Nine New Deep-water Species of Echinodermata from Norfolk Island and Wanganella Bank, northeastern Tasman Sea, with a Checklist of the Echinoderm Fauna

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Nine new species comprising 3 holothurians, 2 echinoids, 3 asteroids and 1 crinoid are described from the deep waters surrounding Norfolk Island and Wanganella Bank, northeastern Tasman Sea. A checklist of the echinoderm fauna shows at least 123 species are now known for that region, which includes the nine new taxa and seven taxa identified only to the level of genus. Taxonomic notes are included in the checklist for the taxa *Bathyplotes punctatus* (Sluiter); *Holopneustes inflatus* Lütken in Agassiz; *Ophiothrix* (*Acanthophiothrix*) *lepidus* de Loriol; *Fromia polypora* H. L. Clark; *Coscinasterias muricata* Verrill; *Astrostole rodolphi* (Perrier); *Oxycomanthus plectrophorum* (H. L. Clark) and *Cenolia spanoschistum* (H. L. Clark).

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Introduction

Norfolk Island (29°S, 168°E) and Wanganella Bank (c. 32°32′S, 167°32′E) lie to the northwest of the northwest tip of New Zealand. A number of recent, published accounts describe, or include records of echinoderms from those regions (Pawson, 1965b; McKnight, 1967, 1968a,b, 1975, 1977; H. E. S. Clark, 1970, 1982; Baker, 1979, 1980; Rowe, 1977, 1985; Edgecombe and Bennett, 1983; Rowe and Albertson, 1987). During the course of an investigation of the systematic composition and zoogeographic relationships of the echinoderm fauna of New South Wales (Australia), Lord Howe Island and Norfolk Island (Tasman Sea), the author has examined echinoderm material held in the collections of the Australian Museum (AM), Museum of Victoria (MV), National Museum of New Zealand (NMNZ) and the collections of the New Zealand Oceanographic Institute (NZOI). This latter collection includes, particularly, a great deal of material from Norfolk Island and Wanganella Bank along the Norfolk Ridge. Previous publications have recorded nearly 70 species from those regions. The present study has revealed not only nearly double that number (123 species) can be recorded, but that 9 of those are species which are new to science and seven taxa are identified as far as genus. The purpose of this paper is to provide descriptions of the new species and present a preliminary, updated checklist of all the taxa now recognized. The checklist includes a citation of the reference recording the taxon from the vicinity of Norfolk Island or Wanganella Bank; a general distribution similarly with an appropriate reference and/or indication to 'this work' indicating the present author's view; depth range; brief taxonomic note for each of 8 species where a comment is required. New records from Norfolk Island or Wanganella Bank are denoted by an asterisk (*). For the purposes of this report an area delimited by the latitudes 28°-33°S and longitudes 167°-169°E is used to include records from waters surrounding both Norfolk Island (28°-30°S, 167°-169°E) and Wanganella Bank (>30°-33°S, 167°-169°E).

Systematic Account
Class HOLOTHURIOIDEA
Family Holothuriidae

Holothuria (*Vaneyothuria*) *uncia* n. sp.
Fig. 1**A**-**D**

Diagnosis: A species in the subgenus *Vaneyothuria* which is distinctively coloured uniformly cream with a chocolate brown ring around each tube-foot and with the rim of the disc of the 3-dimensional table spicules smooth.

Material examined: Holotype, AM J21696, 29°24.8′S, 168°10′E, off Norfolk Island, 342-360 m (NZOI stn I91).

Description: The contracted holotype is about 135mm long and about 57mm wide at the middle of the body. There are 17 tentacles. The tube feet are in three bands along the ventral ambulacra. The ventral-lateral bands are formed by a zigzag alignment of the pairs of tube feet. The mid-ventral band comprises two discrete rows of paired tube feet, the rows spaced about 6-8mm apart. Dorsally the tube feet are more or less scattered, without linear arrangement. The body wall is relatively thin. The calcareous ring is stout and not unusual (Fig. 1**A**). Tentacle ampullae are present. The gonad comprises a large bunch of branched and unbranched tubules on the left hand side of the dorsal mesentery. It lies about 20mm from the anterior end of the body, and the tubules are up to 60mm long. The respiratory trees are not unusual. The gut is full of sand.

Spicules of the tentacles comprise curved spinous rods. The largest rods, from the tentacle stalk, measure up to about 480 μm long x about 50 μm wide. The smallest rods, from the tentacle branches, measure 50-150 μm x 5-7.5 μm (Fig. 1**B**).

Spicules from the dorsal and ventral body walls comprise tables and buttons. The disc of the tables are squarish to irregularly rounded, smooth-rimmed, 90-105 μm in diameter and with a single ring of 8-10 holes (Fig. 1**C**). The spire comprises four pillars, joined by one or two cross-beams. The crown of the spire is small (c. 20-25 μm diameter), with a variable number of small spines. The spire is between 70-90 μm in height. The buttons are usually smooth, irregular in outline and usually have three pairs of holes (Fig. 1**D**). Rarely one or two low knobs may occur along the midline. They measure between 52 μm long x 37 μm wide to 127 μm long x 97 μm wide, with the majority measuring 90 μm x 52 μm. Tables in the dorsal tube feet range up to 112 μm disc diameter, with up to 16 small, peripheral holes, either in a single ring or with some holes offset into a partial, second ring. Buttons are present, but in addition curved and straight supporting rods occur. An irregular end-plate is also present, c. 180 μm diameter. Spicules in the ventral tube feet are often of similar type but the tables range in size from disc diameter 50-90 μm and spires from 40-55 μm in height. The buttons are often elongate (165 μm long x 52 μm wide), with up to 6 pairs of holes. Supporting rods are similar to those in the dorsal appendages and the end-plates range up to 400 μm diameter.

Colour: Uniformly cream, with a narrow basal ring around the ventral tube feet and a much broader (3-4mm diameter) ring of chococolate brown around the dorsal tube feet.

Etymology: Named for *Uncia*, the snow-leopard.

Remarks: This species (*uncia*) is clearly related to *H.* (*V.*) *integra* Koehler and Vaney, of which *H. neozaelanica* Mortensen is a synonym (Rowe, 1969; Cherbonnier and Feral, 1981) and which is distributed from the Bay of Bengal, off Port Hedland, northwest Australia, the Philippines and New Zealand. The spiny-disced tables of *integra* easily separate the two species. Also, the colour of *uncia* is distinctive among known deeper-water species of *Holothuria*.

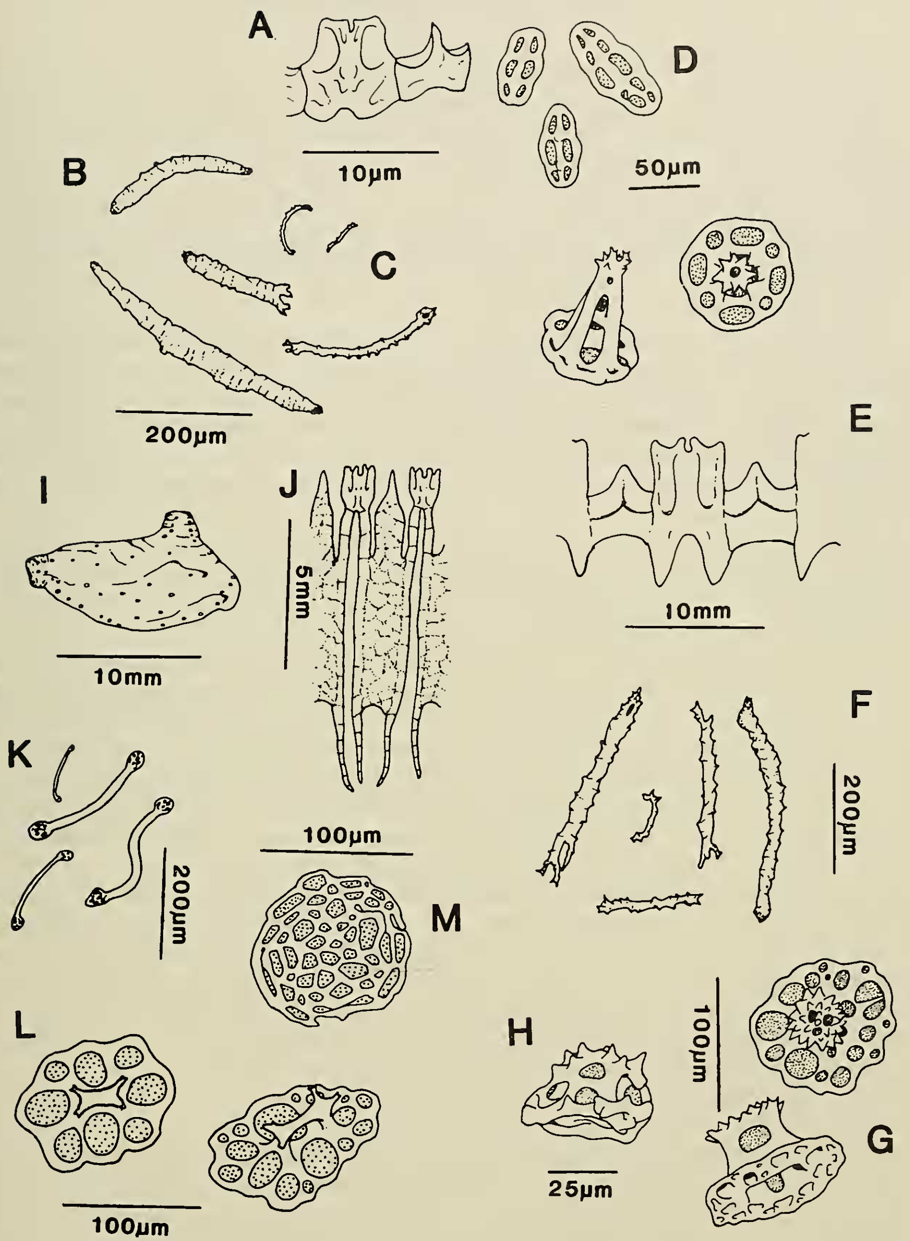

Fig. 1. **A-D** *Holothuria (Vaneyothuria) uncia* n. sp. (holotype AMJ21696), **A** = calcareous ring, interradial and radial plate, **B** = rods from tentacle, **C** = tables from body wall, **D** = buttons from body wall; **E-H** *Mesothuria (Penichrothuria) norfolkensis* n. sp. (holotype AMJ21697), **E** = calcareous ring, **F** = rods from tentacle, **G** = tables from body wall, **H** = 'reduced' table from tube-foot; **I-M** *Neothyonidium parvipedum* n. sp. (holotype, AMJ21698), **I** = lateral view of left side of holotype, **J** = calcareous ring, **K** = rods from tentacle, **L** = tables from body wall, **M** = end plate from tube foot.

Family Synallactidae

Mesothuria (*Penichrothuria*) *norfolkensis* n. sp.
Fig. 1**E-H**

Diagnosis: A species in the subgenus *Penichrothuria* which is uniformly creamy-grey in colour; tube feet are scattered over the body but most prominent along the ventral-lateral ambulacra; reduced tables few; normal tables with 4 pillars which are crowned with ring of numerous small spines.

Material examined: Holotype, AM J21697, 28°57.9′S, 167°45.5′E, off Norfolk Island, 392-423m (NZOI stn P35).

Description: The holotype measures about 165mm in length and about 67.5mm in width. It has 17 tentacles. The tube feet are scattered over the body, but are most prominent along the ventral-lateral ambulacra.

There are no tentacle ampullae. The polian vesicle is single. The madreporite lies to the right hand side of the dorsal mesentery. The gonad is a single tuft on the left hand side of the dorsal mesentery. It comprises some 25 tubules, each ending in a number of bifid lobes giving the gonad the appearance of a bunch of grapes. The water vascular ring is separated from the posterior end of the calcareous ring by about 15mm. The gut is packed with fine sand. The calcareous ring is stout, with radial plates deeply notched posteriorly (Fig. 1**E**).

Spicules from the tentacles comprise more or less straight, or slightly curved, spiny rods. The largest, from the stem, range in length and width up to about 400 μm x 75 μm, respectively. The smallest rods occur in the branches of the tentacles and range between about 60-120 μm in length (Fig. 1**F**).

Spicules from the body wall comprise tables only. Supporting rods and perforated disc plates are additionally present in the tube feet. Rarely in the tube feet are there small, reduced tables. The tables of the dorsal body wall have a disc diameter of 65-130 μm (Fig. 1**G**). There is either a single peripheral ring of 8-10 holes or an inner ring of 8 larger holes alternating with a partial or complete outer ring of 4-10 holes. The spire comprises four pillars with one cross beam. The spires are 52-75 μm high and crowned with a ring of numerous small spines. The tables of the ventral body wall are slightly smaller, with disc diameter up to about 112 μm. The tables of the dorsal tube feet are smaller with disc diameters ranging from 50-90 μm and spires up to 52 μm high. Otherwise, the tables have similar appearance to those of the body wall. The supporting rods are curved, perforated terminally and either side centrally. They are up to 187 μm long. The end plates are up to 300 μm in diameter. Small, irregular, reduced tables are present, but very few in number (Fig. 1**H**). Spicules of the ventral and ventral-lateral tube feet are similar, in all respects, to those of the dorsal tube feet, except that the end plate of the ventral-lateral tube feet have a diameter up to 550 μm.

Colour: Uniformly creamy-grey.

Etymology: Named for the locality of discovery, Norfolk Island.

Remarks: The form of the tables, with a complete ring of numerous small spines at the apex of the spire easily separates this species from all others, including *M.* (*P.*) *verrilli* (Theel) and *M.* (*P.*) *carnosa* Fisher, in the subgenus *Penichrothuria*. Were it not for the occurrence of 'reduced' tables, albeit few, in the tube feet, I would consider *M.* (*P.*) *norfolkensis* closely related to *M.* (*Allantis*) *intestinalis* (Ascanius), though separable from it on the shape of the normal tables (the spire is more slender in *intestinalis*). Heding (1942) is quite emphatic that the absence of 'reduced' tables gives a clear limit to the subgenus *Allantis* in which he placed *intestinalis*. Because of the apparent rarity of the 'reduced' tables in *M.* (*P.*) *norfolkensis*, a fresh assessment of this character would be usefully undertaken. This is particularly relevant because, in their rarity, these tables can easily be overlooked. It is on this somewhat shaky character alone that *norfolkensis* is subgenerically separated from its apparent nearest relative, *intestinalis.*

Family Phyllophoridae

Neothyonidium parvipedum n. sp.
Fig. 1I-M

Diagnosis: A species of *Neothyonidium* with a caudal process, small tube feet in double or irregular quadruple rows on the ventral ambulacra, more or less scattered dorsally; calcareous ring tubular, polyplacous, radials with very long posterior processes, interradials almost as long as the processes of the radials; two-pillared tables in body wall.
Material examined: Holotype, AM J21698, 32°36.32'S, 167°30.7'E, Wanganella Bank, 126m (NZOI stn P4).
Description: The contracted holotype is about 15.25mm long and about 6mm wide at mid body. The body is bluntly tapered anteriorly, but narrowing to a distinct caudal process (tail) posteriorly. The tail is dorsally directed, about 2.5mm from the ventral, backward projection of the body (Fig. 1I). The tube feet are small, in double rows in the ambulacra anteriorly and posteriorly. Mid-ventrally the tube feet are widely spaced in somewhat irregular rows with 4 rows of tube feet in each ambulacrum. Dorsally the podia are fewer in number and without apparent regular arrangement.

There are 20 tentacles, 5 pairs of larger alternating with 5 pairs of small tentacles. The calcareous ring is polyplacous, massive, tubular, about 13.25mm long. The radial plates are notched anteriorly, and have very long posterior processes. The interradial plates are pointed anteriorly and long posteriorly, extending to within about 3mm of the end of the ring. The interradials do not have posterior processes (Fig. 1J). The polian vesicle and madreporite are each single. The form of the gonad is difficult to determine but appears branched. It is preserved in a fused condition.

Spicules of the tentacles comprise smooth, straight, curved, S-shaped or, rarely, X-shaped rods (Fig. 1K). The rods are terminally expanded and perforated. They range in size from 75 μm long x 3.5 μm wide to 240 μm long x 17 μm wide.

Spicules in the introvert comprise two-pillared tables. The disc is irregularly oval to squarish. It has 4 large central holes surrounded by up to about 26-30 smaller holes in one or two alternate rings. The disc reaches a maximum diameter of 112 μm. The spire measures up to 75 μm in height, has a single cross-beam and each of the two terminally divergent pillars bears 2-3 spines at the tip.

Spicules in the body wall comprise scattered, two-pillared tables (Fig. 1L). The disc of the tables range from 90 μm x 75 μm to 112 μm x 105 μm. The disc comprises 4 large, alternating with 4 small peripheral holes. Rarely, an outer, incomplete third row of 3-4 smaller holes is present. The spire comprises two pillars joined by a cross-beam. The tips of the pillars diverge and each is usually minutely bifid. The spires range from 40-60 μm in height.

There are only end plates in the tube feet and these range in diameter from 75 μm (anteriorly and posteriorly) to 100 μm (mid-ventrally) (Fig. 1M).
Colour: Uniformly greyish-white.
Etymology: Named for its small tube feet.
Remarks: This species is most closely related to *N. hawaiiense* (Fisher). It differs from *hawaiiense* in possessing a caudal process, in the slightly smaller disc plates from the tube feet, in possessing rods in the tentacles, and in the smaller number of perforations in the discs of the tables in the introvert. It is possible that *parvipedum* will be found to be conspecific with *hawaiiense*, but insufficient material does not permit such a conclusion at this time. I am not convinced by Heding and Panning's (1954) synonymy of Fisher's

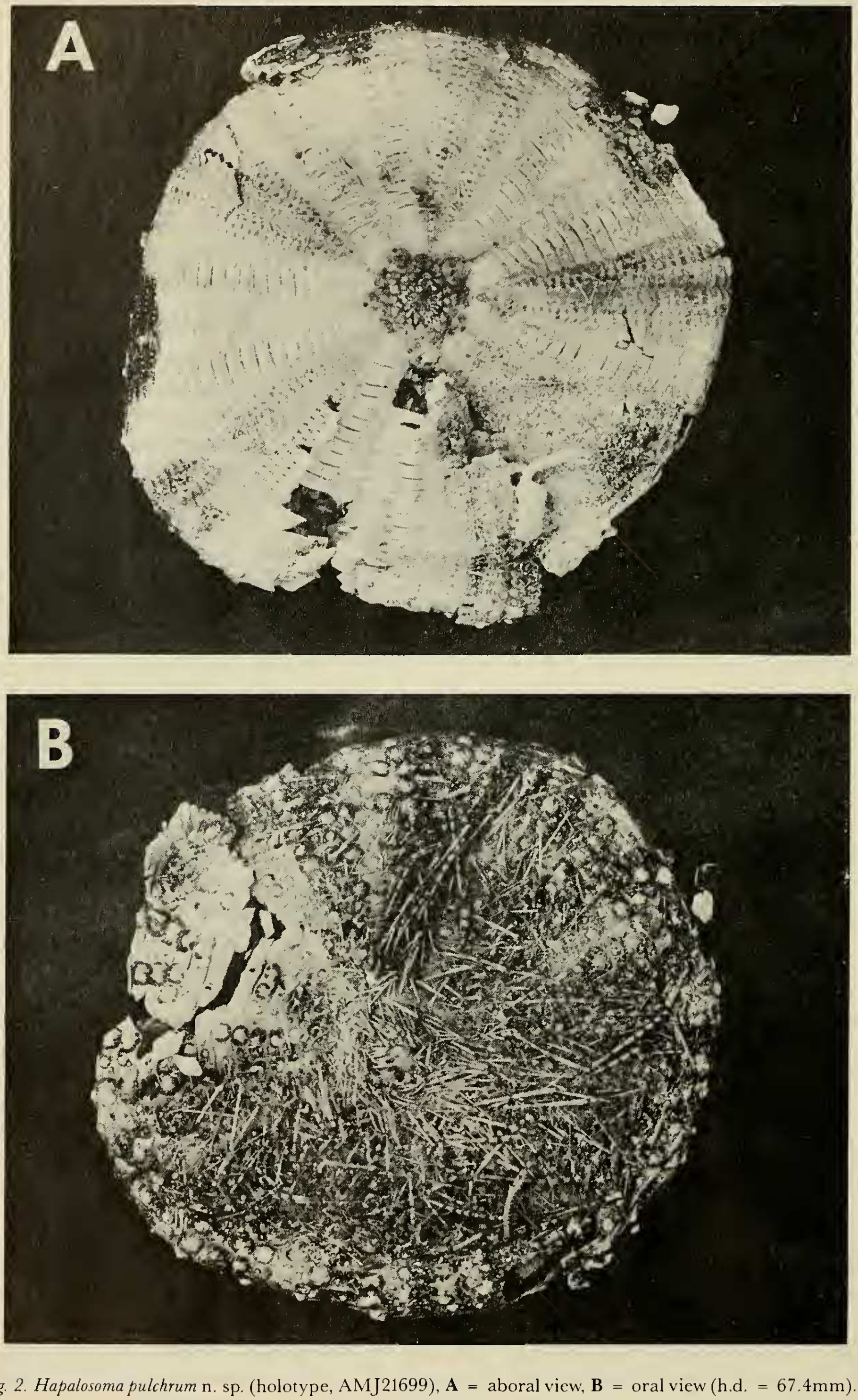

Fig. 2. Hapalosoma pulchrum n. sp. (holotype, AMJ21699), **A** = aboral view, **B** = oral view (h.d. = 67.4mm).

(1907) second Hawaiian species *N. alexandri* with *hawaiiense*. There appears to be as close a relationship between *alexandri* and *N. armatum* Pawson, 1965c, from New Zealand as between *hawaiiense* and *parvipedum*.

Class ECHINOIDEA
Family Echinothuriidae

Hapalosoma pulchrum n. sp.
Figs. 2**A**-**B**, 3**A**-**B**

Diagnosis: A species of *Hapalosoma* lacking aboral primary tubercles.
Material examined: Holotype, AM J21699, 29°54.90′S, 44°.80′E, off Norfolk Island, 130-301m (NZOI stn P26).
Description: The test is flattened, more or less circular in outline, with h.d. = 67.4mm (Fig. 2**A**-**B**).
Apical system: Measures 13mm in diameter. Ocular plates are insert, anvil-shaped, contiguous with the more or less kite-shaped genital plates. The genital pores are large, indicating the probability of a female. A number (8-12) of small tubercles occur on a discrete convexity of the plates adapically to the genital or ocular pores respectively. The madreporite is large and prominent, extending over most of the plate. Apical plates each bear 1 or 2 tubercles (Fig. 3**B**).
Ambulacra: There are 55 plates in each ambulacral column. Two demi-plates, each pierced by a pore pair, are associated with each ambulacral plate. The pore pair piercing the ambulacral plate lies adjacent to the interambulacral plate. The pore pairs form three columns. A large primary tubercle occurs on each second and/or third plate, internal to the pore pairs on the oral surface as far as the ambitus of the test. A smaller tubercle occurs on each plate between the outer demi-plate and pore-pair piercing the ambulacral plate. A second even smaller tubercle occurs regularly under the pore-pair piercing the ambulacral plate. The latter two tubercles form a regular double series to the ambitus in the oral side. Three or four additional smaller tubercles occur in a median transverse line across the plate. Above the ambitus there are no primary tubercles but a row of 6, diminishing to 0-1 adapically, small tubercles forming a median transverse row on the plates. Skin areas are very narrow, almost obliterated between the plates. The ambulacral width at the ambitus is 14.2-15.6mm (Fig. 3**A**).
Interambulacra: There are 37 plates in each interambulacral column. The width of the interambulacrum is about 27mm at the ambitus. A large primary tubercle occurs on each of the first 14 plates from the edge of the peristome to the ambitus on the oral side. These tubercles form a regular series adjacent to the ambulacra. One or two additional tubercles, one usually close to the mid interambulacral margin of the plate, also occur, but irregularly on these plates. Up to about twelve minute tubercles occur scattered between the large tubercles. Above the ambitus, from about the 15th plate from the peristome, there are no large primary tubercles. Instead, a median transverse row of small, but equisized tubercles occur on each plate, the number diminishing from 13-14 at the ambitus to 0-1 adjacent to the apical system. Areas of skin between the plates are minimal (Fig. 3**A**).

All tubercles are perforate and non-crenulate.

Peristome: The peristome measures approximately 14mm in diameter. The plates carry flattened but club-shaped spines and pedicellariae.
Pedicellariae: These are typical of the genus though there is a tendency for the shaft of the bifid-tipped, reduced dactylus pedicellariae to be perforated by up to three small holes.
Colour: Test is pale green, the green being more intense on the ambulacral plates. The

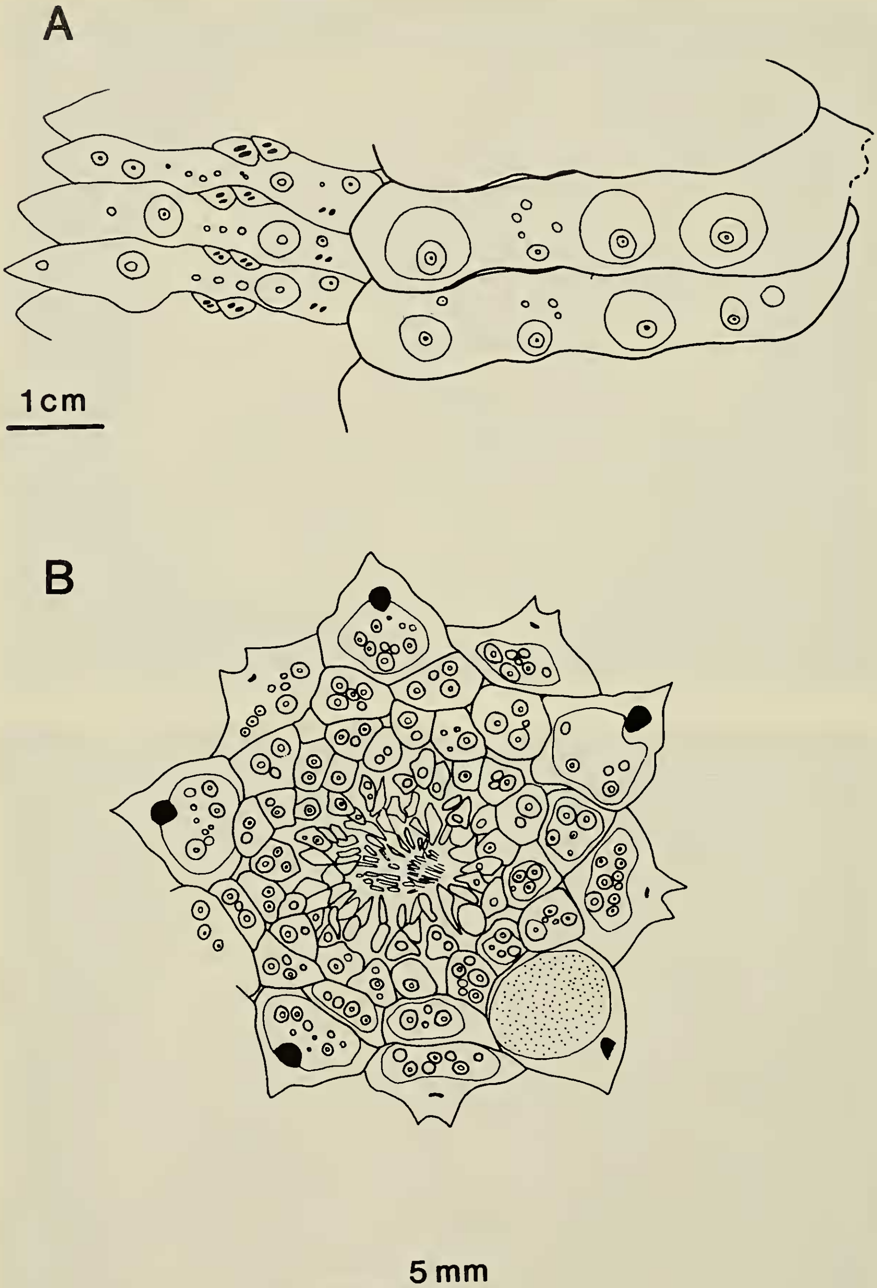

Fig. 3. Hapalosoma pulchrum n. sp. (holotype, AMJ21699), **A** = plates of ambulacrum and interambulacrum, **B** = apical system.

apical system is purplish. A wide purplish longitudinal band occurs in each ambulacral and interambulacral area orally, extending just above the ambitus as a purple patch.

The larger oral spines are very pale greenish with 5-6 narrow purplish bands. Remains of the white 'hoofs' indicate they are not prominent. The smallest secondary spines are uniformly whitish to pale green as are the abactinal spines.
Etymology: *pulcher* (Lat.) = beautiful, referring to its striking colour pattern.
Remarks: This species differs from its only congeners *H. pellucidum* (A. Agassiz) and *H. gemmiferum* Mortensen primarily by the absence of aboral primary tubercles and spines. The pierced blade of the dactylus pedicellariae and the colour pattern may also be useful differences separating the species. The genus *Hapalosoma* was last reviewed by Mortensen (1935).

Family Pedinidae

Caenopedina alanbakeri n. sp.
Figs. 4**A**-**B**, 5**A**-**D**

Diagnosis: A species of *Caenopedina* with relatively short primary spines (1.37 x h.d.); apical system 33% h.d.; peristome 25% h.d.; interambulacral plates with large primary tubercle and prominent secondary tubercle the remaining plate surface covered with small tubercles of 2-3 sizes; milled ring of spines 10% wider than the spine; test pale pink, primary and secondary spines uniformly deep pink basally, lighter towards the tip.
Material examined: Holotype AM J21700, 29°24.80′S, 168°13.20′E to 20°23.70′S, 168°13.80′E, off Norfolk Island, 570-578m (NZOI stn I92).
Description: The test is circular at the ambitus, flattened aborally and orally, the sides strongly arched (Fig. 4**A**-**B**). The h.d. = 41 mm, v.d. = 26 mm. There are 19 coronal plates.
Apical system: This measures 13.5mm in diameter (33% h.d.) (Fig. 5**A**). It is dicyclic with oculars all widely exsert. The male genital pores are small, horizontal, slit-like, with a channel extending from the pore to the lower border of the 8th interambulacral plate. The genital plate bearing the madreporite is not enlarged, the madreporite occupying a triangular, central portion of the septagonal plate. There are, more or less, two distinct groups of tubercles on each genital plate. A triangle of 10-11 tubercles occupies the periproctal edge of the plate while a further 9-10 tubercles form a more or less double transverse band across the plate, the remainder of the plate is bare (Fig. 5**A**). The oculars bear 5-6 small tubercles of which 4-5 form a transverse line straddling the ocular pore, the remaining tubercle occurring towards the inner edge of the plate. The periproct is covered by small plates, the anal aperture more or less centrally placed.
Ambulacra: The ambulacra measure 6.2mm in width at the ambitus (= 35.8% of interambulacra). Ambulacral plates are trigeminate, the pore pairs being in arcs of three on the oral surface from the peristome to the ambitus. Aborally, from about the ambitus to the apical system the pore arcs become more vertically aligned so that the pore pairs form a somewhat sinuous line. The middle component of each plate bears a conspicuous, perforate, non-crenulate, primary tubercle whose areole extends onto the plate components above and below it. These tubercles form a regular vertical series in each column, decreasing in size towards the apical system. Small secondary tubercles, of two sizes, occupy the remaining surface of the ambulacral plates (Fig. 5**B**).
Interambulacra: The interambulacra measure 17.3mm in width at the ambitus. The plates each bear a large primary tubercle more or less in the middle of each plate. The tubercles form a vertical series. The areoles are large and confluent between plates on the oral surface. On the aboral surface, above the ambitus the areoles are separated adapically by a simple row of small, secondary tubercles. A prominent, secondary tubercle occurs near the mid-interradial edge of each plate, forming a second vertical series below the ambitus but a more or less zigzag series above the ambitus. The remain-

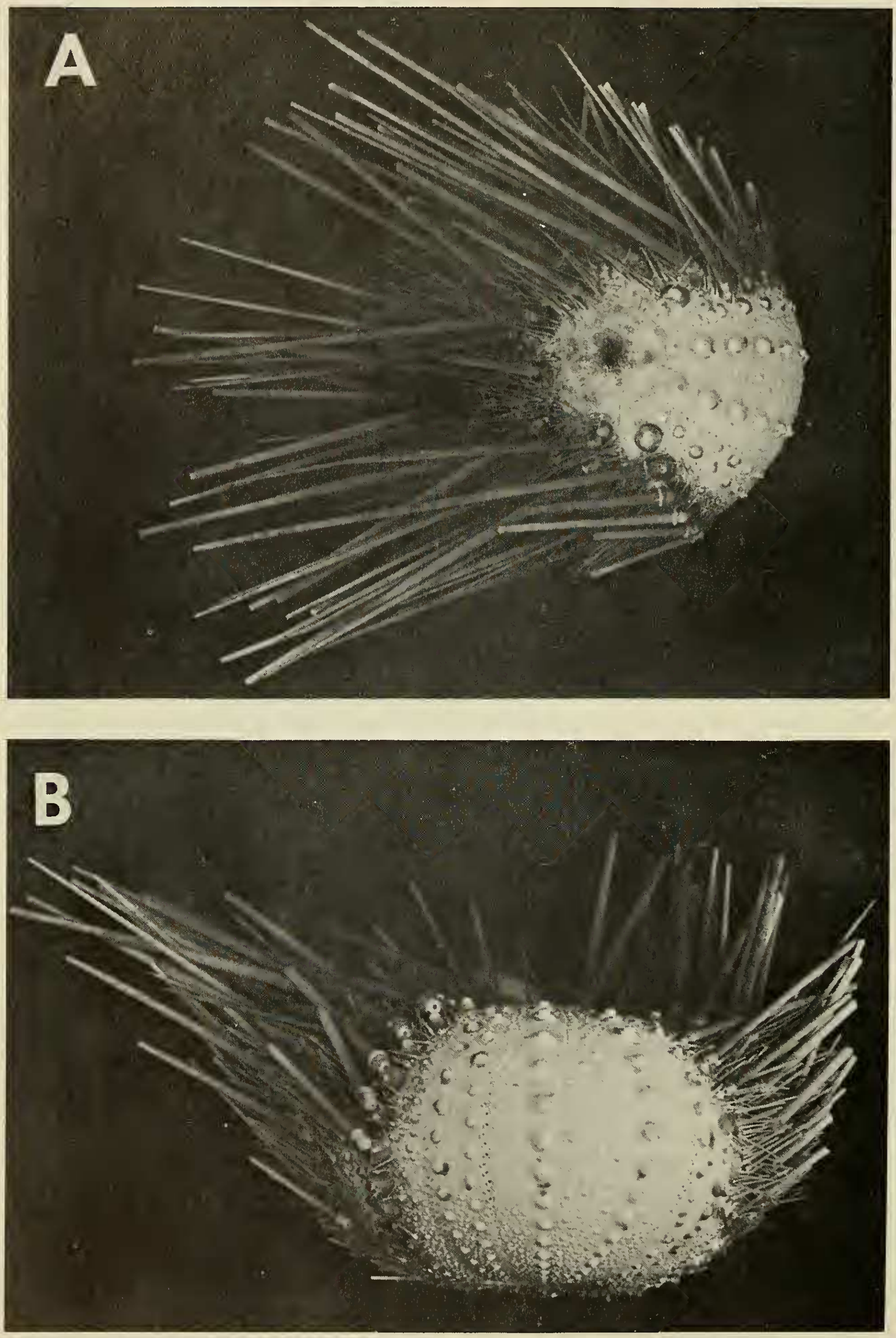

Fig. 4. Caenopedina alanbakeri n. sp. (holotype, AMJ21700), **A** = oblique aboral view, **B** = lateral view (h.d. = 41mm).

ing surface of each plate is crowded with smaller, secondary tubercles of 2-3 different sizes. All tubercles are perforate and non-crenulate (Fig. 5**B**).

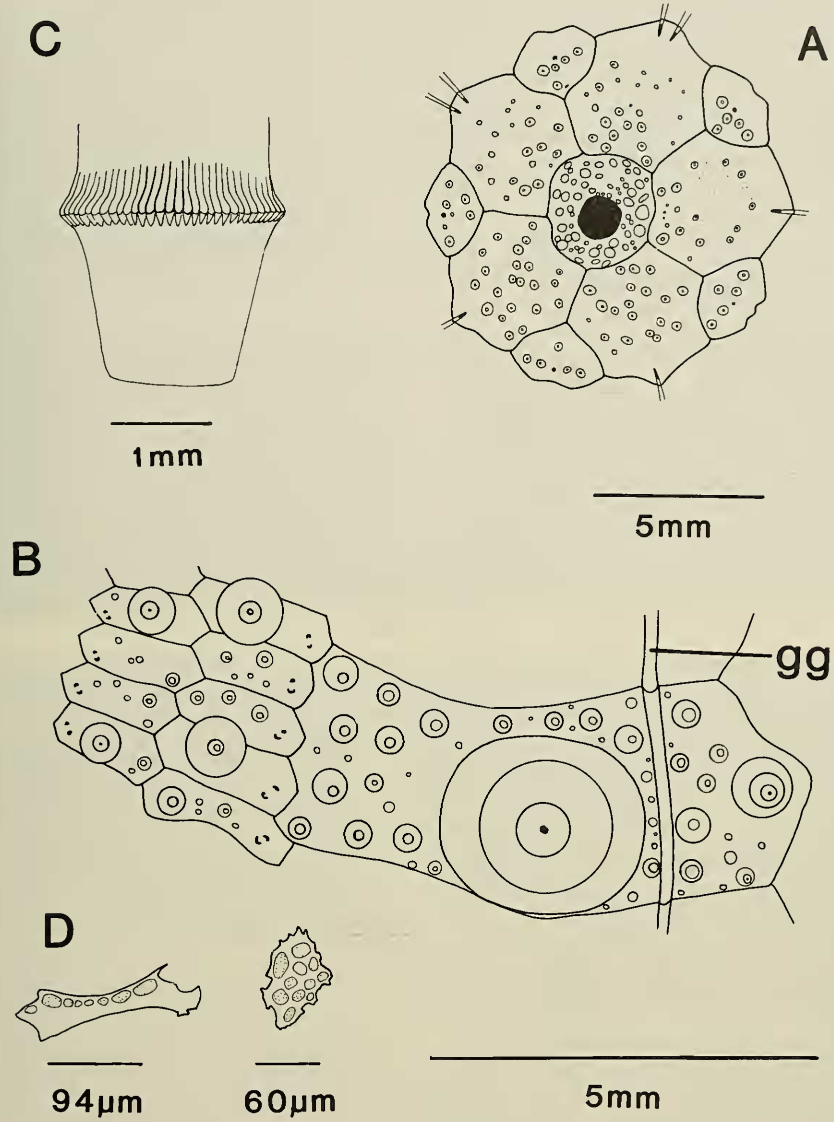

Fig. 5. Caenopedina alanbakeri n. sp. (holotype, AMJ21700), **A** = apical system, **B** = plates of ambulacrum and interambulacrum, **C** = milled ring of primary spine, **D** = spicules from tube-foot. (gg = genital groove).

Peristome: The peristome measures 10.3mm (+ 25% h.d.). It is finely plated as well as containing the conspicuous buccal plates which bear pedicellariae.
Spines: The longest spines are 56.4mm, slender, tapering, longitudinally striated with minute thorns. The milled ring is conspicuous but not widely produced so that it is only 10% wider than the spine (Fig. 5**C**). Secondary spines are similar to the primaries but much smaller, about 1/5-1/4 the length of the primaries.

Spicules: The tube feet contain spicules which are slightly curved, irregularly elongate, perforated plates or smooth rods with marginal perforations (Fig. 5**D**).
Pedicellariae: These do not appear unusual for the genus, or to be distinctive, though the ophicephalous pedicellariae are rare on the test of the holotype.
Colour: The dried test is uniformly a very pale pink (when cleaned with domestic bleach the test is white except for a persistent pink on the plates of the apical system and immediately adjacent coronal plates). The spines are not banded but are deeper pink basally, becoming paler along their length, the distal ⅓ to ½ of the spine being a pale yellowish/lime colour. The secondary spines are similarly coloured only even paler. The poison sacks of the globiferous pedicellariae are violet/purple. The tube feet are pale brown with the tip sienna brown.
Etymology: This distinctive species is named for Dr Alan N. Baker, National Museum of New Zealand, who has contributed significantly to ophiuroid and echinoid taxonomy in this geographical region.
Remarks: The genus *Caenopedina* A. Agassiz has been reviewed by Mortensen (1940). More recently two species have been described from New Zealand waters; *C. novaezealandiae* Pawson (1964) and *C. otagoensis* McKnight (1968c). *C. alanbakeri* is immediately distinguished from its geographically nearest congener *C. novaezealandiae* Pawson by the colour; the size of the milled ring of the primary spines; the relative sizes of the apical system and peristome to h.d.; the relative number of coronal plates and tuberculation of the plates. Although the primary spines are not banded, *C. otagoensis* McKnight is otherwise distinguished from *C. alanbakeri* on similar comparative features to those of *C. novaezealandiae*. Despite the fact that the primary spines are only 1.37 x h.d., their slender form and the test plate ornamentation immediately distinguish *C. alanbakeri* from either of the short-spined *C. pulchella* (A. Agassiz and H. L. Clark) or *C. superba* H. L. Clark. These features clearly also distinguish *C. alanbakeri* from all other congeners.

Class ASTEROIDEA
Family Astropectinidae

Tethyaster tangaroae n. sp.
Figs. 6**A**-**B**, 7**A**-**B**

Diagnosis: A species of *Tethyaster* which has stout tabulae (about twice as high as wide); actinal plates with 1-3 prominently elongate central spinelets; adambulacral plates and some actinal and oral plates usually bear a large, elongate bivalved pedicellaria.
Material examined: Holotype, AM J21701, 28°57.90′S, 167°45.50′E, off Norfolk Island, 392-423m (NZOI stn P35), 2 paratypes, NZOI, 28°54.60′S, 167°44.20′E, off Norfolk Island, 390-402m, (NZOI stn P27).
Description: The holotype measures R = 46.5mm, r = 11.3mm, br (at 2nd inferomarginals) = 10.8mm; R/r = 4.1, R/br = 4.3 (Fig. 6**A**-**B**). The arms are slender, tapering to a narrow tip which is occupied by a prominent, convex, longitudinally elongate terminal plate. The terminal plate has a bumpy surface when cleaned of the minute spinelets which cover it. The spinelets give the plate a shaggy, felt-like appearance. The abactinal plates have a six-lobed base and are tabulate. They reduce in height towards the tip of the arm. The tabulae are about twice as high as they are wide, somewhat waisted and of two sizes, mixed, which are arranged, more or less, in longiseries on the arms. There are thirteen series at the base of the arm, reducing to four series at the arm tip. It is possible to detect a carinal row of spaced, larger tabulae when the tabulae are cleaned of their spinelets. The centre of the tabulae is occupied by up to 25 short, blunt-tipped spinelets of mixed sizes, and the periphery by up to 25 slender spinelets.

The madreporite is at about ⅔r from the disc centre. It bears small spinelets on its

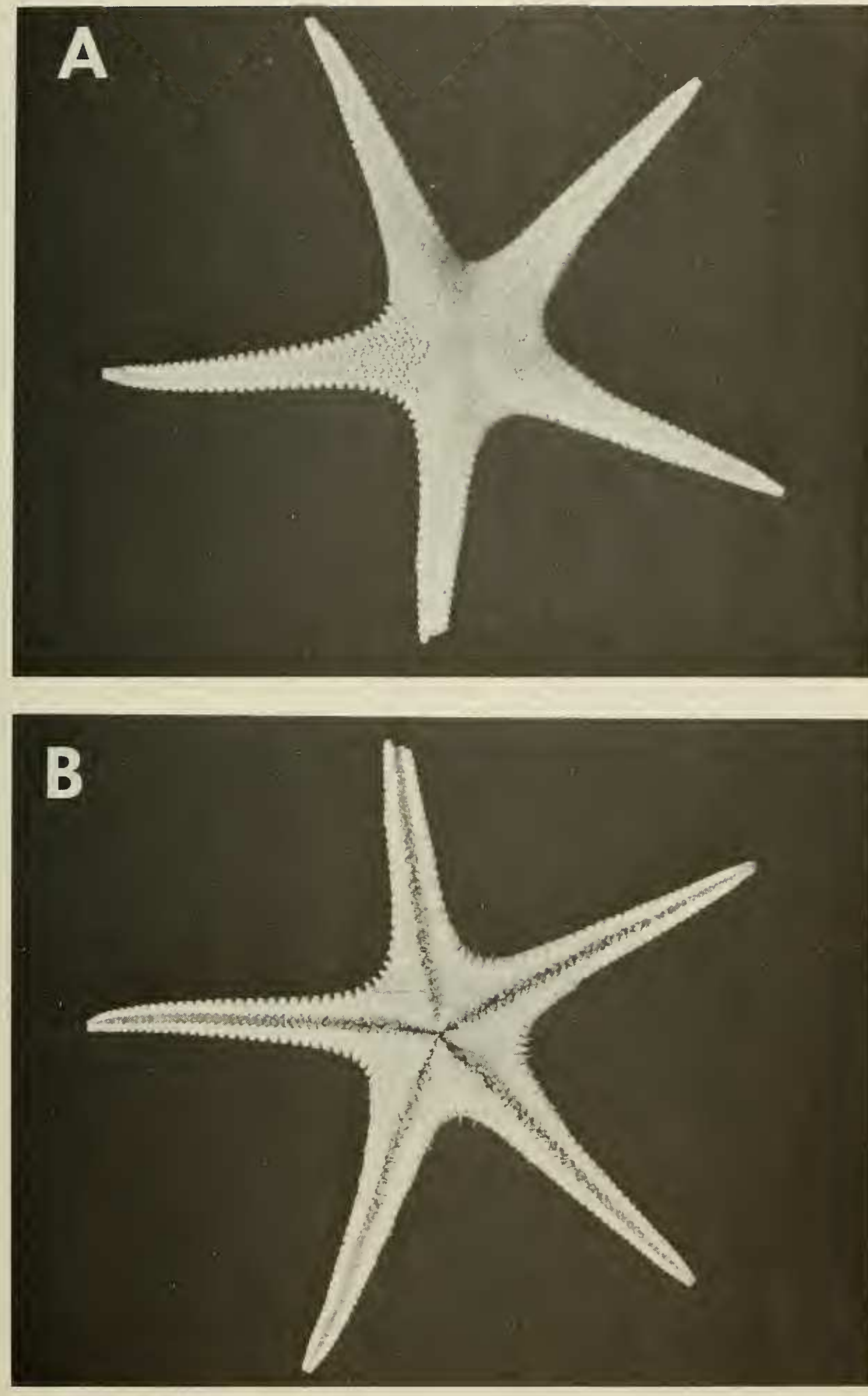

Fig. 6. Tethyaster tangaroae n. sp. (holotype, AMJ21701), **A** = aboral view, **B** = oral view (R = 46.5mm).

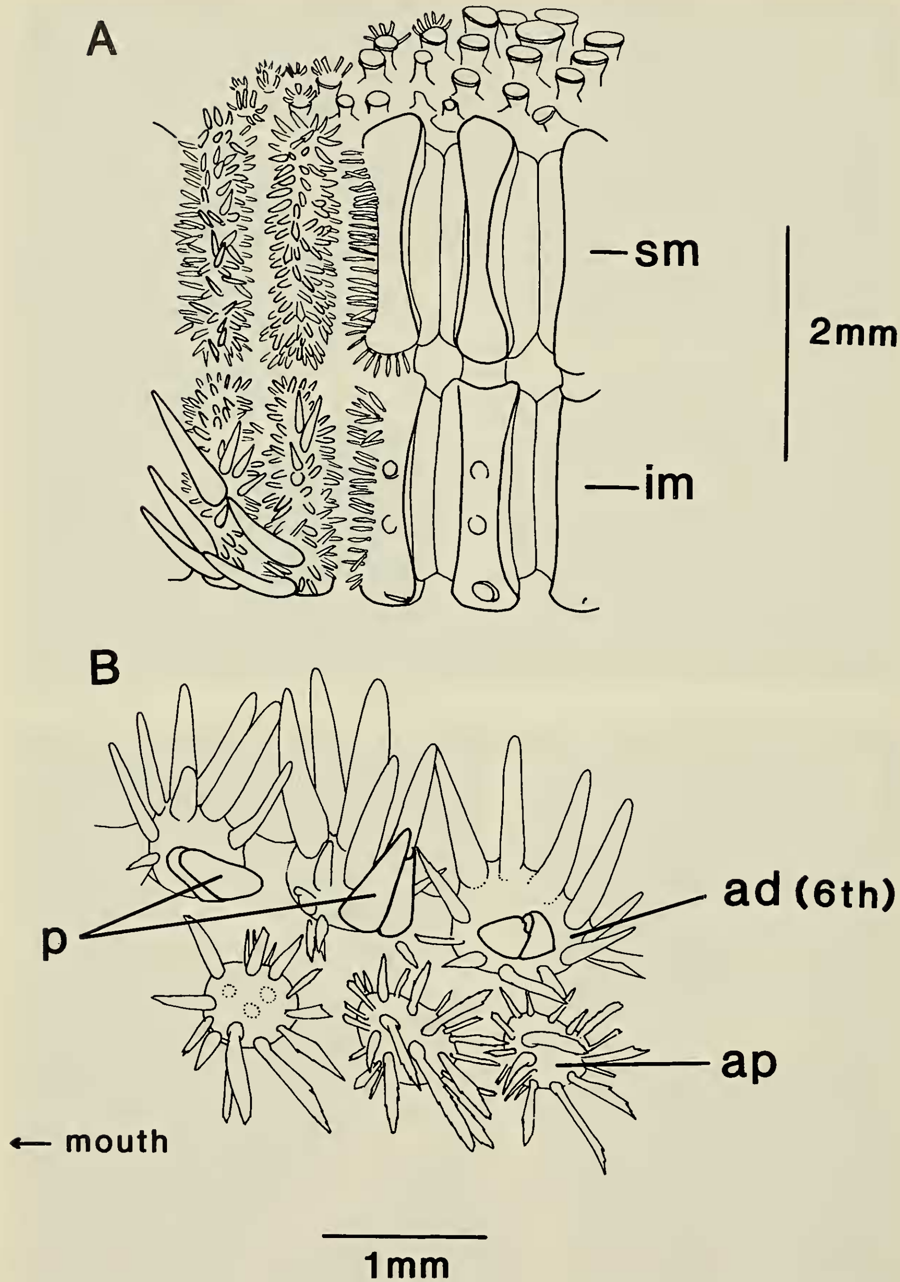

Fig. 7. Tethyaster tangaroae n. sp. (holotype, AMJ21701), **A**= = superomarginal (sm) and inferomarginal (im) plates in interradial arc, **B** = 4th-6th adambulacral plates (ad) and adjacent actinal plates (ap), showing spines and pedicellariae (p).

corrugated surface and is almost hidden by the spinelets of adjacent tabulae. The disc is more or less flat, though the radial regions, at the base of the arms, are slightly convex.

The papulae are single and occur between the tabulae over the whole abactinal surface, extending to the arm tips.

The supero- and inferomarginal plates are similar in size and shape. There are 34 superomarginals and 35 inferomarginals, the distalmost 2-3 inferomarginals being very small and extending under the terminal plate each side. The marginal plates are vertically elongate, with a raised, flat-topped, rectangular median ridge which leave deep, straight-sided fasciolar channels between successive ridges. The flat-topped surface of the ridges are covered with low bumps, each bump bearing a short, stout spinelet. On the superomarginal plates these spinelets become elongate towards the edge of the ridge where together with those on the adjacent plates the spinelets span and cover the fasciolar channels between. The inferomarginal plates bear a vertical series of 3, proximally, reducing to 1 distally, large flattened, acicular spines across the ridged surface. Additionally, smaller slender, but otherwise similar spinelets cover the remaining surface with fasciolar spinelets, similar to those on the superomarginal plates, at the periphery of the ridge (Fig. 7**A**).

The actinal surface is relatively small, with 4 rows of plates on each side and a supplementary row of three plates extending along the mid-interradial line between the oral plates and first inferomarginal plates (Fig. 6**B**). The first actinal row extends to about the 10th inferomarginal plate; the second row extends to about the 6th inferomarginal plate; the third row comprises 3 plates and the 4th is a single plate. The actinal plates have a central convexity which bears elongate spinelets, 1-3 central ones being more prominent, elongate, tapering spines. Several plates bear a large, elongate, bivalved pedicellaria, replacing one or more of the central spines.

The adambulacral plates are somewhat wedge-shaped from actinal aspect, thereby projecting, slightly, into the furrow. There are 3-5 furrow spines, the middle spine being the longer and it is compressed. The actinal surface of the plates bear 3-4 central, elongate spines, one or two of which are replaced by a single, large, bivalved pedicellaria on many plates. The first two adambulacral plates each bear 2-3 such pedicellariae. The periphery of the plates bear a number of smaller, slender spinelets (Fig. 7**B**).

The oral plates bear 6-7 furrow spines. The two adjacent apical spines are so closely appressed as to appear to be fused together. Along the median crest between the adjacent oral plates is a row of 10-11 elongate spines, the 3rd and 4th of which are replaced by a large bivalved pedicellaria on several of the plates.

Neither of the paratypes possess pedicellariae, otherwise they are similar in almost all other respects to the holotype. One paratype measures R = 34.6mm, r = 9.2mm, br = 7.6mm; R/r = 3.76, R/br = 4.6. It has 27 superomarginal and 30 inferomarginal plates. There are 3 actinal rows and 2-3 plates form the median interradial row. The second paratype measures R = 10.3mm, r = 4.2mm, br = 4.7mm; R/r = 2.45, R/br = 2.2. It has 14 superomarginal and 16 inferomarginal plates. The inferomarginal spines are hardly prominent. There are two actinal rows and 2 plates form the median interradial row.

Remarks: *T. tangaroae* differs from its geographically nearest neighbour *T. aulophora* (Fisher) principally by the stouter tabulae, form of the large bivalved pedicellariae, and spinulation of the actinal plates. *T. tangaroae* differs from the South African *T. pacei* (Mortensen) by the actinal spinulation and pedicellariae.

The discovery of a species of *Tethyaster* in the Tasman Sea is not an unexpected extension in range of this widespread genus which has been revised by A. M. and A. H. Clark (1954).

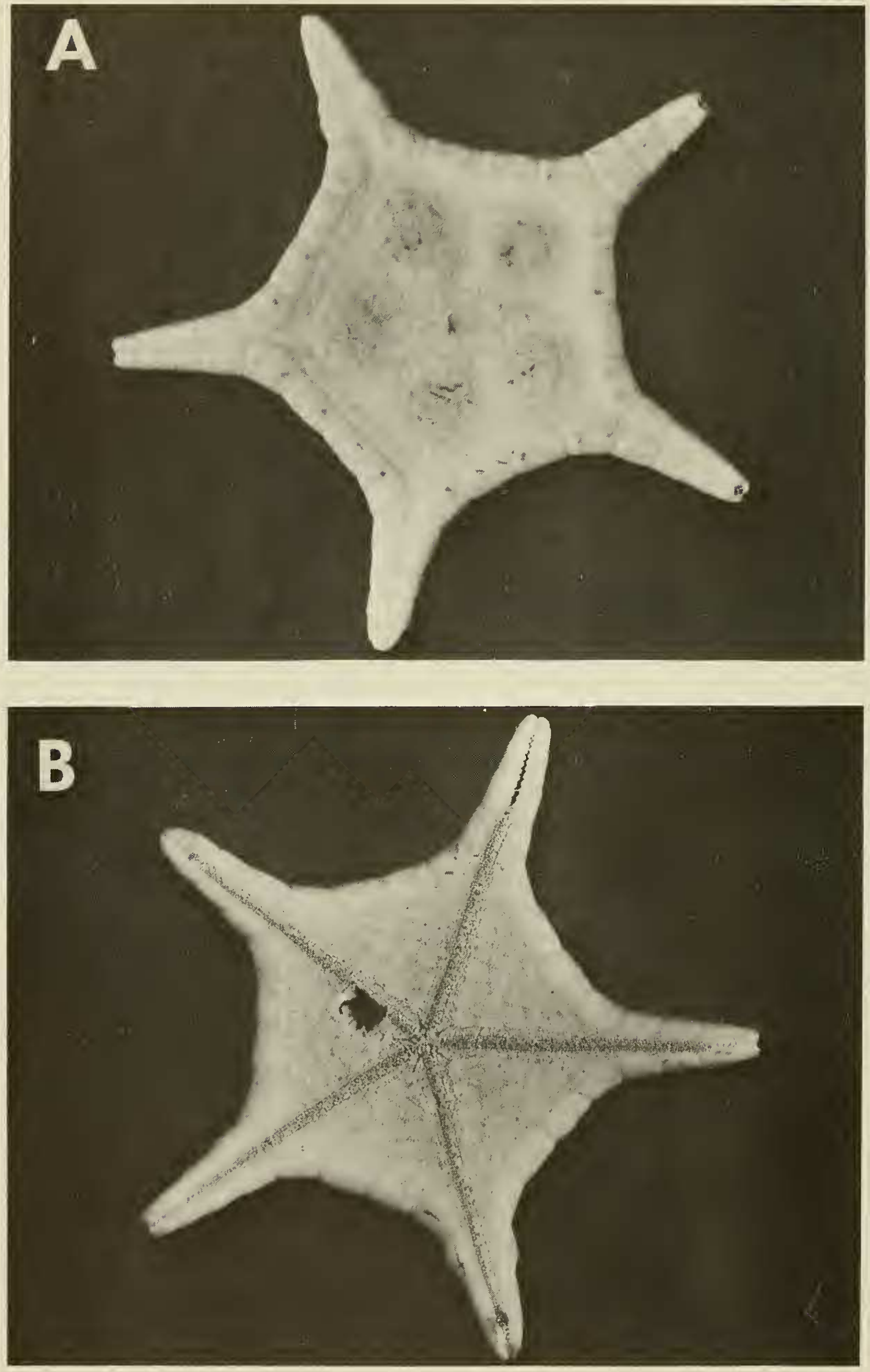

Fig. 8. Glyphodiscus mcknighti n. sp. (holotype, AMJ21702), **A** = aboral view, **B** = oral view (R = 23mm).

Family Goniasteridae

Glyphodiscus mcknighti
Figs. 8**A**-**B**, 9**A**-**B**

Diagnosis: A species of *Glyphodiscus* with smooth, flat abactinal plates, smooth marginal plates and few papulae which are restricted to the radii on the disc.
Material examined: Holotype, AM J21702, 28°42.30′S, 167°56.70′E, Norfolk Island, 475-450m (NZOI stn P46).
Description: The holotype measures R = 23mm, r = 11.5 mm, br = 4.2mm (at 2nd inferomarginals); R/r = 2.0, R/br = 5.5.

The abactinal area is pentagonal, slightly produced at the angles and sunken below the level of the superomarginal plates. The abactinal plates are smooth, flat, without crystal bodies. The plates are rounded-polygonal, the interradial plates being slightly larger than the radial plates. A row of narrow, transversely rectangular plates occurs adjacent to the superomarginals. A small, triangular madreporite occurs ⅓r from the centre of the disc (Fig. 8**A**).

The supero- and inferomarginal plates are similar in shape, size and number. They are block-like, smooth, longer than wide with a rounded dorsal-lateral or actinal-lateral edge respectively. There are 6 of each on each side of the disc and arm, the first 2 supero- and inferomarginals of adjacent radii respectively delimiting the pentagonal abactinal and actinal disc surfaces. The remaining 4 supero- and inferomarginals on each side of the arms unite across the arm along the median line. The terminal plate is small, with a convexity at its tip on either side of the actinal channel which houses the terminal tube foot. This channel is guarded by 3-4 minute granules.

The actinal plates are flat, smooth, rather transversely diamond-shaped. They form a regular pavement arrangement (Fig. 8**B**).

The abactinal, marginal and actinal plates are each surrounded by a single row of minute granules so that a double row of granules occurs between adjacent plates.

Papulae are restricted in each radius abactinally and are delimited as 5 rounded, convex areas each comprising about 10 plates.

Usually 1, occasionally 2, small spatulate pedicellariae occur at the edge of a number of actinal plates, also at the actinal edge of several of the inferomarginal plates (Fig. 9**A**). Pedicellariae are not present on the superomarginal or abactinal plates of this specimen.

The adambulacral plates bear five laterally compressed furrow spines (Fig. 9**B**), behind which stands a row of 3 enlarged (subambulacral) granules. The remaining actinal surface of the plate bears 2-3 rows each of 3-4 smaller wedge-shaped granules which merge in size with those surrounding the actinal plates (Fig. 9**A**).

The oral plates bear 7-8 furrow spines, 4-5 enlarged (suboral) granules and a triangular group of 8-10 wedge-shaped granules on the remaining actinal surface of the plate.
Etymology: Named for Mr D. McKnight of NZOI who has described much of the Tasman echinoderm fauna.
Remarks: I have placed this new species in the herein elevated subgenus *Glyphodiscus* Fisher on the grounds that the species characters are consistent with those outlined for the genus by Fisher (1917, 1919). I believe the smooth plates which lack glassy bumps (crystalline bodies), the complete ring of peripheral granules around all plates and the form of the adambulacral armature are quite reasonably sufficient to distinguish members of this genus from those in either *Iconaster* Sladen, *Lithosoma* Fisher or *Astroceramus* Fisher.

G. mcknighti is clearly distinguished from its only congener *G. perierctus* Fisher which has roughened superomarginal plates, tumid peripheral abactinal disc plates and papulae distributed over the disc. In respect of size and shape, the two species are very closely similar.

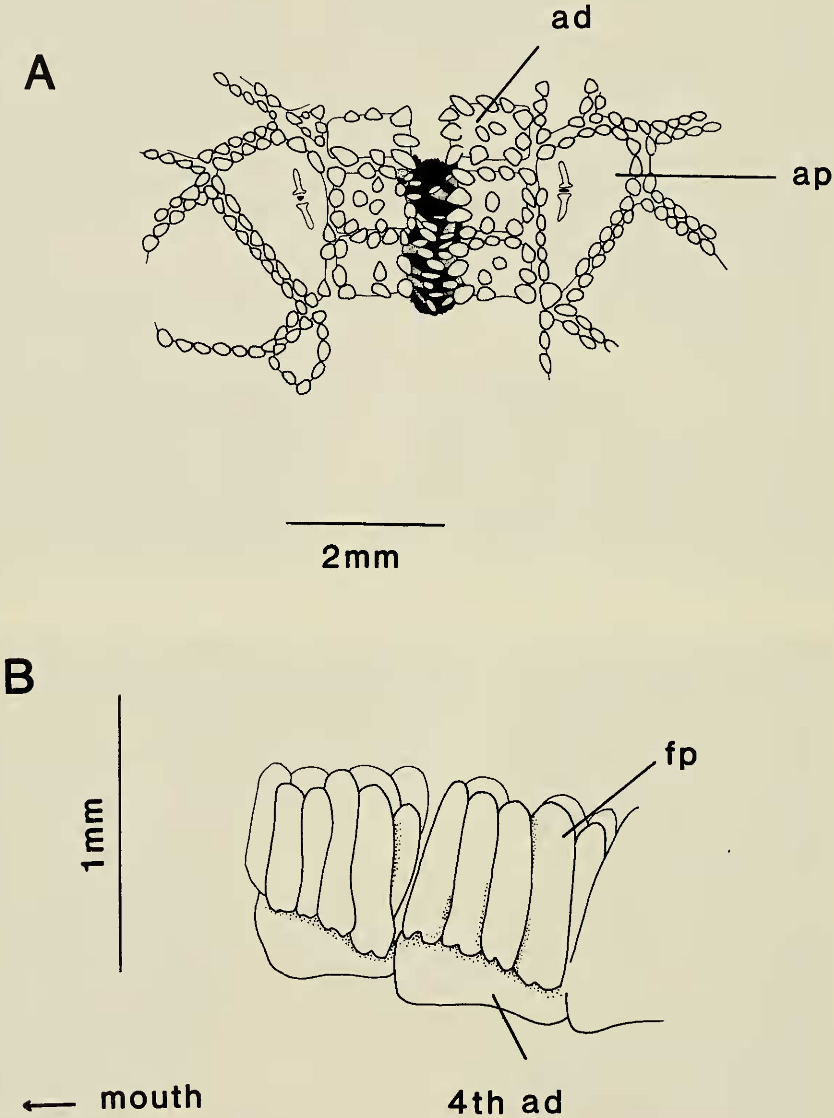

Fig. 9. Glyphodiscus mcknighti n. sp. (holotype, AMJ21702), **A** = spine and granule arrangement on adambulacral (ad) and adjacent actinal (ap) plates with pedicellariae, **B** = furrow spines (fp).

Family Brisingidae

Novodinia helenae
Figs. 10**A**-**B**, 11**A**-**C**

Diagnosis: A species of *Novodinia* with 12 arms, disc with papulae in groups of up to 10, single madreporite, membranous, unskeletonised genital region of arm, and single adambulacral spine.

Material examined: AM J21703, 29°20.20′S, 168°10.79′E, off Norfolk Island, 308m (NZOI, stn I94).

Description: The holotype has 12 rays; dd = 14mm, R = 75mm, br = 3.8mm (at base), 5.5-5.9mm (at widest part of genital expansions 12mm from base of ray), 3.0mm (at ½R); R/r = 10.7 (Fig. 10**A-B**).

The disc is circular, 3.7mm high, flattened abactinally. It is covered by overlapping scale-like, and convex abactinal plates which form an open reticulum in which groups of up to 10 (occasionally single) papulae occur. Sharply pointed spines (up to 1.2mm), wreathed almost to their tips with crossed pedicellariae (Fig. 11**C**) occur on a number of the convex plates. These spines may stand singly, in pairs or triplets. In the latter two cases the spines are united by a web across which the pedicellariae span.

The genital region, at the base of the arm, is covered by a thin, unskeletonised membrane. This region is crossed by 4-5 complete costae. The costae comprise the marginal plate each side of the arm, linked more or less regularly by 7-10 rod-shaped abactinal plates. Costae 1 and 2 may be irregularly linked by a few abactinal plates extending mid-dorsally between them. Most of the plates of the costae, except for the marginal plates of the first two costae, bear a single, sharply pointed, slender spine. Most of these spines are encased in a gland-like sheath of pedicellariae. Beyond the 4th-5th costae the spine bearing marginal plates and abactinal plates form incomplete costae, that is to say a marginal and 4-5 small abactinal plates project dorsalwards along the side of the arm on each side but do not link over the abactinal surface. The link is made instead by a wide band of crossed pedicellariae. The abactinal surface of the arm is then covered by a very thin membrane for the rest of the length of the arm. Abactinally, between each of the incomplete costae a rounded patch of pedicellariae also occurs along the arms. The incomplete costae occur opposite every 4th-5th adambulacral plate along the arm (Fig. 11**A**).

The adambulacral plates are block-like, wider than long and each bears a large, cylindrical spine (2.5mm) which at least for the length of the genital area are flared into a bi-quadrifid tip. Beyond the genital area these spines are slender and pointed. These spines bear numerous pedicellariae, but these are confined to the outer surface and do not ensheath the spines. The first adambulacral plate of each arm is fused across the interradial line to its adjacent neighbour. However the first two adambulacral plates on each side of each arm are united by a syzygy. Thereafter the plates are united by muscle blocks, the interstices between each successive pair of adambulacral plates being half the length of the plates themselves.

The actinosome is 8mm in diameter and the mouth is 3.6mm wide. The peristome is thin but translucent. The oral plates are as usual for the genus, with lateral processes meeting mid-radially. In well-developed oral angles each plate bears 5 spines in a fan-shaped, marginal arrangement. The innermost spine is usually very small, rarely is it long and bearing pedicellariae. The second spine is always long and pointed and bears pedicellariae. The remaining 3 spines are small, non-pedicellariae bearing and decrease in size towards the furrow. Where arms are being regenerated, the mouth angle plates bear fewer spines (3-4) of which the elongate pedicellariae bearing spine is in the apical position. A small additional spine can be seen to develop in the interradial side of this spine in angles with more advanced regeneration. There are no spines on the actinal surface of the oral plates. The furrow margin of each oral plate is excavate to accommodate the first pair of tube feet (Fig. 11**B**).

The madreporite (1.2mm diameter) is small, subtuberculate, coarsely furrowed.

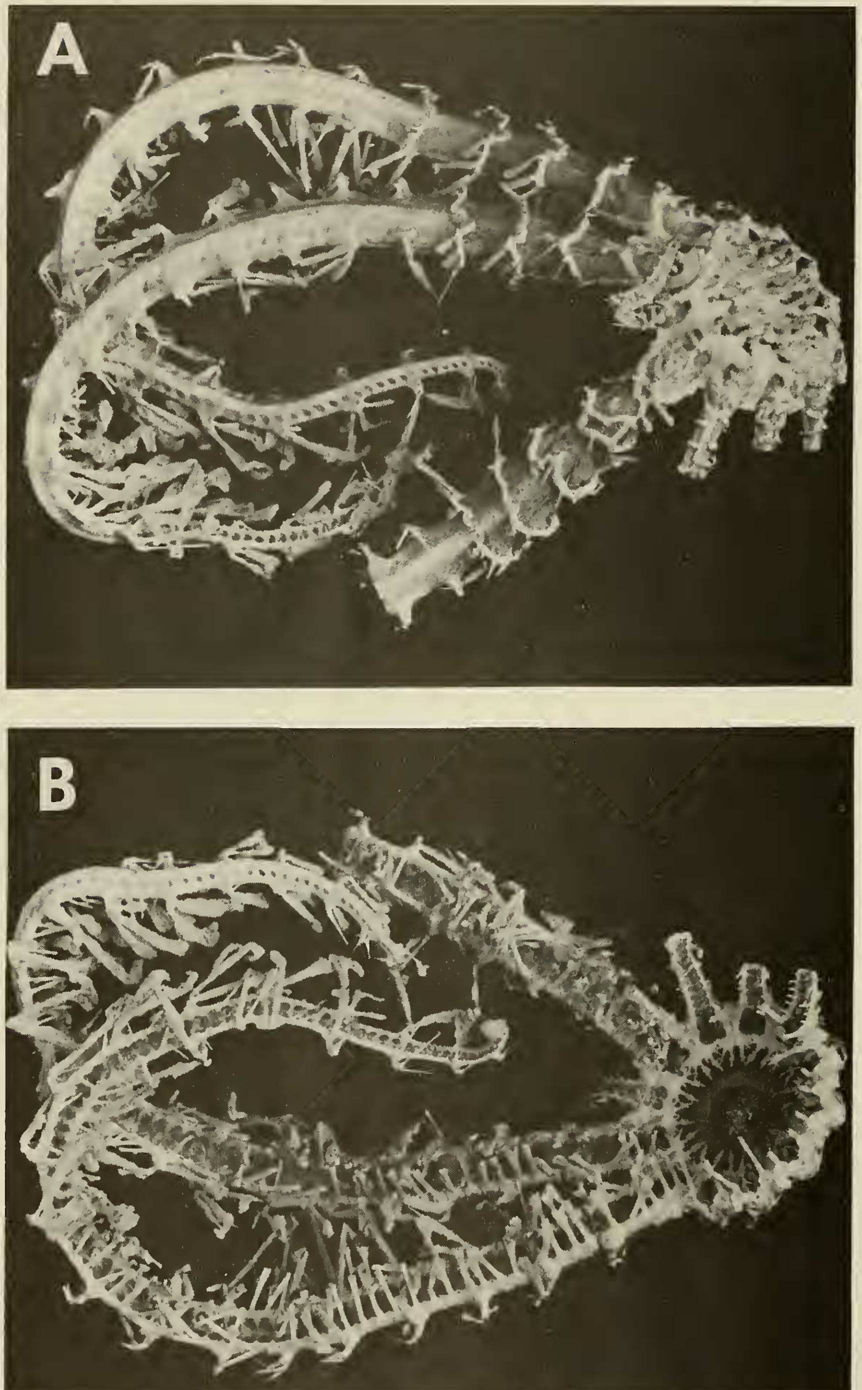

Fig. 10. Novodinia helenae n. sp. (holotype, AMJ21703), **A** = aboral view, **B** = oral view (dd = 14mm, R = 75 mm).

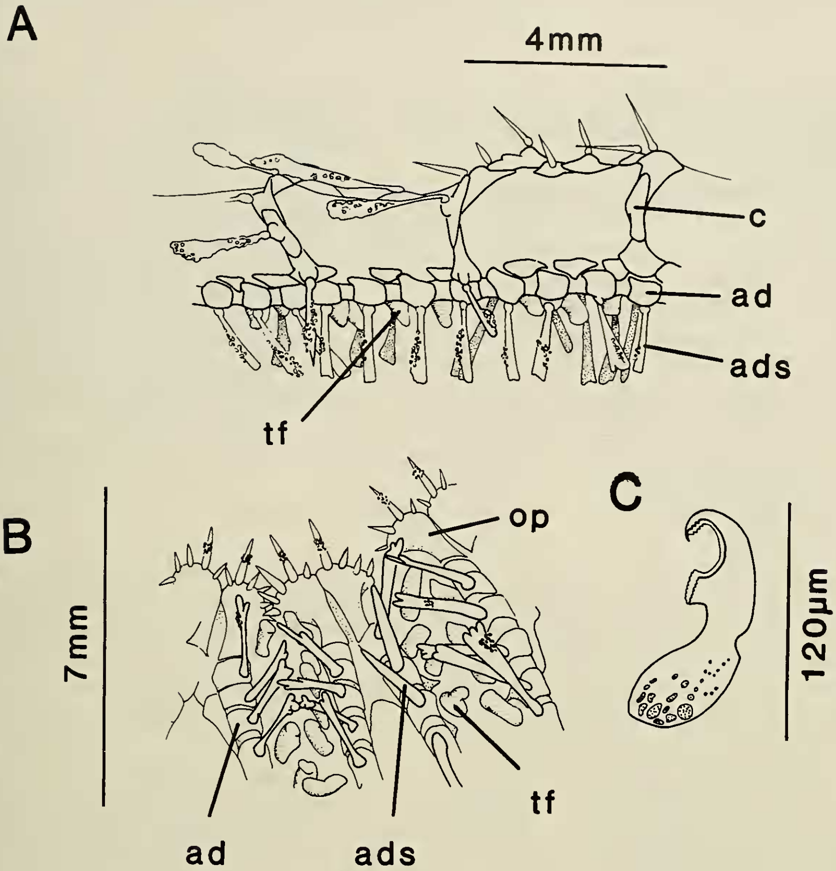

Fig. 11. Novodinia helenae n. sp. (holotype, AMJ21703), **A** = costae (c) in genital region of arm, **B** = oral plates (op) and arm bases with spine arrangements, **C** = value of crossed pedicellaria (ad = adambulacral plate; ads = adambulacral spine; tf = tube-feet).

Etymology: Named for Dr Helen E. S. Rotman (nee Clark) who has contributed to our knowledge of Tasman and Antarctic asteroids.

Remarks: The new species clearly belongs in the genus *Novodinia* Dartnall et al., as most recently redefined by Downey (1986). Only two species of *Novodinia* are recorded from the Tasman/New Zealand region. *N. australis* (H. L. Clark), from southeastern Australian waters and *N. novaezealandiae* (H. E. S. Clark), from off the Chatham Islands, east of New Zealand. *N. helenae* is immediately distinguished from each of these species by a number of characters: firstly, low arm number (12) as opposed to 14-16 (*australis*) or 18 (*novaezealandiae*); secondly, abactinal skeletal arrangement of the disc with groups of papulae (in each of *australis* and *novaezealandiae* the skeletal network is close and papulae occur singly); thirdly, the genital area of the arm is membraneous in *N. helenae* but plated in the other two species. The number of madreporites (1 in *helenae* but 4 in *australis*) and the number of adambulacral spines (1 in *helenae* but 3-4 spines in *novaezealandiae*) are also features of distinction. Arm number and ornamentation of disc and genital regions readily distinguish *N. helenae* from its other congeners.

Class CRINOIDEA
Family Antedonidae

Nanometra duala n. sp.
Fig. 12**A**-**E**

Nanometra johnstoni. McKnight, 1977: 136 (non *N. johnstoni* John)

Diagnosis: A species of *Nanometra* with a pair of wing-like extensions to the segments of P_3 and subsequent pinnules.

Material examined: Holotype, AM J21704 and 2 paratypes, NZOI, 29°20.20′S, 168°10.79′E, off Norfolk Island, 308m (NZOI, stn I94).

Description: The holotype has 10 arms broken at about 20br and measuring about 10mm in length. The estimated length of the arms is not more than 20mm (Fig. 12**A**). The cirri are XXIV-XXVI, 19-22. The first 2 segments are twice as broad as they are long, the third segment is 1.5 x as long as it is broad, 4th-5th segments twice as long as broad, 6th segment 1.75 x as long as broad, 7th segment 1.25 x as long as broad. Distally, the segments are as long as they are broad. The segments do not bear a dorsal spine but the distal end is expanded (Fig. 12**A**-**B**).

The centrodorsal is conical, with a rugose apex. The cirri are arranged in vertical rows of 2 or 3 (Fig. 12**B**).

The radials are narrow, almost hidden, with a tubercle at each of the exposed corners of the plate.

The $1Br_1$ is twice as broad as it is long, with the proximal and distal edges more or less straight but with the distal edge everted. There is a rounded or chisel-shaped tubercle arising on each side of the ossicle and one or two spinulose tubercles below each of these on the dorsal-lateral surface of the ossicle. The axillary ($1Br_2$) is triangular, slightly broader than long (1.25:1). The proximal border is slightly convex, the distal border everted and spinulose. There are one or two spinulose tubercles occurring on the lateral surfaces of the ossicle (Fig. 12**B**-**C**).

Br_1 is quadrate, about 2-2.5 times as wide as long. Up to 4 spinulose tubercles may occur on the lateral surface of the ossicles. Remaining brachials are more or less elongate, wedge-shaped, with the distal edge everted and spinulose (Fig. 12**C**-**D**). Syzygies occur at 3+4 and usually 9+10, but occasionally the second syzygy occurs at 8+9 or 11+12 or 13+14. The third syzygy occurs at 14+15 or 15+16. P_1 is the longest pinnule and the stoutest. It is 3mm long, comprising 11 segments. The first segment is broader than long, the second is quadrate, the remaining segments are up to 2 times as long as broad. P_a is about 1.5mm long and comprises 6 segments. P_2 is smaller and more slender than P_1, is about 2mm long and comprises 9 segments. The segments of these pinnules are strongly everted and spinulose on their distal edge. P_3 is the first gonadal pinnule. On P_3 and subsequent pinnules (for the length of the broken arms) the lateral edges of the 2nd to 4-5th segments are expanded into thin, wing-like processes, giving the pinnules a very characteristic form (Fig. 12**D**).

One paratype is very similar indeed to the holotype in being a relatively intact, if broken armed, specimen. The second paratype comprises the calyx of a specimen with many broken arm pieces. The form of the segments of the pinnules is, however, unmistakable in uniting the specimens within a single species.

Etymology: duo = two; ala = wing (Lat.) referring to the 2-winged appearance of the pinnular segments.

Remarks: The very distinctive form of the pinnule segments immediately distinguishes this species from its congeners *N. johnstoni* John (from S.E. Australia); *N. clymene* A. H. Clark (from the East Indian region) and *N. bowersi* (A. H. Clark) (from southwestern Japan), which have been reviewed by A. H. Clark and A. M. Clark (1967). McKnight's

(1977) record of *N. johnstoni* from the same locality (NZOI stn I94) refers instead, I believe, to the new species *N. duala*.

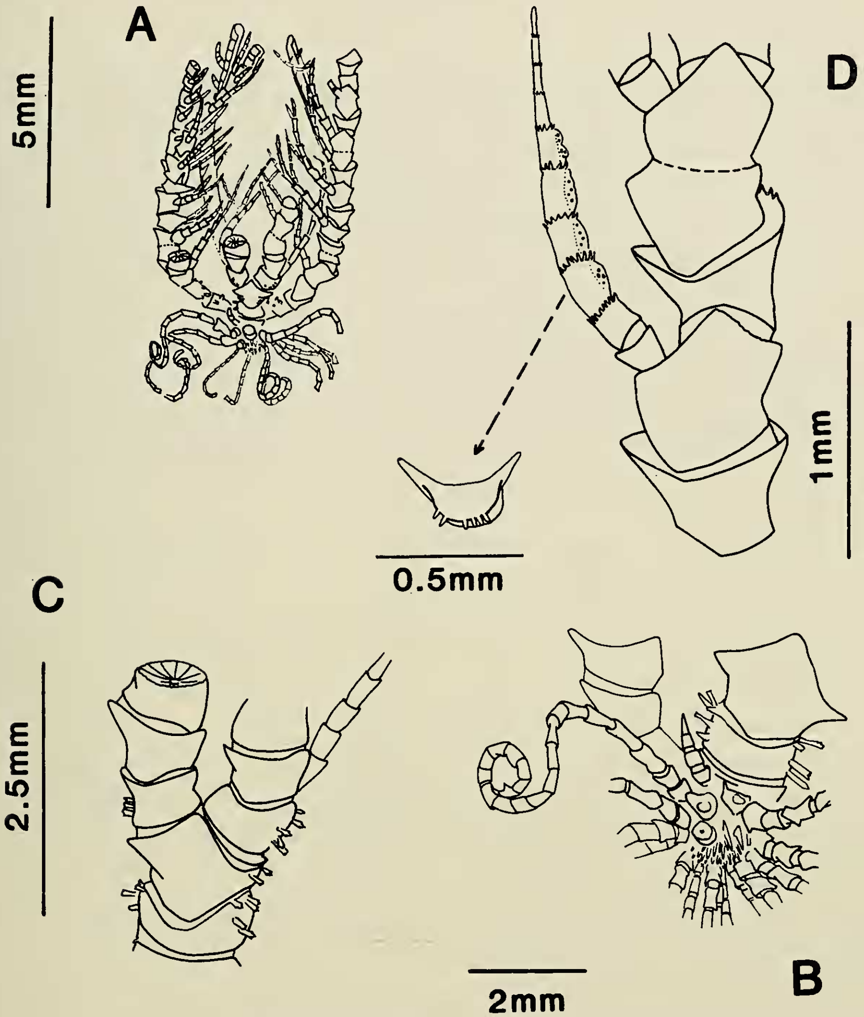

Fig. 12. Nanometra duala n. sp. (holotype, AMJ21704), **A** = lateral representation of holotype, **B** = cirri, centrodorsal and 1Br, **C** = 1Br and arm bases, **D** = P_3 with cross-section of pinnule segment showing wing-like extensions.

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TABLE 1

Checklist of echinoderms from Norfolk Island and Wanganella Bank, northern Tasman Sea, with general distributions and depth ranges. (= new record.)*

Taxon	Norfolk Island 28°-30°S, 167°-169°E	Wanganella Bank >30°-33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
Holothuroidea				
Family Holothuriidae				
1. *Holothuria* (*Vaneyothuria*) *uncia* Rowe	*	—	This work.	342-360
2. *H.* (*Halodeima*) *atra* Jaeger	Edgecombe & Bennett (1983)	—	Indo-west Pacific; ?eastern tropical Pacific; Clark & Rowe (1971); Rowe (1985).	0-30
3. *H.* (*Lessonothuria*) *lineata* Ludwig	Edgecombe & Bennett (1983)	—	Indo-west Pacific; ?eastern tropical Pacific; Clark & Rowe (1971); Rowe (1985), as *H.* (*L.*) *pardalis* Selenka; non Selenka, 1867.	0-10
4. *H.* (*Mertensiothuria*) *leucospilota* (Brandt)	Edgecombe & Bennett (1983)	—	Indo-west Pacific; ?eastern tropical Pacific; Clark & Rowe (1971); Rowe (1985).	0-10
5. *H.* (*Platyperona*) *difficilis* Semper	Edgecombe & Bennett (1983)	—	Indo-west Pacific; ?eastern tropical Pacific; Clark & Rowe (1971); Rowe (1985).	0-13
6. *H.* (*Stauropora*) *dofleini* Augustin	*	—	Indo-west Pacific; this work.	0-20
7. *H.* (*Thymiosycia*) *hilla* Lesson	Edgecombe & Bennett (1983)	—	Indo-west Pacific; ?eastern tropical Pacific; Clark & Rowe (1971); Rowe (1985).	0-30
Family Synallactidae				
8. *Mesothuria* (*Penichrothuria*) *norfolkensis* Rowe	*	—	This work.	492-423
9. *Bathyplotes natans* (Sars)	—	*	Widespread in Atlantic and Pacific Oceans; New Zealand; Southeastern and southern Australia, Pawson (1965a); this work.	200-1600
10. *Bathyplotes punctatus* (Sluiter)	—	*	Philippines; Malay Archipelago, Cherbonnier & Féral (1981). I include *Kareniella gracilis* Heding (1940) in the synonymy of *B. punctatus*. Similarly I am of the opinion that *Bathyherpystikes punctatus* Sluiter (type-species of *Bathyherpystikes* Sluiter, 1901) is congeneric with *Stichopus natans* Theel (type-species of *Bathyplotes* Ostergren, 1896), so that both *Kareniella* and *Bathyherpystikes* are regarded by me, herein, as synonyms of *Bathyplotes*.	310-614
Family Laetmogonidae				
11. *Laetmogone violacea* (Theel)	*	—	Cosmopolitan; Hansen (1975).	

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°30°S, 167°-169°E	Wanganella Bank >30°33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
12. *Laetmogone maculata* (Theel)	*	—	Japan; Malay Archipelago; N.E. Tasmania; Victorian coast, Australia; Hansen (1975); this work.	
Family Phyllophoridae				
13. *Neothyonidium parvipedum* Rowe	—	*	This work.	126
Family Synaptidae				
14. *Leptosynapta dolabrifera* (Stimpson)	*	—	Southern Australia; Lord Howe Island (Tasman Sea); H. L. Clark (1946).	0-46
Echinoidea				
Family Cidaridae				
15. *Prionocidaris callista* Rowe & Hoggett	Rowe & Hoggett (1986)	—	Southeastern Australia; Lord Howe Island; Kermadec Islands; Rowe & Hoggett (1986).	10-85(?198)
16. *Phyllacanthus imperialis* (Lamarck)	—	McKnight (1975)	Indo-west Pacific; Kermadec Islands Clark & Rowe (1971); Rowe & Hoggett (1986).	0-73(?130)
17. *Stylocidaris brevicollis* (de Meijere)	*	—	Malay Archpelago; Lord Howe Island (Tasman Sea); Rowe & Hoggett (1986).	69-301
18. *Stereocidaris* sp.	—	McKnight (1975)	?= *S. microtuberculata* (Yoshiwara); Rowe & Hoggett (1986).	500
19. *Salenocidaris hastigera* (A. Agassiz)	McKnight (1968a)	—	Indian Ocean; Malay Archipelago; North Cape, New Zealand; McKnight (1968a).	370-2565
20. *Rhopalocidaris gracilis* (Döderlein)	*	—	Japan; Shigei (1986).	83-720
Family Echinothuriidae				
21. *Hapalosoma pulchrum* Rowe	*	—	This work.	130-301
22. *Calveriosoma gracile* (A. Agassiz)	*	—	Japan; Philippines; Malay Archipelago; Shigei (1986).	160-950
Family Aspidodiodematidae				
23. *Aspidodiadema tonsum* A. Agassiz	*	—	Japan; Philippines; Malay Archipelago; Kermadec Islands; NE coast Australia; Mortensen (1940); this work.	180-1135
Family Arbaciidae				
24. *Coelopleurus maculatus* A. Agassiz & H. L. Clark	*	—	Japan; Philippines; Malay Archipelago; Shigei (1986).	60-360

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°30°S, 167°-169°E	Wanganella Bank >30°33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
Family Diadematidae				
25. *Centrostephanus rodgersi* (A. Agassiz)	*	—	Southeastern Australia; Lord Howe Island (Tasman Sea); Kermadec Islands; northern coast of North Island, New Zealand; Pawson (1965b).	0-30
26. *Diadema savignyi:* Michelin	Edgecombe & Bennett (1983)	—	Indo-west Pacific; Clark & Rowe (1971).	0-70
27. *Diadema palmeri* Baker	*	—	New Zealand; coast of New South Wales; Lord Howe Island (Tasman Sea); Baker (1967); this work.	10-50
Family Pedinidae				
28. *Caenopedina alanbakeri* Rowe	*	—	This work.	570-578
29. *Caenopedina novaezealandiae* Pawson	—	McKnight (1975)	North Island, New Zealand; McKnight (1975).	324-500
Family Temnopleuridae				
30. *Holopneustes inflatus* Lütken in Agassiz	? Mortensen (1943)	—	Southeastern Australia; this work. Mortensen (1943) based this record on examination of two old specimens. He considered the provenance Norfolk Island as doubtful).	0-30
31. *Trigonocidaris micropora* Mortensen	*	—	Philippines; Malay Archipelago; Mortensen (1943).	186-350
32. *Orechinus monolini* (A. Agassiz)	—	McKnight (1975)	Indo-Pacific, including Kermadec Islands; Mortensen (1943); McKnight (1975).	318-2300
Family Toxopneustidae				
33. *Toxopneustes pileolus* (Lamarck)	*	—	Indo-west Pacific; Clark & Rowe (1971).	0-90
34. *Tripneustes gratilla* (Linnaeus)	Edgecombe & Bennett (1983)	—	Indo-west Pacific, including Kermadec Islands; northern coast, North Island, New Zealand; Clark & Rowe (1971); Pawson (1965b).	0-75
35. *Pseudoboletia indiana* (Michelin)	Edgecombe & Bennett (1983)	—	Indo-west Pacific; Kermadec Islands and northern coast, North Island, New Zealand; Clark & Rowe (1971); this work.	0-100

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°30°S, 167°-169°E	Wanganella Bank >30°33°S, 167° 169°E	Other Distribution/Authority/Comments	Depth (m)
Family Echinidae				
36. *Gracilechinus multidentatus* (H. L. Clark)	–	McKnight (1975)	Kermadec Islands; New Zealand; southeastern Australia; McKnight, 1968b&c; this work.	510-1324
Family Echinometridae				
37. *Echinometra mathaei* (Blainville)	Edgecombe & Bennett (1983)	–	Indo-west Pacific; Lord Howe Island, Tasman Sea; Kermadec Islands; Clark & Rowe (1971); Pawson (1965b).	0-139
38. *Heliocidaris tuberculata* (Lamarck)	Edgecombe & Bennett (1983)	–	Southeastern Australia; Lord Howe Island (Tasman Sea); Kermadec Islands; northern coast, North Island, New Zealand; Pawson (1965b).	0-54
39. *Heterocentrotus mammillatus* (Linnaeus)	Edgecombe & Bennett (1983)	–	Indo-west Pacific; Clark & Rowe (1971).	0-30
Family Clypeasteridae				
40. *Clypeaster australasiae* (Gray)	Pawson, 1965b	?McKnight (1975)	Southwest Pacific; Japan; Eastern Australia; Lord Howe Island (Tasman Sea); northern coast, North Island, New Zealand; ?Kermadec Islands; Pawson (1965b).	3-50
41. *Clypeaster virescens* (Döderlein	*	–	Japan; Philippines; Indo-China; Australia and New Zealand; Shigei (1986).	40-301
Family Fibulariidae				
42. *Echinocyamus polyporus* Mortensen	Pawson, 1965b	–	North Island, New Zealand; Pawson (1965b).	9-536
Family Laganidae				
43. *Laganum decagonale* (Blainville)	*	–	Eastern Indian Ocean; Philippines; Malay Archipelago; Clark & Rowe (1971).	5-301
44. *Peronella hinemoae* Mortensen	Pawson (1965b)	McKnight (1968a)	New Zealand; Kermadec Islands; McKnight (1968a).	17-260
Family Apatopygidae				
45. *Oligopodia epigonus* (von Martens)	Pawson (1965b)	–	Indo-west Pacific; Lord Howe Island (Tasman Sea); Pawson (1965b).	35-141
Family Brissidae				
46. *Brissus agassizi* Döderlein	Baker (1967)	–	Japan; eastern coast Australia; Lord Howe Island (Tasman Sea); northern coast, North Island, New Zealand; Baker (1967).	0-120

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°-30°S, 167°-169°E	Wanganella Bank >30°-33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
47. *Brissopsis oldhami* Alcock	Pawson (1965b)	—	Western Indian Ocean; Malay Archipelago; Philippines; New Zealand and Chatham Rise; Kermadec Islands; Mortensen (1951); Pawson (1965b).	18-2736
Family Asterostomatidae				
48. *Heterobrissus niasicus* (Döderlein)	Baker & Rowe (in press)	—	New Caledonia; Eastern Indian Ocean; Baker & Rowe (in press).	420-475
Ophiuroidea				
Family Asteroschematidae				
49. *Asteroschema tuberiferum* Matsumoto	Baker (1980)	—	Japan; Hawaii; Baker (1980).	325-965
50. *Asteroschema igloo* Baker	Baker (1980)	—	Kermadec Islands; Baker (1980).	450-501
Family Gorgonocephalidae				
51. *Astrothroax waitei* (Benham)	Baker (1980)	—	South Africa; southeastern Australia; New Zealand; Baker (1980).	73-998
52. *Astrothrombus vercors* (Koehler)	Baker (1980)	—	Malay Archipelago; northeastern New Zealand; Baker (1980).	204-751
53. *Asteroporpa australiensis* H. L. Clark	—	McKnight (1975)	Southeastern Australia; Kermadec Islands; New Zealand; Baker (1980); McKnight (1975) as *A. wilsoni* Bell.	55-508
54. *Asteroporpa* (*Astromoana*) *reticulata* Baker	Baker (1980)	—	—	71-301
Family Euryalidae				
55. *Astroceras elegans* (Bell)	Baker (1980)	Baker (1980)	New Zealand; Baker (1980).	92-508
Family Hemieuryalidae				
56. *Ophiogyptis nodosa* Koehler	*	—	Bonin Islands; Philippines; Malay Archipelago; Guille (1981).	35-308
Family Ophiuridae				
57. *Ophiura micracantha* H. L. Clark	*	—	Japan; Philippines; Malay Archipelago; eastern Australian coast; Kermadec Islands; Baker (1979).	210-308
58. *Amphiophiura insolita* (Koehler)	Baker (1979)	—	Hawaii; Philippines; Ceram Sea; Baker (1979).	204-1236
59. *Amphiophiura taranui*	—	McKnight, 1968a	—	138

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°-30°S, 167°-169°E	Wanganella Bank >30°-33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
60. *Ophiomusium scalare* Lyman	*	—	Japan; Philippines; Malay Archipelago; Kermadec Islands; Guille (1981); McKnight (1975).	124-1100
61. *Ophioplocus imbricatus* (Müller & Troschel)	McKnight (1967)	—	Indo-west Pacific; Clark & Rowe (1971).	0-30
62. *Ophiozonoida parva* McKnight	—	McKnight (1975)	—	130
Family Ophioleucidae				
63. *Ophiopyrem bispinosum* Koehler	Baker (1979)	—	Andaman Islands (Indian Ocean); Baker (1979).	438-500
64. *Ophiopallas paradoxa* Koehler	Baker (1979)	—	East Africa; Philippine Islands; Baker (1979); Guille (1981).	170-500
Family Ophiocomidae				
65. *Ophiocoma dentata* Müller & Troschel	Edgecombe & Bennett (1983)	—	Indo-west Pacific; Clark & Rowe (1971).	0-30
66. *Ophiocomella sexradia* (Duncan)	*	—	Indo-west Pacific and tropical east Pacific; Clark & Rowe (1971).	0-15
Family Ophiodermatidae				
67. *Bathypectinura heros* (Lyman)	Baker (1979)	—	Widespread in tropical seas; New Zealand; Australia; Baker (1979).	240-2960
Family Ophiacanthidae				
68. *Ophiacantha cornuta* Lyman	*	—	Kermadec Islands; Fiji; H. L. Clark (1915).	308-1080
69. *Ophiacantha pentagona* Koehler	—	McKnight (1975)	Indo-Pacific; Macquarie Island; McKnight (1975).	82-1724
70. *Ophiacantha serrata* Lyman	Baker (1979)	—	Admiralty Islands (west Pacific); Baker (1979).	278-500
71. *Ophiacantha* sp.	—	McKnight (1975)	—	318-383
72. *Ophiocamax rugosa* Koehler	*	—	Malay Archipelago; Philippines; Japan; Guille (1981).	190-520
73. *Ophiomyces delata* Koehler	Baker (1979)	—	Malay Archipelago; Baker (1979).	350-4239
74. *Ophioprium larissae* Baker	Baker (1979)	—	—	500
75. *Ophiopthalmus relictus* (Koehler)	Baker (1979)	—	Indian Ocean; Japan; Malay Archipelago; Baker (1979).	500-1624
76. *Ophioplinthaca pulchra* Koehler	—	McKnight (1975)	Philippines; Malay Archipelago; McKnight (1975).	204-1171

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°30°S, 167°-169°E	Wanganella Bank >30°33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
77. *Ophiurothamnus stultus* (Koehler)	—	McKnight (1975)	Philippines; Malay Archipelago; McKnight (1975).	742-1705
Family Ophiactidae				
78. *Ophiactis profundi* Lutken & Mortensen	—	McKnight (1975)	Widespread in Pacific; McKnight (1975).	46-1644
Family Amphiuridae				
79. *Amphiura lymani* Studer	Baker (1979)	—	South Georgia; Southern Australia; Baker (1979).	5-500
80. *Amphiura psilopora* H. L. Clark	Baker (1979)	—	North Pacific; Japan; New Zealand; Baker (1979).	40-700
81. *Amphiura* sp.	—	McKnight (1975)	—	954-951
82. *Amphipholis squamata* (Delle Chiaje)	McKnight (1967)	—	Cosmopolitan; Baker (1982).	0-500
Family Ophiothricidae				
83. *Ophiothrix* (*Ophiothrix*) *ciliaris* (Lamarck)	*	—	Eastern Indian Ocean; Indo-China; Philippines; Malay Archipelago; western Pacific; tropical Australian coast; Clark & Rowe (1971).	0-308
84. *Ophiothrix* (*Acanthophiothrix*) *lepidus* de Loriol	*	McKnight (1975)	Indo-west Pacific; southeastern Australia; Kermadec Ridge; I recognize this species as distinct from *O. purpurea* Von Martens with which it has been synonymized (see Clark & Rowe, 1971) principally on form of radial shields and colour. I consider *Ophiogymna saltatrix* McKnight (1968b) conspecific with *Ophiothrix* (*Acanthophiothrix*) *lepidus* de Loriol; this work.	10-508
Asteroidea				
Family Luidiidae				
86. *Luidia aoicularia* Fisher	*	—	Indian Ocean; Japan; Philippines; Malay Archipelago; ?South Pacific Islands; N.W. Australia; Elizabeth Reef (Tasman Sea); A. M. Clark (1989 in press).	9-308
Family Astropectinidae				
86. *Astropecten celebensis* Döderlein	*	—	Malay Archipelago; A. M. Clark (1989 in press).	394-472

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°30°S, 167°-169°E	Wanganella Bank >30°33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
87. *Astropecten polycanthus* Müller & Troschel	*	—	Indo-west Pacific; Kermadec Islands; New Zealand; Clark & Rowe (1971); H. E. S. Clark (1970).	0-185
88. *Tethyaster tangaroae* Rowe	*	—	This work.	390-423
Family Benthopectinidae				
89. *Cheiraster* (*Luidiaster*) *teres* (Sladen)	*	—	Malay Archipelago; A. M. Clark (1981)	260-402
90. *Cheiraster* (*Luidiaster*) sp.	*	—	This work.	308-310
Family Goniasteridae				
91. *Glyphodiscus mcknighti* Rowe	*	—	This work.	450-475
92. *Anthenoides rugulosus* Fisher	*	—	Philippines; east coast Australia; this work.	194-472
93. *Milteliphaster wanganellensis* H. E. S. Clark	—	H. E. S. Clark (1982)	—	422-437
94. *Rosaster mimicus* Fisher	—	H. E. S. Clark (1982)	Philippine Islands; Chatham Rise; Alderman Islands; H. E. S. Clark (1982).	200-920
Family Asterodiscididae				
95. *Asterodiscides grayi* Rowe	Rowe (1977)	—	Japan; Eastern coast Australia; Kermadec Islands; Rowe (1985).	71-108
Family Ophidiasteridae				
96. *Ophidiaster confertus* H. L. Clark	McKnight (1967)	—	Southeastern Australia; Lord Howe Island; McKnight (1967).	0-50
97. *Ophidiaster* sp.	—	McKnight (1975)	—	500
98. *Fromia milleporella* (Lamarck)	*	—	Indo-west Pacific; Clark & Rowe (1971).	0-30
99. *Fromia polypora* H. L. Clark	*	—	Southern and Southeastern Australia; Zeidler & Shepherd (1982). I am convinced that because of similarities in body form, granulation, spination and papular distribution, *Austrofromia polypora* (type species of *Austrofromia* H. L. Clark (1921)) is congeneric with *F. milleporella* (Lamarck) (type species of *Fromia* Gray (1840)) so that I commit *Austrofromia* H. L. Clark (1921) to the synonymy of *Fromia* Gray (1840); this work.	0-108

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°30°S, 167°-169°E	Wanganella Bank >30°33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
100. *Heteronardoa carinata* (Koehler)	*	—	Indian Ocean; Japan; Philippines; Malay Archipelago; Tasman Sea; Kermadec Islands; Rowe (1976).	34-301
101. *Leiaster leachi* (Gray)	*	—	Indo-west Pacific; Clark & Rowe (1971).	10-30
102. *Linckia guildingi* Gray	*	—	Tropicopolitan; Rowe (1985).	0-20
Family Pterasteridae				
103. *Pteraster (Apterodon) obesus* H. L. Clark	*	—	Japan; Hayashi (1973).	65-308
Family Asterinidae				
104. *Asterina alba* H. L. Clark	*	—	Lord Howe Island, Elizabeth & Middleton Reefs (Tasman Sea); this work.	0-20
105. *Patiriella exigua* (Lamarck)	*	—	Southern Indian Ocean and South Africa; St. Paul's Island; Southern and southeastern Australia; Lord Howe Island (Tasman Sea); Dartnall (1971).	littoral
Family Asteropseidae				
106. *Petricia vernicina* (Lamarck)	*	—	Southern Australia; Kermadec Islands; this work.	0-60
Family Echinasteridae				
107. *Echinaster colemani* Rowe & Albertson	Rowe & Albertson, 1987	—	New South Wales, Australia; Rowe & Albertson (1987).	5-22
Family Asteriidae				
108. *Coscinasterias muricata*	*	—	Southern Australia; Lord Howe Island (Tasman Sea); New Zealand. This species is recognized herein as a valid species and taken out of the synonymy of *Coscinasterias calamaria* (Gray); this work.	0-91
109. *Astrostole rodolphi* (Perrier)	A. M. Clark (1950)	—	New South Wales, Australia; Lord Howe Island (Tasman Sea); Kermadec Islands; northern coast, North Island, New Zealand (Rowe). This species includes synonyms *A. insularis* H. L. Clark (1938) and *A. multispina* A. M. Clark (1950); this work.	0-250
110. *Coronaster halicepus* Fisher	—	McKnight (1975)	Philippine Islands; McKnight (1975).	192-545

TABLE 1 (Cont'd.)

Taxon	Norfolk Island 28°30°S, 167°-169°E	Wanganella Bank >30°33°S, 167°-169°E	Other Distribution/Authority/Comments	Depth (m)
Family Brisingidae				
111. *Novodinia helenae* Rowe	*	—	This work.	308
Crinoidea				
Family Isocrinidae				
112. *Metacrinus nodosus* P. H. Carpenter	McKnight (1977)	—	Kermadec Islands; McKnight (1977).	570-1152
113. *Metacrinus* sp.	McKnight (1977)	—	—	669-732
114. *Saracrinus varians* (P. H. Carpenter)	—	McKnight (1977)	Philippines; Malay Archipelago; Kermadec Islands; McKnight (1977, as *Metacrinus*).	304-1152
Family Comasteridae				
115. *Oxycomanthus plectrophorum* (H. L. Clark)	McKnight (1975)	McKnight (1975)	Southeastern Australia; New Zealand. Records by McKnight (1977; 1975) are based on his misidentification of specimens as *Comanthus* (= *Cenolia*) *benhami* A. H. Clark; Rowe et al. (1986).	37-924
116. *Cenolia spanoschistum* (H. L. Clark)	McKnight (1977)	—	Southern Asutralia; New Zealand. The record by McKnight (1977) is based on his misidentification of specimens as *Comanthus* (= *Cenolia*) *trichoptera* (J. Müller); Rowe et al. (1986).	18-310
117. *Comissia norfolkensis* McKnight	McKnight (1977)	—	Hoggett & Rowe (1986).	450-578
Family Charitometridae				
118. *Charitometra basicurva* (P. H. Carpenter)	—	McKnight (1975)	Kermadec Islands; A. H. Clark (1950).	716-1159
119. *Glyptometra crassa* (A. H. Clark)	McKnight (1977)	—	Bay of Bengal (Indian Ocean); Malay Archipelago; McKnight (1977).	73-1023
Family Antedonidae				
120. *Antedon incommoda* Bell	McKnight (1977)	—	Southern coast of Australia; A. H. & A. M. Clark (1967).	0-68
121. *Antedon detonna* McKnight	McKnight (1977)	—	—	15-24
122. *Nanometra duala* Rowe	McKnight (1977)	—	McKnight (1977); as *Nanometra johnstoni* John; this work.	308
123. *Tonrometra* sp.	—	McKnight (1977)	—	500