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NOTES ON A COLLECTION OF ECHINODERMS FROM THE  
AUSTRALIAN MUSEUM.<sup>1</sup>

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(Figure I.)

Through the kindness of Dr. C. Anderson, Director of the Australian Museum, a collection of Echinodermata of more than ordinary interest was sent to me for identification in April, 1925. They were largely collected by Surgeon Lieutenant-Commander W. E. J. Paradise, R.A.N. (late H.M.A.S. "Geranium"), and chiefly on little known portions of the Great Barrier Reef, Queensland, between 17° and 19° S. lat. A few other localities are, however, represented. As several of the species have not hitherto been taken on the coast of Australia, and the records for many others show important extensions of range it seems to me worth while to publish an annotated list of the species contained in the collection. I sincerely thank Dr. Anderson for the opportunity to examine this material and I would add that credit is due Dr. Paradise for the important contribution he has made to our knowledge of the Australian marine fauna. There are in the collection altogether 101 specimens, representing 42 species.

CRINOIDEA.

COMATELLA STELLIGERA (*P. H. Carpenter*).

The occurrence of these specimens on the Queensland coast is of interest because there are no authentic earlier records from south of the Torres Strait region. The present localities are: Off Ellison Reef, Queensland, 5-15 fms. August, 1924, 1 specimen. Dredged in 7 fms. on Surprise Shoal, outer Great Barrier Reef, Q'ld., about 18° S., 1 specimen.

COMATULA PECTINATA var. PURPUREA (*J. Müller*).

I think Gislen (1919, Kungl. Svenska Vet.-Akad. Handl., 59, No. 4, p. 6) is right in his decision that *Comatula purpurea* (*J. Müller*) is only a form or variety of *C. pectinata*, but the three specimens in the present collection throw little light on the question. Two are rather large specimens with the oral arms 125 mm. long; they look like *pectinata*, but have the cirri as in *purpurea*. The third specimen is smaller, quite stout, with all the arms subequal; there are only two cirri and the colour is a bright orange-brown (rust-colour). This colouration has the appearance of being artificial.

*Localities*.—Off Ellison Reef, outer Great Barrier Reef, Queensland, 5-15 fms., Aug. 1924. 2 fine specimens. Outer Great Barrier Reef, Qld., between 17° and 19° S.; exposed reefs at low tide. 1 rust-coloured specimen.

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<sup>1</sup>See also paper by F. A. McNeill and A. A. Livingstone on pp. 193-199.

COMASTER MINIMUS (*A. H. Clark*).

This is a notable addition to the Australian fauna, as it was not previously known from any point nearer than Rotti. The present specimen has 21 arms, 75-80 mm. long, and no cirri. The III. br. series is present *four* times, and two of these being on one arm show the species character of III. br. 2, clearly. The colour of this individual is light brown, and the whole appearance is much more delicate than that of *Comatella*, *Comatula* or *Comanthus*.

*Locality*.—Off Ellison Reef, outer Great Barrier Reef, Queensland, 5-15 fms. August, 1924. 1 specimen.

COMANTHUS ANNULATUS (*Bell*).

The geographical range of the species is not affected by the present record:

Dredged in 7 fms. on Surprise Shoal, outer Great Barrier Reef, Queensland, about 18° S. 1 small specimen with 21 arms 40-50 mm. long, and 4 cirri.

COMANTHUS BRIAREUS (*Bell*).

The known range of this species is not affected by the present records.

Between tides, Feather Reef, outer Great Barrier Reef, Queensland, between 17° and 19° S. 1 large specimen with about 70 arms.

Dredged in 7 fms. on Surprise Shoal, outer Great Barrier Reef, Queensland, about 18° S. 1 small specimen with 40 arms or more; arms broken and often meeting.—

HIMEROMETRA ROBUSTIPINNA (*P. H. Carpenter*).

The occurrence of this fine comatulid on the Great Barrier Reef is interesting because no member of the genus as now restricted has been known from Australian coastal waters, the nearest locality being at the Kei Islands. One of the specimens has 29 arms, and about thirty cirri, with 27-29 segments. The other has 36 arms, and the cirri are xxxii, 29-33. In both specimens the cirri have the dorsal teeth confined to the outermost segments; seldom more than six segments show the teeth clearly, and often only one.

*Locality*.—Off Ellison Reef, outer Great Barrier Reef, Queensland, 5-15 fms., August, 1924. 2 specimens.

## ASTEROIDEA.

ARCHASTER TYPICUS *Müller and Troschel*.

Not new to the Queensland coast, yet of interest for the locality: On bottom of lagoon, on sand flat, at low tide, Frankland Group, Great Barrier Reef. 1 dark-coloured specimen with R = 57 mm.

ASTROPECTEN POLYACANTHUS *Müller and Troschel*.

The specimens are small (R = 36 mm. and 43 mm.) but typical, except that the distal inferomarginal spines are more than usually long and slender. The colour is grayish-brown, with the long spines dirty whitish.

*Locality.*—Great Palm Island, Northeast Bay, 5 fms.; seaweed, on sandy bottom; dredged. 2 specimens.

CULCITA NOVAEGUINEAE *Müller and Troschel.*

A large dry specimen with R about 100 mm. bears only "Great Barrier Reef, Queensland" as its locality label. If the locality were in the vicinity whence most of the present collection came, it would be a notable extension of the range of the genus.

ANTHENEAE ACUTA *Perrier.*

As this well-known Port Jackson species has been recorded from Frazer Island, Queensland, I refer to it a single small specimen (R = 35 mm.) from Hervey Bay; this is in rather poor condition, and has lost all its colour. The rays are rather slender, 15 mm. wide at base, and 11 mm. half way from the centre of the disc to the tip.

FROMIA ELEGANS *H. L. Clark.*

There are two *Fromias* from Coates Reef, outer Great Barrier Reef, Queensland, which seem to belong to this fine species, originally described from the Murray Islands, Torres Strait. They are very dark coloured, but this may be due to imperfect preservation.

The occurrence of *F. elegans* on the above named reef, between 17° and 19° S. lat., forms a notable extension of its range.

FROMIA MILLEPORELLA (*Lamarck.*)

There are half a dozen *Fromias*, also from Coates Reef, outer Great Barrier Reef, between 17° and 19° S. lat., which are clearly this long-known species, although it has not hitherto been recorded from the mainland coast of Australia. The present specimens are of average size and all are pentamerous.

NARDOA NOVAECALEDONIAE (*Perrier.*)

This species was not known hitherto from south of Green Island (off Cairns, Queensland) but there are two specimens of rather small size (R less than 60 mm.) in the present collection from Feather Reef, outer Great Barrier Reef, Qld., between 17° and 19° S.

LINCKIA GULDINGII *Gray.*

A specimen of *Linckia* from Lord Howe Island, South Pacific (secured in 1888), labelled *L. (ehrenbergi?)* seems to belong to this widespread species, the occurrence of which at Lord Howe Island is notable, but not extraordinary, as the species is already known from Masthead Island, Capricorn Group, Queensland.

The present specimen is, however, extraordinary in possessing 7 arms and only *one* madreporite; beginning with the longest arm and counting clockwise, the arms measure, in millimetres, 85, 80, 27, 35, 37, 16 and 68. The combination of a single madreporite with more than 5 arms is very rare.

OPHIDIASTER *sp?*

The single specimen from Lord Howe Island, South Pacific has been artificially coloured and hence some of the essential features required

for identification are completely obscured. It is accompanied by a life-size sketch of a specimen taken at Lord Howe Island, Jan. 30, 1922. This sketch shows the colour in life to be brown-orange, with blotches and markings of a darker shade. The specimen itself is painted a brick-red.

After comparing this specimen with all the species of *Ophidiaster* available to me, I am inclined to consider it as representative of an undescribed species, but it is out of the question to attempt to describe it until better material is available. It differs from *O. confertus*, the species already known from Lord Howe Island, in several particulars, but especially in the adambulacral armature. These apparent differences may, however, be due to the large size of the present specimen (R = 125 mm.), and its unfortunate painted condition. More material of all the ophidiasterids occurring at Lord Howe Island is much to be desired.

*ASTERINA EXIGUA (Lamarck).*

This well-known species is represented by 5 specimens from the Frankland Group, Queensland, and 3 specimens from the outer Great Barrier Reef, Qld., between 17°-19° S.; at low tide. All are small, the largest being 26 mm. across.

*ASTERINA GUNNII Gray.*

There is a single well-preserved specimen of this species, 42 mm. in diameter, from Shellharbour, on the south coast of New South Wales.

OPHIUROIDEA.

*OPHIOCOMA BREVIPES Peters, var. VARIEGATA E. A. Smith.*

There are 10 specimens at hand of this perplexing brittle-star; of these, 3 are easily recognisable as forma *doederleini* de Loriol, and 7 are evidently forma *dentata* Lütken. All were collected July 7, 1924, between tides on the coral reef flat at High Island, Frankland Group, Great Barrier Reef, Queensland. This is a little further south than it had previously been secured. The largest specimens have the disc 20-24 mm. across. In *dentata* the size of the meshes in the reticulation of the disc shows great diversity; if the meshes are small, say, .33 mm. across, the disc appears to be dark, but when the meshes are a full millimetre in diameter, the disc appears light.

*OPHIOCOMA ERINACEUS Müller and Troschel.*

There is a single small specimen from between tides in the coral pools at High Island, Frankland Group, Queensland, July 7, 1924. The disc is 9 mm. in diameter. Every other one of the uppermost arm-spines is noticeably swollen.

*OPHIOCOMA SCHOENLEINII Müller and Troschel.*

This species was collected with the preceding two at High Island in the Frankland Group, Queensland, on July 7, 1924. There are 2 specimens, 12-15 mm. in diameter of disc. Green Island, near Cairns, Queensland was the former southernmost known locality.

OPHIOCOMA SCOLOPENDRINA (*Lamarck*).

The collection contains a single specimen of this common and widespread species, from the south-western coast of Ysabel Island, British Solomon Islands. It was collected in August, 1924, by N. S. Heffernan, the local District Officer. The disc is 16 mm. in diameter and the arms are about 85 mm. long. The remarkable feature of this specimen, however, is that, save for a very few basal pores, there is only a single tentacle-scale on each of the arm-pores. It thus bears the same relation to *scolopendrina* that *schoenleinii* does to *erinaceus*. It will be convenient to have a name for so easily recognized a form, so I suggest that it be called "forma *monolepis*."

OPHIOMASTIX ANNULOSA (*Lamarck*).

This well-known brittle-star is represented by three specimens from the tide pools on Ellison Reef, outer Great Barrier Reef, Queensland. This is the farthest south that the species has been found to occur.

OPHIOMASTIX MIXTA *Lütken*.

The known range of this species is extended far to the south by a specimen collected July 17, 1924, by Dr. Paradise, on the reef-flat off High Island, Frankland Group, Queensland, which is between 17° and 18° S. lat.

OPHIARTHURUM ELEGANS *Peters*.

There are 9 specimens of this very common brittle-star from the Frankland Group, Queensland, 7 of them from the tide-pools on the reef-flat at High Island. They were taken July 17, 1924. Green Island, off Cairns, Qld., was previously the southernmost known locality for this species.

OPHIARACHNA INCRASSATA (*Lamarck*).

Green Island, off Cairns, Queensland, was the southernmost station known for this species, but in the present collection are the following, ranging in disc-diameter from 18 to 45 mm.

Coral reef-flat off High Island, Frankland Group, Queensland, July 17, 1924. 2 specimens. Feather Reef, outer Great Barrier Reef, Queensland, 17°-19 S. lat., between tides. 2 specimens.

OPHIOLEPIS NODOSA *Duncan*.

The discovery of this species on the Queensland coast is the most interesting addition to the echinoderm fauna of Australia that has been made for several years. The species was previously known only from the holotype, an individual 18 mm. across the disc, taken at Elphinstone Island in the Mergui Archipelago. The arms were scarcely as long as the disc-diameter, and the colour was orange above, with some splashes of purple, and whitish below. The present specimen is not quite so large (13 mm. across the disc), the arms are relatively longer (16-18 mm.) and the colour is quite different, but in other respects it is perfectly typical and I have no doubt of the identification. The Queensland specimen is dull orange-brown above, the arms a trifle darker than the disc with half a dozen rather indefinite narrow cross-bands of purplish-brown; the kidney-shaped nodules between the radial shields are dull

greyish; the lower surface is dull greyish-brown, but under a lens this colour is seen to be due to numerous fine brown dots on a dirty-whitish background. This remarkable brittle-star was taken by Dr. Paradise on the reef-flat off High Island, Frankland Group, July 17, 1924.

#### ECHINOIDEA.

##### PRIONOCIDARIS BISPINOSA (*Lamarck*).

This specimen, though a wreck, is of special interest because of the locality. It was found washed up on the shore, May 27, 1920, after a tidal wave in the Gulf of Carpentaria, near Fat Feller (or Fatman's) Creek. Records of echinoderms from the Gulf of Carpentaria are still very few.

##### CENTRECHINUS SAVIGNYI (*Michelin*).

A single specimen from the "outer Great Barrier Reef, Queensland," between 17° and 19° S. is 47 mm. in diameter, very black, with scarcely a trace of red, and no trace of white.

##### CENTRECHINUS SETOSUS (*Leske*).

I refer to this species five young specimens, 9-15 mm. in diameter, because the peristomial region is white, but it is hard to make out any satisfactory white spots dorsally. The locality is recorded as simply Frankland Group, Great Barrier Reef, Queensland.

##### STOMOPNEUSTES VARIOLARIS (*Lamarck*).

At Northeast Bay, Great Palm Island, 2 small specimens, 13 and 15 mm. in diameter, were dredged in 5 fms. amongst seaweed on a sandy bottom. The species is already known from the Queensland coast.

##### TEMNOPLEURUS TOREUMATICUS (*Leske*).

One small specimen, 17 mm. h.d., is in the collection from Magnetic Island, Queensland. Another, 25 mm. h.d. was taken with a seine in shallow water on the mud flats, S.W. of Vanderlin Island, Sir Edward Pellew Group, Gulf of Carpentaria.

##### SALMACIS SPHAEROIDES (*Linné*).

There is a single specimen, 64 mm. h.d., from Magnetic Island, Queensland, and one specimen 74 mm. h.d. from the Sir Edward Pellew Group, Gulf of Carpentaria; the last was taken with a seine net in shallow water on the mud flats southwest of Vanderlin Island.

##### TEMNOTREMA PHOENISSA<sup>2</sup> *sp. nov.*

Test 6.5 mm. in diameter and 3 mm. high, with the actinostome 3.25 mm. across, the abactinal system 2.5 mm. and the periproct about 80 mm. In both ambulacral and interambulacral areas there are 11 or 12 coronal plates in each column. The inter-ambulacra are a little over 2 mm. wide at the ambitus and the ambulacra measure a trifle less than 2 mm.; the general impression is that ambulacra and interambulacra are of about equal width. The pits in the interambulacra are large, but

<sup>2</sup>Gr. *Φοίνισσα* = purple-red.

seldom longer than the space between the two of a pair; they are rather shallow and ill-defined at the ambitus, but are much better defined dorsally. In the ambulacra they are smaller but still quite conspicuous. Typically, each coronal plate, in both interambulacra and ambulacra,

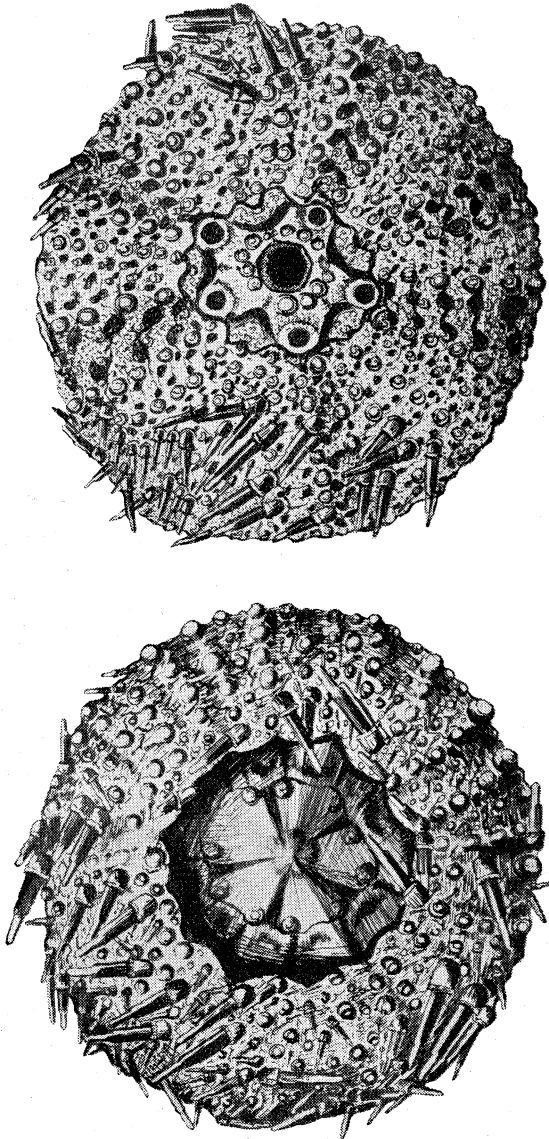


Fig. 1.

*Temnotrema phoenissa*, sp. nov.  $\times 10$  diameters.



carries a primary tubercle of moderate size near its centre, or, in the ambulacra, nearer the outer margin, and on each lower corner a small secondary tubercle.

In the ambulacra, owing to the narrowness of the plate and the space occupied by the pores the outer one of these secondary tubercles is almost directly beneath the primary. There are thus nominally three series of tubercles in each half of each area, but owing to the very poor development of the secondaries, only the primary series is at all easily seen, even with a lens.

Abactinal system large and conspicuous. Genital plates in close contact, shutting out all the oculars from the periproct, as usual in the Temnopleuridae; each genital has a very conspicuous pore in its distal half, and 2 or 3 well-marked secondary tubercles on its proximal margin, but there is no transverse line or groove; madreporite little larger than the other genitals, with 25-30 pores. Ocular plates wider than high, with a conspicuous pit or furrow along the proximal side, a secondary and 2 or 3 miliary tubercles distal to this furrow, and a small pore distal to the secondary tubercle. Poriferous areas narrow, nearly vertical, with very small pores. Periproct covered with a number of plates some (perhaps many) of which are now missing; it is evident that the plates were not approximately equal in size, but on the other hand it is equally clear that there was no suranal occupying more than half the area; the anus is undoubtedly excentric.

Actinostome large, with its membrane perfectly bare save for the five pairs of buccal plates, each of which carries a tube-foot; these plates are small and well separated from each other, so the distance between two pairs is not much greater than that between the two plates of a pair.

Primary spines from a millimetre to a millimetre and a half long, rather stout basally, but the distal third (or sometimes more) is abruptly smaller; abactinally the spines have their tips truncated with a sharp central thorn, but actinally the tips of the spines are rounded and the central thorn is scarcely or not at all evident. None of the spines are thorny or at all capitate. The only pedicellariae observed were the rather large but not distinctive ophicephalous ones; on the abactinal surface these have the valves red-purple, but actinally they are colourless.

Colour dull purplish-red with the inter-radial areas, abactinally, distinctly dull purple, though not in marked contrast. Primary (and other) spines bright red with more or less of their tips white.

Holotype, Reg. No. J. 4644, Australian Museum. Taken from coral, in company with *Parasalenia*, in 8 fms. off Ellison Reef, outer Great Barrier Reef, Queensland.

This is a very pretty but perplexing little sea-urchin, nearly related to *T. sculpta*, but with larger pits, different genital plates and a totally different colouration. Possibly more abundant material may show it is only a colour form of that species, but at present one would not be justified in calling this specimen *sculpta*. The difference from *maculata*, *scillae* and *siamensis* are equally evident, and the two Hawaiian Islands species are even more different. Hence it must, for the present at least, carry its own name. The conspicuous genital pores would seem to

indicate maturity in spite of the small size. The genus *Temnotrema* was not hitherto known from south of the Torres Strait region.

The drawing is by Miss Joyce K. Allan.

PARASALENIA GRATIOSA *A. Agassiz.*

There are two very small specimens of a *Parasalenia* in the collection which are almost certainly this species, though they are obviously too young to make the specific identification certain. One is 8 mm. long by 6.5 mm. wide and its primary spines are 6 mm. long; the other is only 3.5 mm. long, almost 3.5 mm. wide, and its primaries are 4 mm. long. These specimens were secured with the new *Temnotrema* from coral, in 8 fms., off Ellison Reef, outer Great Barrier Reef, Queensland.

ECHINONEUS CYCLOSTOMUS *Leske.*

There are two specimens of this tropicopolitan species at hand; one, 31 mm. long, by 24 mm. broad and 14 mm. high, was collected at Coates Reef, outer Great Barrier Reef, Queensland, and the other, 30 x 22 x 15.5, was taken at Feather Reef, also on the outer Great Barrier between 17° to 19° S. lat. These records extend the southern range of the species very considerably.

MOIRA STYGIA *A. Agassiz.*

There is a superb specimen of this remarkable spatangoid at hand from Port Denison, Queensland, the first satisfactory record from the Australian coast, though I saw specimens in the Museum in Brisbane in 1913. The present specimen is 40 mm. long, 33 mm. wide and 32 mm. high; the rear end is markedly concave. The dense covering of slender spines is so smooth, it gives the animal a "silky" appearance and feeling. The colour is a bright light fawn.

Accompanying the specimen is a note saying that it was found "floating upon surface of water in Bowen Harbour, Pt. Denison, Queensland. Mr. Rainford says this form swims on surface by aid of paddle-like spines on ventral surface. It can't be sunk." It is highly improbable that this species is capable of swimming—no sea-urchin known does that (after metamorphosis)—but, like its very near relative *Moira atropos*, it lives buried in mud or soft sand. This particular specimen died and as decay set in and gases began to form within the body, its buoyancy increased until it rose to the surface where it was found. Naturally it "could not be sunk" as the gases which brought it to the surface prevented its again sinking. The paddle-like spines of the ventral side suggest the possibility of swimming, but although they occur in many spatangoids there is not the slightest evidence that they can be thus used. They are obviously useful in forcing a way into or through mud or soft sand.

HOLOTHURIOIDEA.

POLYCHEIRA RUFESCENS (*Brandt.*)

The discovery of this interesting holothurian at the Frankland Group, Queensland, is noteworthy, for it was not previously known from south of Cape York. There are 3 specimens at hand, 1 with 17 and 2 with

18 tenacles each; they are very dark purple-brown and range from 55 by 6 mm. to 80 by 9 mm.

*HOLOTHURIA EDULIS Lesson.*

A small specimen in fair condition is at hand from 7 fms., on Surprise Shoal, about 18° S. lat., outer Great Barrier Reef, Queensland.

*HOLOTHURIA IMPATIENS (Forskål).*

There are 2 small, very dark individuals at hand without any specific locality. They are labelled simply "Great Barrier Reef," Queensland, and each measure 60 by about 15 mm.

*HOLOTHURIA PARDALIS Selenka.*

In all, five representatives of this species are in the collection, ranging from 23 to 32 mm. in width and from 55 to 78 mm. in length; they are all in fair condition. Four of them were obtained on the "Great Barrier Reef," Queensland, while the fifth came from the Frankland Group, Queensland.

*HOLOTHURIA LEUCOSPILOTA (Brandt).*

An unique individual occurs in the collection labelled as from "Great Barrier Reef," Queensland. The specimen is in fair condition and measures 29 by 71 mm.