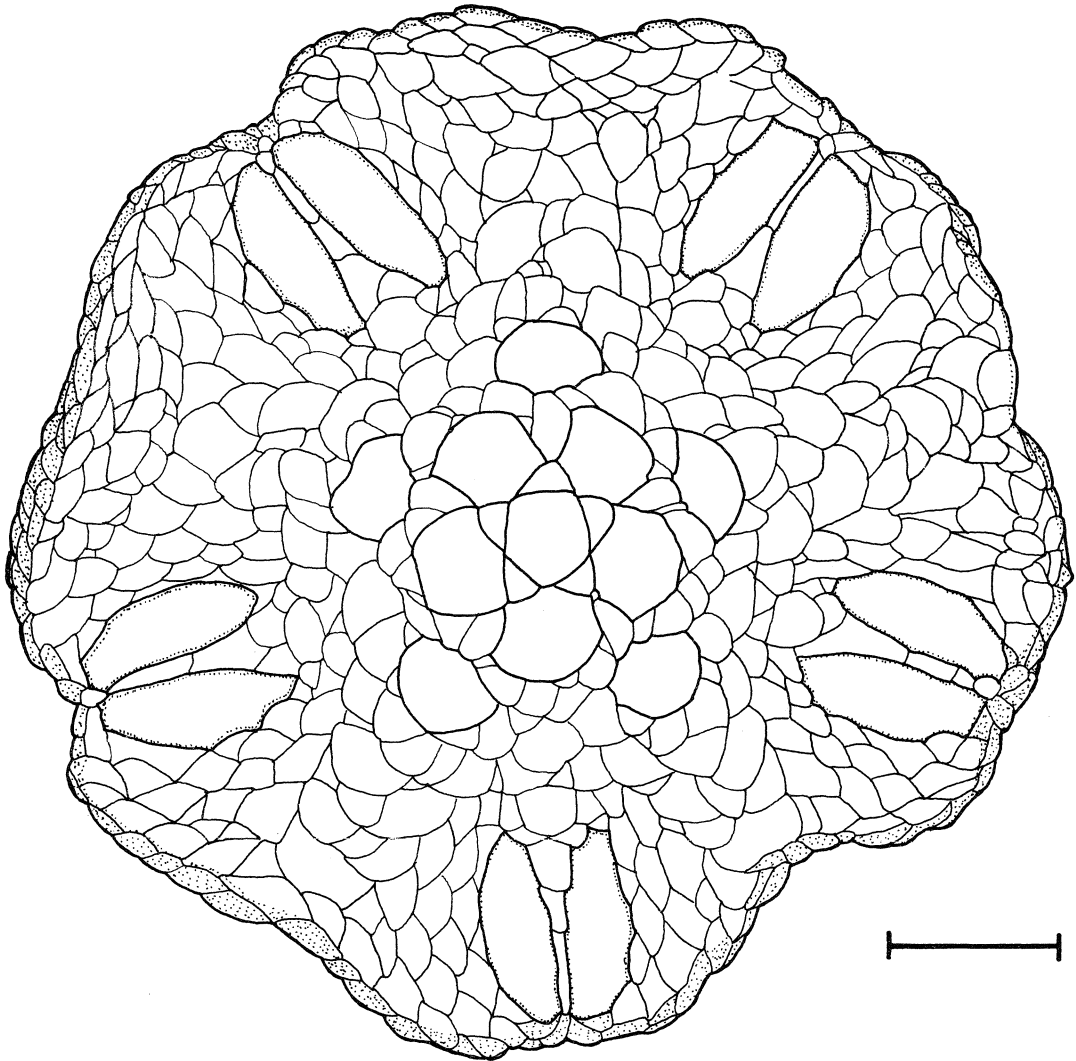


Fig. 2. *Amphioplus (Amphichilus) ochroleuca* (Brock). Dorsal surface of the disc. Scale represents 1.0 mm.

***Amphiura (Amphiura) luetkeni* Duncan**
(Fig. 3a,b)

Amphiura lütkeni Duncan, 1879: 464, pl. X, fig. 17.

Amphiura (Amphiura) luetkeni.—A. M. Clark & Rowe, 1971: 80, 97, pl. 13, figs. 6,7.

Amphiura duncani Lyman, 1882: 124, 132, 310. — Koehler, 1905: 33.— Matsumoto, 1917: 208.

MATERIAL

Station 7-1 (J.8887).

Amphiura (Amphiura) luetkeni, first described from Korean Seas, has subsequently been recorded from the East Indies, Philippine Islands, China and South Japan (A.M. Clark and Rowe, 1971). The Swain Reefs specimen, therefore, represents a new record for Australian waters.

The dorsal surface of the disc (disc diameter, 3.5 mm) is very finely scaled and no central rosette of primary plates is apparent; the fine scaling continues into the ventral interradii. The radial shields are banana-shaped, three times as long as broad and equal to half the disc radius. Distally, the radial shields of each pair are either not or only just contiguous: proximally, they are divergent and widely separated from each other. The two large, prominent infradental papillae are separated by a broad diastema from the second oral papillae on either side. The large pointed oral tentacle scale abuts onto the entire lateral margin of the oral plate. The oral plates are conspicuously sunken midway along their length, rising up to meet the adoral shields distally and for the insertion of the infradental papillae proximally (Fig. 3a). The ventral arm plates are longer than broad for the greater part of the arm length. There is one moderate sized tentacle scale. The dorsal arm plates are rounded pentagonal and the lateral and distal margins form a continuous fan shape; there is some overlap between succeeding plates (Fig. 3b). The lateral arm plates encroach upon the ventral and dorsal arm plates but do not meet either above or below. Proximally, there are six arm spines, which reduce in number to five and then four about halfway along the arm length. The spines are cylindrical with bluntly pointed rugose tips; the lowermost in each series is the longest and approaches one arm segment in length.

There are no colour notes for the living specimen and no colour remains in the dried material.

***Dougaloplus echinatus* (Ljungman)**

Ophiophragmus echinatus Ljungman, 1867: 316.

Ophiocnida echinata. — H. L. Clark, 1946: 203.

Dougaloplus echinatus.—A. M. Clark, 1970: 35, text-fig. 7h-k, ?l.—A. M. Clark & Rowe, 1971: 80, 100, text-fig. 26i.—Gibbs *et al.*, 1976: 123.

MATERIAL

Station 6-1 (J.8888).

The present record represents a further extension southward of the species' range in the Great Barrier Reef.

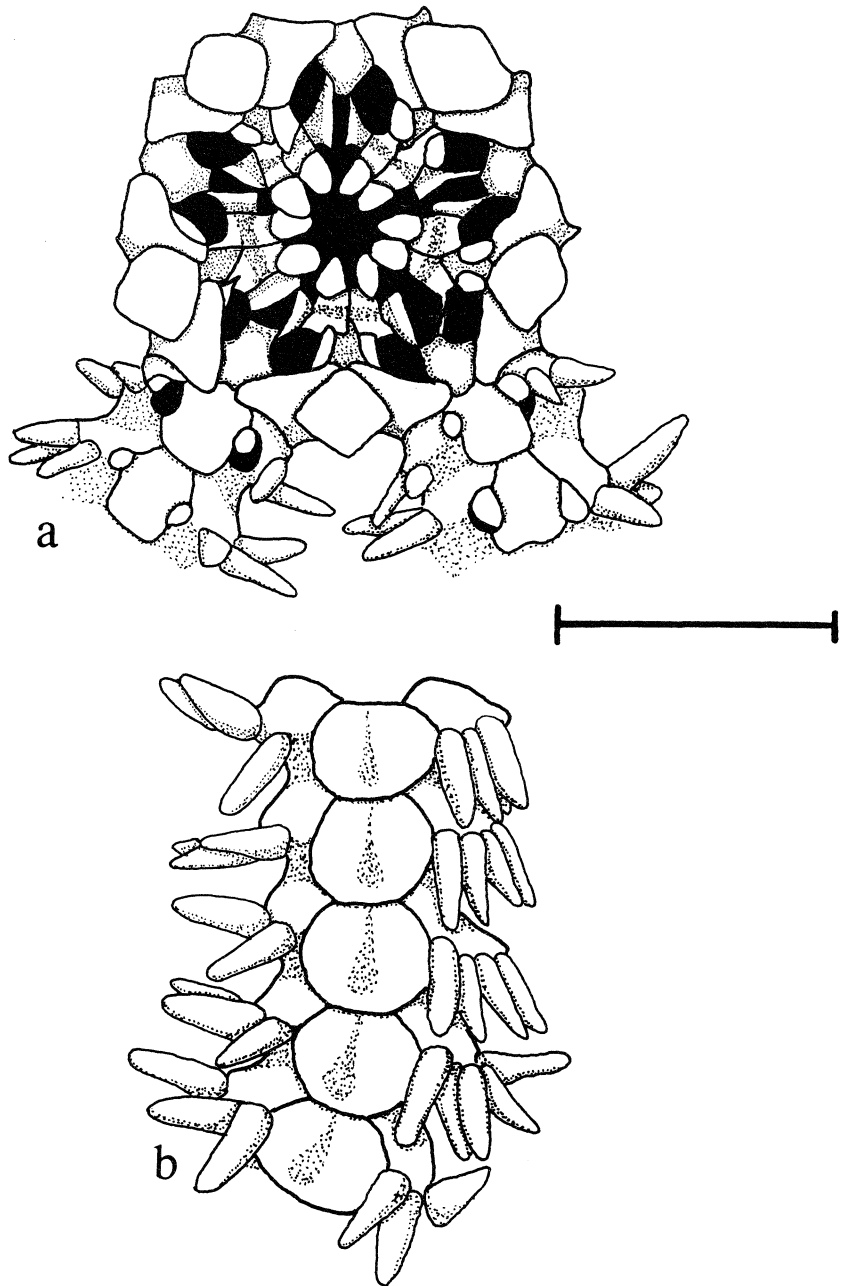


Fig. 3a *Amphiura (Amphiura) luetkeni* Duncan. Ventral surface of the disc.
3b. Dorsal surface of the arm, segments 5-9. Scale represents 1.0 mm.

OPHIACTIDAE

Ophiactis savignyi (Müller & Troschel)

Ophiolepis savignyi Müller & Troschel, 1842:95.

Ophiactis savignyi.— H. L. Clark, 1921: 108; 1938: 260; 1946: 210. — A. M. Clark & Rowe, 1971: 82, 103, pl. 14, fig. 4. — Gibbs *et al.*, 1976: 123.

MATERIAL

Station 4-1 (J.8883).

A live specimen of *Ophiactis savignyi* is illustrated in colour by Coleman (1977:165).

OPHIOTRICHIDAE

Macrophiothrix longipeda (Lamarck)

Ophiura longipeda Lamarck, 1816: 544.

Macrophiothrix longipeda. — H. L. Clark, 1921: 110, pl. 15, fig. 5, pl. 33, fig. 1; 1938: 288; 1946: 221. — A. M. Clark, 1967: 648, pl. 11, fig. 1, text-fig. 1m. — A. M. Clark, 1968: 300, figs. 3 m-o, 4 p-r, 5 p-r, 7l, m. — A. M. Clark & Rowe. 1971:82, 114, pl. 16, fig. 4, text-figs. 35 f, 37 l.

MATERIAL

Station 1-1 (J.8903); Station 6-2 (J.8904); off Gillett Cay-1 (J.7585).

Colour slides are available of the dorsal and ventral aspect of one specimen (J.8904). The radial shields are marked with blue and yellow blotches and black spots; the remainder of the disc is dirty brown. The arms are cross-banded with brown and dark blue upon which black spots, each surrounded by a yellow rim, are irregularly distributed. Ventrally, the disc is brown and the arms similarly cross-banded with brown and deep blue. The extended tube-feet are bright blue. In the dried specimen, the brown has changed to blue and the yellow rims around the black spots have entirely disappeared.

Ophiothela danae Verrill

Ophiothela danae Verrill, 1869: 391.— A. M. Clark & Rowe, 1971: 84, 116, pl. 14, fig. 5. — A. M. Clark, 1976: 112. — Gibbs *et al.*, 1976: 125.

Ophiothela hadra H. L. Clark, 1915: 284, pl. 14, fig. 2; 1921: 117, pl. 13, fig. 5; 1938: 319.

MATERIAL

Station 6-1 (J. 8891).

Under its synonym *Ophiothela hadra*, *Ophiothela danae* (A.M. Clark, 1976) has been recorded from the east Australian coast as far south as Ballina, New South Wales (H. L. Clark, 1921, 1938; Edean, 1953, 1957). The Swain Reefs specimen falls within this range.

From a colour slide of the living specimen, the dorsal disc is red centrally and marbled with white, yellow and black towards its perimeter. The dorsal surface of the arms is cross-banded with yellow, white and black. In the dried specimen, the red

colouration is reduced to pale pink; the yellow has entirely disappeared; and the black changed to blue. The considerable alterations in disc and arm pigmentation brought about by preservation in alcohol may explain the frequently observed mismatch in colouration between *Ophiothela danae* and the gorgonians upon which this brittlestar is commonly epizoic (for example Gibbs *et al.*, 1976). H. L. Clark (1921) also noted that a marked change in colouration is effected by preservation, the green and yellow tints of the living material becoming pale rose and grey.

***Ophiothrix ciliaris* (Lamarck)**

Ophiura ciliaris Lamarck, 1816:545.

Ophiothrix stelligera Lyman, 1874:237, pl. 3, figs. 15-20. — H. L. Clark, 1921:114, pl. 16, fig. 8; 1938: 273; 1946: 216.

Ophiothrix ciliaris. — A. M. Clark, 1967:646. — A. M. Clark & Rowe, 1971: 84, 109, text-fig. 35a.

MATERIAL

Station 1-1 (J.8892); Station 4-1 (J.8893); Station 6-3 (J.8894-8896).

Under its synonym, *Ophiothrix stelligera*, *Ophiothrix ciliaris* has been recorded for the Great Barrier Reef from the Murray Islands (H. L. Clark, 1946). The Swain Reefs material represents a considerable southward extension of its range in the Great Barrier Reef.

A colour slide is available of one of the living Station 6 specimens. The disc is pale cream with dark brown spots. The dorsal surface of the arms is marked with two longitudinal dark brown stripes either side of the midline which is yellow where it overlies faint cross-bands produced by an increased red colouration. In the dried specimen, nearly all the colouration has disappeared and only the dorsal disc spots and brown arm stripes remain; even these are rather faded. H. L. Clark (1938) similarly noted that the red and pink colouration of living material disappears on preservation, leaving only brown or dull purple shades.

***Ophiothrix (Acanthophiothrix) proteus* Koehler**

Ophiothrix comata.— Koehler, 1898: 105, pl. 2, figs. 11-14 (non *Ophiothrix comata* Müller & Troschel).

Ophiothrix proteus Koehler, 1905: 100.— H. L. Clark, 1915: 277.

Ophiothrix (Acanthophiothrix) proteus.— A. M. Clark, 1967: 648.—A. M. Clark & Rowe, 1971: 84, 111, pl. 15, fig. 5.— Gibbs *et al.*, 1976: 126.

MATERIAL

Station 6-2 (J.8898).

O. (Acanthophiothrix) proteus has recently been recorded from the northern part of the Great Barrier Reef (Gibbs *et al.*, 1976) and the present material represents a southward extension of its range.

From a colour slide of one of the living specimens, the dorsal surface of the arm is

boldly marked with two longitudinal orange stripes separated by a broad white stripe running along the midline. In addition, the arms are broadly cross-banded due to the intensification of the red-orange ground colour of the arms. A similar increase in pigmentation is present in the adjoining arm spines of these darker arm segments. The disc is pale cream marked with single orange stripes that continue inwards from the double orange stripes of the arms between each of the radial shields of a pair. In addition, each radial shield is marked with rows of small dark brown spots that regularly radiate out from its adradial distal corner. In the dried specimens, much of this colouration has disappeared leaving only two dark purple longitudinal stripes running either side of the midline of the dorsal arm surface.

Ophiothrix (Keystonea) martensi australis H. L. Clark

Ophiothrix martensi australis H. L. Clark, 1921: 111, pl. 15, fig. 4.

Ophiotrichoides martensi australis.—H. L. Clark, 1938:305; 1946: 231.

Ophiothrix (Keystonea) martensi australis.—A. M. Clark & Rowe, 1971: 86, 107, text-fig. 34d.

MATERIAL

Station 6-1 (J.8899).

Colour slides of both the ventral and dorsal aspect of the living specimen are available. The dorsal surface of the disc is pale blue with dark blue lines radiating out from its centre that continue along the dorsal midline of the arms with the zigzag pattern characteristic of this subspecies (H. L. Clark, 1938). Both on the disc and more prominently on the arms, these longitudinal blue markings are bordered with orange. At its perimeter and in the ventral interradial, the disc is variegated with blue and orange. A broad blue stripe runs along the entire ventral arm surface. In the dried specimen, the orange pigmentation has entirely disappeared and is replaced with pale blue.

Ophiothrix (Keystonea) nereidina (Lamarck)

Ophiura nereidina Lamarck, 1816: 544.

Ophiothrix nereidina.—H. L. Clark, 1921: 112, pl. 15, figs. 2, 8, 9.

Ophiotrichoides nereidina.—H. L. Clark, 1938:306; 1946: 232.

Ophiothrix (Keystonea) nereidina.—A. M. Clark, 1967: 648, fig. 11,—A. M. Clark & Rowe, 1971:86, 107, text-fig. 34b.

MATERIAL

Station 5-1 (J.8900); Station 6-1 (J.8901).

Ophiothrix (Placophiothrix) striolata Grube

Ophiothrix striolata Grube, 1868: 45.—H. L. Clark, 1921: 114, pl. 15, fig. 1.

Placophiothrix striolata.—H. L. Clark, 1938: 314; 1946: 225.

Ophiothrix (Placophiothrix) striolata.—A. M. Clark: 1967: 648.—A. M. Clark & Rowe, 1971: 86, 113.

MATERIAL

Station 4-2 (J.8906, J.8907); Station 6-4 (J.8908-J.8911).

Endean (1957) classified *O. (Placophiothrix) striolata* as a 'mainland' species with a distribution south from Torres Strait to Lindeman Island. The Swain Reefs record suggests that this species should also be considered a 'reef' species. In addition, it represents a southward extension of its range in the Great Barrier Reef.

A colour slide is available of one specimen (J.8910). The dorsal surface of the arms is regularly cross-banded with brown and white speckled segments alternating with yellow segments marked with bold blue blotches either side of the midline. The prominent radial shields are marked with yellow and brown speckling. Distally, each shield has a central blue blotch; proximally, a similar blue marking extends across the shields of each pair. In the dried material the yellow and brown colouration has entirely disappeared, leaving the disc and arms white with pale blue markings. H. L. Clark (1938) has commented on the considerable colour changes effected by preservation in this species.

OPHIOCOMIDAE

Ophiocoma dentata Müller & Troschel

Ophiocoma dentata Müller & Troschel, 1842: 99.—Devaney, 1970: 13.—A. M. Clark & Rowe, 1971: 86, pl. 18, figs. 2, 3.—Gibbs *et al.*, 1976: 128.

Ophiocoma brevipes var. *variegata* H. L. Clark, 1921: 130.

Ophiocoma insularia var. *variegata* H. L. Clark, 1938: 330; 1946: 246.

MATERIAL

Station 1-4 (J.7376, J.8865-J.8866); Station 8-2 (J.8864).

Ophiocoma erinaceus Müller and Troschel

Ophiocoma erinaceus Müller and Troschel, 1842: 98.—H. L. Clark, 1915: 291, pl. 15, figs. 5,6; 1921: 127; 1938: 329; 1946: 244.—A. M. Clark & Rowe, 1971: 86, 119, pl. 17, figs. 5,6.—Gibbs *et al.*, 1976: 128.

MATERIAL

Station 1-6 (J.8867, J.8869-J.8870); Station 8-4 (J.8868).

Ophiocoma scolopendrina (Lamarck)

Ophiura scolopendrina Lamarck, 1816: 544.

Ophiocoma scolopendrina.—H. L. Clark, 1915: 293, pl. 14, figs. 10,11; 1921: 125, pl. 13, fig. 9; 1946: 243.—A. M. Clark & Rowe, 1971: 86, 128, pl. 14, figs. 3,4.

MATERIAL

Station 1-1 (J.7375); off Gillett Cay-1 (J.7140).

Ophiomastix caryophyllata Lütken

Ophiomastix caryophyllata Lütken, 1869: 99.—H. L. Clark, 1921: 137, p. 14, fig. 4., pl. 36, fig. 10; 1946: 249.—A. M. Clark & Rowe, 1971: 86, 120.

MATERIAL

Station 1-1 (J.8872).

Ophiomastix caryophyllata has been recorded from the Murray Islands (H. L. Clark, 1946), Low Isles (Endean, 1961), and Heron Island (Endean, 1965). The Swain Reefs record represents a further southward extension of the species' range.

In the dried specimen, the disc is creamy yellow with dark brown spots, both dorsally and ventrally. The sharply pointed disc spines are a uniform pale cream. The entire distal half of each dorsal and ventral arm plate is pale cream and strongly contrasts with the dark brown colouration of the proximal half of the arm segment. The four arm spines in each series are distinctly banded with dark brown on cream. The uppermost spines are conspicuously enlarged and clavate and are further distinguished by their more uniform dark colouration.

Ophiomastix luetkeni Pfeffer

Ophiomastix luetkeni Pfeffer, 1910: 83.—H. L. Clark, 1915: 296, pl. 16, figs. 3,4; 1921: 136.—A. M. Clark & Rowe, 1971:86, 120, pl. 19, fig. 1.

MATERIAL

Station 1-2 (J.8871); 1974-1 (J.8689).

Ophiomastix luetkeni has previously been recorded from the East Indies, Philippine Islands, China and South Japan (A. M. Clark & Rowe, 1971). The present material, therefore, represents an extension of the species' range to Australian waters.

The Swain Reefs specimens were compared with specimens of *O. luetkeni* from the Solomon Islands (loaned from the British Museum (Natural History) by courtesy of Miss A. M. Clark). In all the specimens, the majority of the uppermost arm spines are greatly elongate and enlarged compared to the other arm spines of each series but only very rarely are these spines conspicuously thickened and clavate. The arm spines are banded but frequently this is rather indistinct. The colour throughout the dried specimens is very dark brown with narrow light brown to pale cream markings along the distal margins of the dorsal and ventral arm plates and between succeeding side arm plates. The sharply pointed disc spines are either a uniform pale or dark colour.

O. luetkeni is distinguished from *O. janualis* Lyman, which also lacks clavate upper arm spines, by the banding of its arm spines (A. M. Clark and Rowe, 1971). In both *O. caryophyllata* Lütken and *O. corallicola* H. L. Clark, which have also been reported from Australian waters, the upper arm spines are regularly and conspicuously clavate (A. M. Clark & Rowe, 1971).

Ophiopsila gilletti, sp.n.

(Fig. 4a, b, c)

TYPE MATERIAL

Station 4-1. Gillett Cay adjacent to Station 3, dredged, at 36.5 m depth. Holotype T.A.M. reg. no. J.8873.

DIAGNOSIS

A species of *Ophiopsila* with ventral interbrachia transparent and sparsely scaled; both tentacle scales erect, the outer, fine and spiniform, the inner, spatulate and with a 'mid-rib'; numerous clustered dental papillae and two lateral, thin, blunt-tipped oral papillae. The holotype is dried from alcohol.

DESCRIPTION

Disc diameter c. 5 mm, distorted dorsally. Arm length c. 20 mm (d.d: a.l. = 1:4). Dorsally, the disc is densely covered with fine, imbricating scales. Ventrally, a small triangular area of sparsely scaled, transparent skin in each interbrachium delineated by the distal margin of the oral shields and the large opaque scales bordering the proximal quarter of the genital clefts (Fig. 4a). The radial shields are narrow (length 0.1 mm, breadth 0.01 mm), tapering proximally where they are encroached upon by the disc scales. The shields of each pair are separated by one or two rows of enlarged disc scales. The dorsal arm plates are longer than broad and contiguous throughout the length of the arm. Proximally, each lateral arm plate bears ten arm spines, reducing to eight or nine at the arm tip. All the arm spines are broadly flattened, blunt-tipped and minutely serrated over their entire surface. In each series, the lowermost spine is the longest, approaching one and a half times the segment length. The spatulate form of the arm spines is most developed in the second and third uppermost spines of each series. The five or six middle arm spines of each series are approximately identical in morphology and dimensions (Fig. 4b). All the arm spines are erect and are not adpressed to the arm surface. The ventral arm

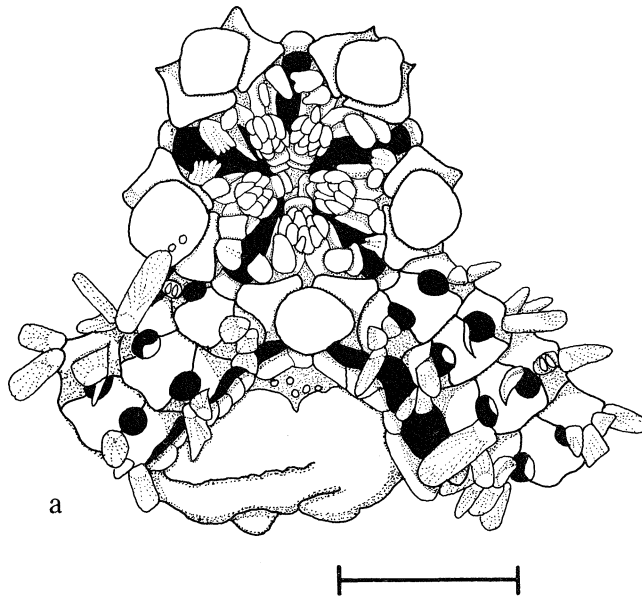
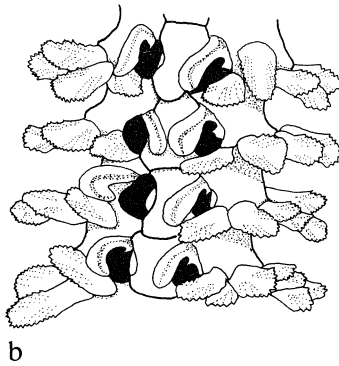
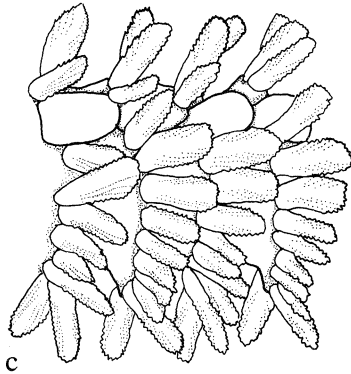


Fig. 4a. *Ophiopsila gilletti* sp.n. Ventral surface of the disc.



4b. Ventral surface of the arm, midway down its length.
4c. Arm in profile, segments, 5-7. Scale represents 1.0 mm.

plates are longer than wide, their distal margins becoming somewhat concave towards the arm tip. The tentacle pores are large. Two tentacle scales are present: the outer is thin and spiniform; the inner is thin, spatulate and bears a distinct 'midrib' on its ventral surface (Fig. 4c). The inner tentacle scales are usually erect but occasionally lie flat on the ventral arm surface. The inner and outer tentacle scales on each side appear to be joined basally by a fine membrane: this membrane is not derived from the tube-foot and may be a preservation artefact. A small, semilunar scale may be present bordering the central inner margin of the tentacle pore. The oral shield is distinctly broader than long. The proximal margin is gently rounded; the distal margin is slightly prolonged to form a broad lobe. The adoral shields approach each other closely interradially above the oral shields but are not contiguous. The oral plates bear eight or nine clustered, small, slender, dental papillae. Each adoral shield bears two lateral, thin, broad, blunt-tipped oral papillae. In several jaw sectors, the lateral papillae are split at the tip. The colour of the dried holotype is pale fawn with sinuous orange-brown markings; the radial shields are pale fawn. The arms are cross-banded at two to three segment intervals with orange-brown and chocolate brown. The arm spines are white with a faint orange cross-band about a third of the way up from the spine base. Ventrally, the arms and mouth region are white. Towards the arm tip, the cross-banding of the dorsal arm surface appears ventrally.

There are no colour notes for the live specimen.

The highly distinctive ophiocomid genus *Ophiopsila* Forbes has not been recorded previously from Australian waters although its members are widespread through tropical and temperate regions (H. L. Clark, 1915, 1918; Koehler, 1930; Baker, 1974). *O. novaezealandicae* from New Zealand (Baker, 1974), and two South African species, *O. seminuda* (A. M. Clark, 1952) and *O. bispinosa* (A. M. Clark, 1974), have recently been added to the extensive species list. As Baker (1974) has noted, the genus may well require revision since many of its species are known from only one or two specimens. In addition, there is evidence that spine number, frequently used to differentiate species in this genus (e.g. H. L. Clark, 1918), may vary with disc diameter. One hesitates to add a further species to the considerable array of species already described but the present Swain Reefs specimen differs in several aspects from these known taxa. The discovery of additional Australian material of this genus may further elucidate the status of the Swain Reefs specimen.

Thus, *O. gilletti* differs from *O. novaezealandicae* Baker in that: (1) the radial shields taper proximally rather than being rectangular and are not surrounded by distinctly different sized disc scales; (2) the dorsal arm plates are longer than broad throughout the entire arm length and are not obscured or separated by skin; (3) there are two lateral oral papillae compared to three to five in *O. novaezealandicae*.

The new species compares closely with the South African *O. seminuda* A. M. Clark in that the ventral interbrachia are naked and the number and morphology of the arm spines are similar. However, the dorsal arm plates in *O. seminuda* are broader than long, the opposite condition to that found in *O. gilletti*.

With its numerous clustered dental papillae and two oral papillae, *O. gilletti* is close to two Indo-Pacific species: *O. polyacantha* H. L. Clark (1918) from the Dutch East Indies; and *O. pantherina* Koehler (1898) from the Mergui Archipelago. It differs from the former in the spatulate rather than slender morphology of the arm spines and from the latter in that the ventral interbrachia are sparsely rather than completely scaled and in the higher number of arm spines.

The species is named, as is its type locality, Gillett Cay, for Keith Gillett, leader of the Swain Reefs Expedition.

OPHIONEREIDAE

Ophionereis intermedia A. M. Clark

Ophionereis intermedia A. M. Clark, 1953: 90, text-fig. 12.

MATERIAL

Station 4-1 (J.8863).

Ophionereis intermedia was described by A. M. Clark (1953) from a single specimen collected at 80 m in the Tsuguru Strait, North Japan. The present record, therefore, represents a considerable extension in the species range to Australian waters.

Although the disc of the Swain Reefs specimen (disc diameter 2 mm; minimum arm length 12 mm) is quite badly distorted and much of its dorsal aspect missing, small, needle-like genital papillae are clearly visible edging the genital slits in two of the ventral interradii. Morphologically, *O. intermedia* closely resembles *O. dubia* (Müller & Troschel) which has been reported from the north-west Australian coast (H. L. Clark, 1946) and the Great Barrier Reef (Gibbs *et al.*, 1976). Indeed, from the dorsal aspect, the two species are indistinguishable (A. M. Clark, 1953). Both possess extremely fine disc scaling and accessory scales that are inserted at the distal margins of the supplementary arm plates. The two species are principally distinguished by the presence of needle-like genital papillae in *O. intermedia*; genital papillae are entirely lacking in *O. dubia*. In addition to this feature, *O. intermedia* may be distinguished from *O. dubia* by the form of its ventral arm plates (A. M. Clark, 1953; pers comm.) and by the positioning of the tentacle scale relative to the ventral arm plate. Further records of *O. intermedia* in Australian waters have been identified in the collections of The Australian Museum; this material will be described and extensively discussed elsewhere (Kingston, in preparation).

Ophionereis lineata H. L. Clark

Ophionereis lineata H. L. Clark, 1946: 238.—A. M. Clark & Rowe, 1971: 88, 122, text-fig. 56a-e.

MATERIAL

Station 6-1 (J.8874).

A. M. Clark (in A. M. Clark & Rowe, 1971) suggested that *Ophionereis lineata* was indistinguishable from *Ophionereis fusca* Brock but that this synonymy could only be confirmed after further examination of *O. fusca* from its type locality, Amboina. Because of this, the Swain Reefs specimen is presently referred to *O. lineata* although its extremely close resemblance to *O. fusca* is fully acknowledged by the present author. If *O. lineata* should prove to be synonymous with *O. fusca*, then H. L. Clark's (1946) record for Lindeman Island will provide an extension of range for *O. fusca* from the East Indies, and Philippine and South Pacific Islands to Australian waters. This would be confirmed by the Swain Reefs record which, in turn, would represent a further southward extension into the Great Barrier Reef.

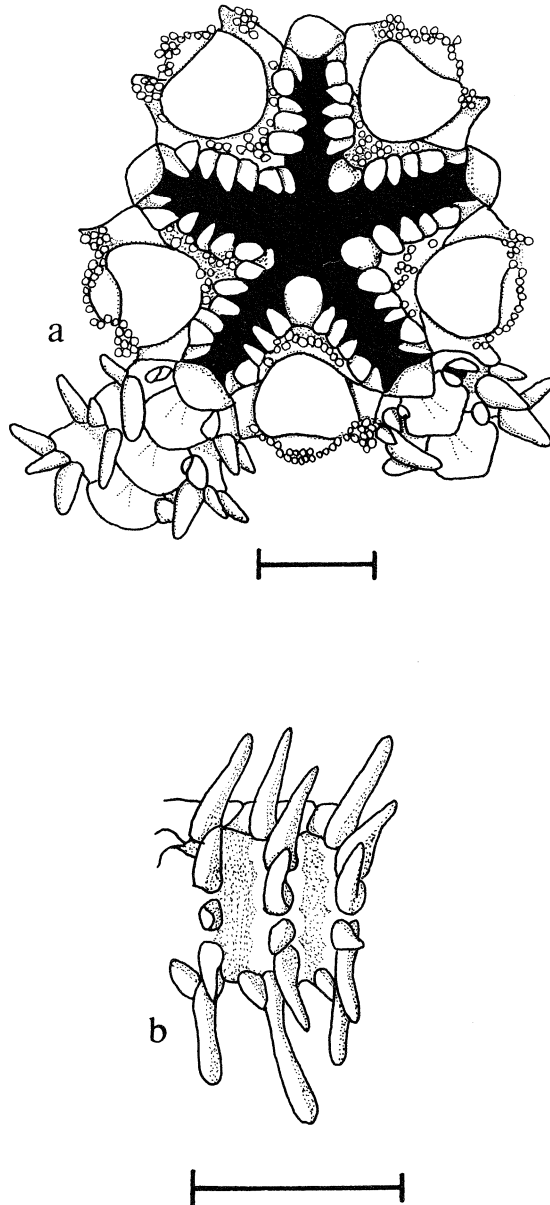


Fig. 5a. *Ophiarachnella macracantha* H. L. Clark. Ventral surface of the disc.
5b. Arm in profile, midway down its length. Scale represents 1.0 mm.

MATERIAL

Station 4-1 (J.8879).

Ophioconis cincta has previously been reported from Broome and Darwin (H. L. Clark, 1946). The Swain Reefs record represents an extension of its range to the Great Barrier Reef.

Although the disc is rather badly distorted in the present specimen (disc diameter 3.5 mm approximately), marginal disc spinelets are clearly visible. In addition, a very few spinelets are scattered over the dorsal surface of the disc. The highly variable occurrence and distribution of disc spinelets in this species noted by H. L. Clark (1938) has been discussed by A. M. Clark (1965). In the dried specimen, the disc and arms are white with grey-brown widely spaced, narrow cross-bands on the arms. There are no colour notes for the living specimen.

***Ophiodyscrita pacifica* (Murakami)**

(Fig. 6a, b)

Ophiocryptus pacificus Murakami, 1943:188, text-fig. 10.

Ophiodyscrita pacifica. — A. M. Clark & Rowe, 1971:88, 128.

MATERIAL

Station 5-1 (J.8880)

Ophiodyscrita pacifica was first reported from Palao by Murakami (1943). The Swain Reefs specimen, therefore, represents a new record of the species for Australian waters.

In the present specimen, disc diameter is 5 mm; the arms are all broken off within 10 mm of the disc. Although the disc is badly damaged dorsally its granulation is pronounced, extending ventrally to cover the entire mouth apparatus and continuing along the arms. The dorsal arm plates are triangular and are heavily encroached upon by the granulated lateral arm plates which meet both above and below the arm. The five conical arm spines of each series are very small and only approach one third of the length of the arm segment. For the greater length of the arm there is only one tentacle scale (Fig. 6a, b).

O. pacifica primarily differs from the closely related Australian species, *O. acosmeta* H. L. Clark, reported from Broome (H. L. Clark, 1938:356) in that at similar disc diameters, *O. acosmeta* has eight arm spines compared to the five or six in *O. pacifica*. The holotype of *O. acosmeta* (figured in A.M. Clark & Rowe, 1971: 100, text-fig. 54d-f) was available for examination (on loan from the Museum of Comparative Zoology, Harvard). In addition to differences in arm spine number, the two species also differ in the form of the dorsal and ventral arm plates. In *O. pacifica*, the dorsal arm plates are fully exposed and are triangular in shape; in *O. acosmeta*, the plates are exposed only to the extent of a restricted elliptical area. The ventral arm plates in *O. pacifica* are elongate pentagonal in shape whereas in *O. acosmeta*, they approach an almost circular form (Fig. 6a, b).

No trace of colour remains in the dried specimen but a colour slide of the living specimen shows the dorsal surface of the disc to be brick red and the arms broadly cross-banded with pink and white. Murakami (1943) describes the disc of *O. pacifica* as "dirty grey with the arms cross-banded with light grey and light brownish olive". It is not known whether the colours of the living specimen would fade to those described for dried material: Certainly in the Swain Reefs specimen, the living colours are entirely fugacious.

The Swain Reefs specimen (disc diameter 7 mm; arm length (broken) 30 mm) closely compares with H. L. Clark's (1946) description and A. M. Clark & Rowe's (1971) figure of the holotype from Lindeman Island with one exception: the genital papillae, although extending along the entire length of the genital slit, do not continue around to the dorsal surface of the arm. It is highly probable that this feature may be due to the comparatively small disc diameter of the Swain Reefs specimen. In both the holotype of *O. lineata* and two specimens of *O. fusca* (loaned from the British Museum (Natural History) by courtesy of Miss A. M. Clark) in which the disc diameter ranges from 8.5-10 mm, a palisade of genital papillae is clearly visible above the dorsal arm surface as it emerges from the disc.

The two species differ principally in their colouration. *O. fusca* has a spotted disc and dorsal arm plates, together with banded arm spines. In the dried specimen of *O. lineata*, the disc is similarly spotted and marked with brown; the arms are broadly cross-banded and display a longitudinal stripe along the midline; the arm spines are not banded (H. L. Clark, 1946).

OPHIODERMATIDAE

Ophiarachna megacantha H. L. Clark

Ophiarachna megacantha H. L. Clark, 1938: 341, text-figs. 28-30; 1946: 254.

MATERIAL

Station 6-3 (J.8875-J.8876).

Ophiarachna megacantha has previously been recorded from off Double Island Point and Lindeman Island in the Great Barrier Reef (H. L. Clark, 1938; 1946). The Swain Reefs specimens fall midway between these presently recorded furthest south and north limits of the species range. Endean (1957) classed *O. megacantha* as a 'mainland' species; the present record suggests that it also be classified as a 'reef' species.

The three Swain Reefs specimens compare closely with the holotype and a paratype of the species placed in the collections of The Australian Museum.

There are no colour data for the living specimens.

Ophiarachnella infernalis (Müller & Troschel)

Ophiarachnella infernalis Müller & Troschel, 1842: 105.

Ophiarachnella infernalis.—H. L. Clark, 1909: 124; 1921: 142; 1938: 347; 1946: 262.—A. M. Clark & Rowe, 1971: 88, 125, text-fig. 43a.—Gibbs *et al.*, 1976: 129.

MATERIAL

Station 6-1 (J.8877).

The present record represents a further southward extension of the species range from that reported by H. L. Clark (1946) and Gibbs *et al.* (1976).

Colour notes with the living specimen describe it as 'medium and dark brown'.

Ophiarachnella macracantha H. L. Clark

(Fig. 5a,b)

Ophiarachnella macracantha H. L. Clark, 1909: 126.—A. M. Clark & Rowe, 1971: 88, 126.

MATERIAL

1974-1 (J.8688).

Ophiarachnella macracantha has previously been recorded from the Caroline Islands in the South Pacific (H. L. Clark, 1909) and the present record represents a new extension of range to Australian waters.

The Swain Reefs specimens compares closely with two paratypes of *Ophiarachnella macracantha* loaned by the Museum of Comparative Zoology, Harvard (this previously unfigured species will be illustrated elsewhere (Kingston in preparation). In the dried specimen (disc diameter, 13 mm; arm length, 58 mm,) the disc is pale grey above with exposed, almost circular, dark grey radial shields. In addition, a star-shaped dark grey marking with the points of the star aligned between the members of each pair of radial shields is present on the disc surface. The arms are grey dorsally and broadly crossbanded with darker grey. The fine but dense granulation of the dorsal surface continues into the ventral interradial up to the supplementary oral shields which are exposed. There is a maximum of seven arm spines proximally but for the greater part of the arm length, six arm spines are present in each series.

The lowermost spine is the longest and equal to one and half times the arm segment length (Fig. 5a, b).

Ophiochasma stellatum (Ljungman)

Ophiarachna stellata Ljungman, 1867: 305.

Ophiochasma stellata.—H. L. Clark, 1909: 121.

Ophiochasma stellatum.—H. L. Clark, 1921: 141; 1938: 345; 1946: 259.—A. M. Clark & Rowe, 1971: 88, 124, pl. 20, fig. 1.—Gibbs *et al.*, 1976: 129.

MATERIAL

Station 6-1 (J.8878).

Endean (1957) classed *Ophiochasma stellatum* as a 'mainland' species; the present material from Swain Reefs, however, suggests its inclusion as a 'reef' species. In addition, this record represents an extension of range southward from the species' previously recorded distribution (Endean, 1965; Gibbs *et al.*, 1976).

Ophioconis cincta Brock

Ophioconum cinctum Brock, 1888: 480.

Ophiurodon cinctum Matsumoto, 1917: 315. — H. L. Clark, 1938:339.

Ophioconis cincta. — H. L. Clark, 1946:255. — A.M. Clark & Rowe, 1971:88,127, text-fig. 44f.

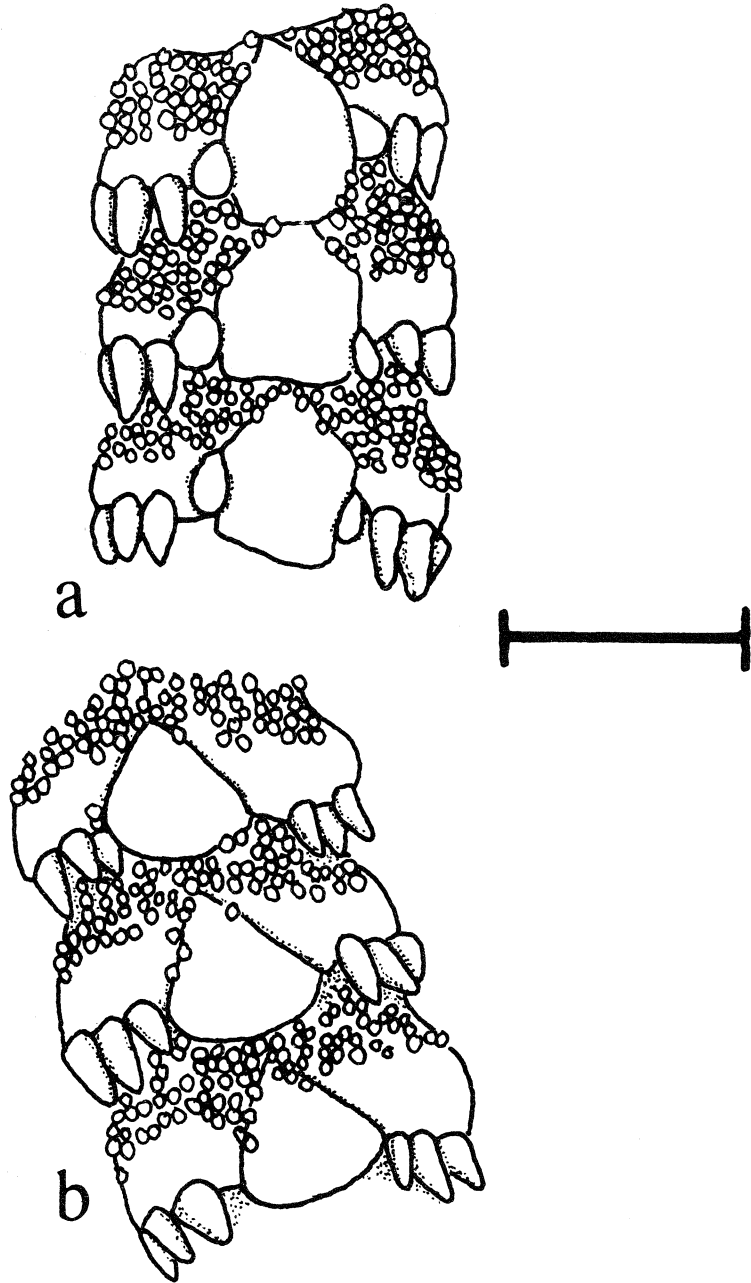


Fig. 6a. *Ophiodyscrita pacifica* (Murakami). Ventral surface of the arm, segments 5-8.
6b. Dorsal surface of the arm, segments 5-8. Scale represents 1.0 mm.

Ophiopeza spinosa (Ljungman)

Ophiarachna spinosum Ljungman, 1867:305.

Ophiopezella spinosa. — H. L. Clark, 1921: 141; 1946:258.

Ophiopeza spinosa. — A. M. Clark & Rowe, 1971:90, 127, text-fig. 44e. — Gibbs *et al.*, 1976: 130.

MATERIAL

Station 1-2 (J.8881); Station 6-2 (J.8882).

The present record represents an extension of range southward from the northern part of the Great Barrier Reef.

Live colour notes with one of the Station 1 specimens describe the brittlestar as cream with faint brown cross-bands on the dorsal arm surface. The dried material is similarly pigmented.

Ophiopsammus yoldii (Lütken)

Ophiopeza yoldii Lütken, 1856:98.

Pectinura yoldii. — H. L. Clark, 1921:141; 1946:257.

Ophiopsammus yoldii. — A. M. Clark, 1968:317, fig. 9a, b. — A. M. Clark & Rowe, 1971:90, 127, pl. 21, figs. 7, 8. — Gibbs *et al.*, 1976:130.

MATERIAL

Station 6-2 (J.8889-8890).

Live colour notes for one specimen describe the disc and arms as cream and the arms broadly cross-banded with orange. In the dried specimen, the orange cross-bands have faded to brown.

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Table 1. Stations sampled by the Swain Reefs Expedition, 1962.

Station	Location, depth and deposit
1.	Whole of reef and sand flats adjacent to base camp, N. W. end of Gillett Cay (21° 43'S:152° 25'E)
2.	Reef crest at Price Cay, approximately 3 miles S.E. of Gillett Cay
3.	Dredgings from coral sand, 5m, lagoon of Gillett Cay, about 1 mile E. of cay*
4.	Dredgings from 36.5m, off Gillett Cay adjacent to Station 3*
5.	Dredgings from 27.5-36.5 m, off Gillett Cay, in vicinity of anchorage*
6.	Dredgings from 64-73 m, off Gillett Cay, approximately 2 miles N.E. of anchorage*
7.	Beach at Thomas Cay, approximately 8 miles N.W. of Gillett Cay
8.	Beach and adjacent reef of Capre Cay (22° 09'S:152° 25'E) including shallow dead-coral area close to cay, reef-flat and reef-crest

*dredgings taken with either a metre triangle dredge or a large wire-mesh dredge.