

# ECHINODERMA.

## I.

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(5 Plates.)

HAD it not been for the earlier return of the 'Gauss,' this report would probably have had the distinction of signalling the re-discovery of the interesting Crinoid genus, *Promachocrinus*, which, as its name denotes, was one of the prizes of the voyage of the 'Challenger.'

As in the collection of the 'Southern Cross,' I am again able to call attention to some remarkable variations within what are obviously the limits of single species. The specimens which exhibit these variations could not have been obtained but by very careful collecting, and in the case of *Cycethra* it is of importance to note that they were all taken in a comparatively small area; the examples of this genus received by two naturalists, who made a number of species with them, were all taken from stations comparatively close to one another,\* but it is to be hoped that such a course will never be taken again; evidence as to the variability of species of Echinoderms is now beyond question.

## A.—ANACTINOGONIDIATA.

### I. HOLOTHURIOIDEA.

The collection of Holothurians is small, and the points of greatest interest are revealed by Prof. MacBride and Mr. Simpson in their valuable report on the larvae, which follows this memoir.

#### CHIRIDOTA.

I submitted an example of a form taken at 100 fms., off Coulman Island, to Prof. Ludwig, who has made Antarctic Synaptids one of his special domains. Owing, apparently, to the unfortunate use of formol the spicules are so disintegrated that a definite judgment is impossible, but it seems probable that the species is *C. pisanii* or allied thereto.

\* It is true that *C. simplex* was found at Trinidad Channel, and the 'Challenger' specimens on the eastern side of Patagonia; but he who will look at a map of South America will smile at a "Chorological Synopsis of the species" which gives three to the Atlantic and one to the Pacific.

F. JEFFREY BELL.

## CUCUMARIA CROCEA.

*Holothuria (Cucumaria) crocea*, Lesson, Cent. Zool. (1832), p. 153, pl. lli. fig. 1.  
*Cucumaria crocea*,\* Ludwig, Hamb. Magalh. Sammelreise, Holothurien (1898), p. 15 *ibique citata*.

In the succeeding memoir by Prof. MacBride and Mr. Simpson there will be found an interesting account of the brood-pouches and young of this form. It was taken at Coulman Island, 100 fms., and on various dates at Winter Quarters down to 41 fms.

## CUCUMARIA LAEVIKATA.

*Pentactella laevigata*, Verrill, Bull. U.S. Nat. Mus. i. 3 (1876), p. 76.  
*Cucumaria laevigata*, Ludwig, *op. cit.*, p. 32 *ibique citata*.

The characters of these two species have been fully discussed by Prof. Ludwig, and it is quite unnecessary for me to enter again on the subject.

Taken in Winter Quarters to 41 fms. and in McMurdo Bay.

Several distorted *Cucumariae* and some young were taken at various dates while at Winter Quarters, and at 78° 25' 40" S., 185° 39' 06" E.

## PSEUDOPSOLUS FERRARI.

(Plate V., fig. 3.)

It is unfortunate that this new species should be represented by a single specimen only, but there is no doubt that it is unlike any form that has as yet been described.

Tentacles ten, two much smaller than the rest; trivial pedicels in three complete longitudinal series; dorsal perisome devoid of large scales or grains, flexible and soft to the touch, and having only a few trellis-like spicules. There are some distinct pedicels scattered on the dorsal surface. 73 mm. long, 32.5 mm. greatest width.

The important differences between this species and the only form belonging to the genus which has yet been described are of varying value; the distinctness of the dorsal pedicels is of great significance, for their presence in *P. macquariensis* is so inconspicuous that Prof. Dendy denied their existence, on which Prof. Ludwig has remarked "Zu einer Entschuldigung will ich aber gleich hinzufügen, dass die dorsalen Füßchen sehr gering an Zahl und sehr retraktil sind, sodass sie sich der Beobachtung leicht entziehen können." †

The spicules are more delicate and trellis-like in the new species, and there is a

\* In my 'Southern Cross' Report I cite W. Thomson as the first author of the combination "*Cucumaria crocea*"; he wrote *Cladodactyla crocea* in 1876 (not 1878, and not on p. 55); as all my blunders were made by Dr. Lampert in his "Seewalzen," I stand convicted of neglecting the legendary advice of the venerable gentleman who was once President of my College at Oxford.

† Hamburger Magalh. Sammelreise Holothurien (1898), p. 49.

very considerable difference in size. As there is but a single specimen, I thought the question whether or no it is hermaphrodite might be left over for the present.

The only suggestion that I have to make is that Prof. Ludwig's definition of the genus (*op. cit.*, p. 50) should be altered by the omission of the words "Sehr wenigen," as applied to the dorsal "Füsschen."

As the type of the genus came from Macquarie Island, the two are not widely separated; no information is given as to the depth of the more northern species; the Antarctic form was taken at 20 fms., while at Winter Quarters.

#### THYONE sp.

A young specimen was taken off Cape Adare.

#### MESOTHURIA MAGELLANI.

*Holothuria magellani*, Ludwig, Ber. Oberhess. Ges. xxii. (1883), p. 175.  
*Mesothuria magellani*, Oestergren, Festschrift für Lilljeborg (1896), p. 350; Ludwig, Ergebn. Hamburg. Sammelreise Holothur. (1898), p. 8.

Two much-injured specimens are assigned to this species; I was unable to find spicules, but I do not always expect to find specimens taken out of ice-cold water and from 100 fms. equal to the best products of the laboratories of Naples or Plymouth.

Coulman Island, 100 fms.

## B.—ACTINOGONIDIATA.

### II. CRINOIDEA.

#### COMATULIDAE.

#### PROMACHOCRINUS KERGUELENENSIS.

(Plate I.)

*Promachocrinus kerguelensis*, P. H. Carpenter, Proc. Roy. Soc. xxviii. (1879), p. 385.

This is certainly one of the most interesting finds of the 'Discovery,' for the genus was, till the German South Polar Expedition brought back specimens, only known from the collections of the 'Challenger,' which found two species in the Southern Seas, and one a few degrees north of the Equator. The only addition to our knowledge since Dr. Carpenter's report has been the note by Dr. Minckert of Greifswald,\* while Dr. Bather has suggested that it may be a "permanent meristic variation."† I give a figure

\* Zool. Anzeig. xxviii. (1905), p. 490.

† Treatise on Zoology iii. (1900), p. 195.

of a self-dissected specimen which is, I think, clearer and more illuminating than the originals of the 'Challenger' report. It would be of particular interest to discover fossil examples of this ten-rayed form; at present, all we can say as to the "permanency" of the form is that it has endured for thirty years; as to the polyphyletic origin of the genus which Dr. Bather suggests,\* we can only say that we have only such data as are given by the distribution of the genus. Though Dr. Minckert had made two genera, he has not contributed to the elucidation of Dr. Bather's suggestion.

Taken at East end of Barrier, 100 fms.; off Coulman Island, 100 fms.; and at Winter Quarters.

#### ANTEDON ADRIANI.

(Plate II.)

This new species is represented by a number of specimens; as I have already named a member of the genus *A. wilsoni*, I take the specific name from the second Christian name of Mr. E. A. Wilson, M.B., surgeon and naturalist to the Expedition.

It was taken at various depths, down to 130 fms., at Winter Quarters, and at 500 fms. off Mts. Erebus and Terror.

At first sight this species does not recall the northern *A. eschrichti*, but it shows, on analysis, some striking points of resemblance—the shape of the centrodorsal, the length (but not the number of the cirri), and the shapes of their joints, as well as the form of the first brachial; but what distinguishes the creature from all *Antedons* known to me is the saw-like appearance of the arms when viewed from the side, and well shown in the figure; this is due to the presence of a well-marked square protuberance on the dorsal face of most of the arm-joints.

Arms ten, centrodorsal semicircular, with three rows of cirri; these are from 50–60 in number, may be 60 mm. long, and may have as many as 60 joints; the axillary has a prominent knob, and the outer edge of the first brachial is twice as long as the inner; the arm-joints are stout, laterally compressed, and nearly all have one or two dorsal spinous processes; syzygies are extraordinarily rare in the proximal part of the arm, where, too, the pinnules are rather short; further out they are better developed. No specimen is anything like perfect.

#### ANTEDON ANTARCTICA.

*Antedon antarctica*, P. H. Carpenter, Chall. Rep. Comatulæ (1888), p. 144.

I have compared a single specimen taken at Winter Quarters with those collected by the 'Challenger' at Heard Island, and have no doubt of their identity. Some young specimens, which appear to belong to this species, were also taken.

\* Treatise on Zoology iii. (1900), p. 195.

## III. ECHINOIDEA.

## CIDARIDAE.

## CIDARIS CANALICULATA.

- Temnocularis canaliculata*, A. Agassiz, Bull. M.C.Z. i. (1863), p. 18.  
*Goniocidaris canaliculata*, id. Rev. Echin. (1872), p. 131; Wyv. Thomson, Journ. Linn. Soc. xiii. (1876), p. 65; Loven, Bih. Svensk. Akad. Hdlg. xiii. iv., l. p. 5; Agass., Mem. M.C.Z. xxxi. (1904), p. 4.  
*Cidaris (Dorocidaris) canaliculata*, Döderlein, Jap. Seeigel, i. (1887), p. 16.  
*Cidaris canaliculata*, Meissner, Ergebn. Hamb. Magalh. Sammelreise, v. (1900), l., p. 3 *ibique citata*.  
*Stereocidaris canaliculata*, Mortensen, Ingolf Echinoid. (1903), p. 29.

I have given the name of *C. canaliculata* to a number of specimens of an Echinoid, which were mainly collected at a depth of 100 fms., but I must own to grave doubts as to the correctness of the name. It seems to have escaped notice that this *consensu omnium* (with the exception of Dr. Mortensen\*) circumpolar Antarctic form was first described from the "Caroline Islands," which Caroline Islands we surmise to be those in the Pacific, as in the Revision of the Echini we find "Caroline and Sandwich Islands"; elsewhere, Zanzibar and the Navigator Islands are given as habitats, "if the localities are to be trusted"; that is to say, the species was founded on specimens said to be found within the tropics.

I am not going to join those who claim that forms must differ specifically, either because they are found at different spots or different depths; but, as I showed many years ago, there is a distinct intertropical fauna in the Great Ocean,† and the fact, if fact it be, that a member of that fauna is also a circumpolar Antarctic form ought to rest on the firmest possible basis. Unfortunately, the National Collection has no examples from any station further north than Tasmania.

Again, the original diagnosis, based on the Caroline specimen or specimens, is too short for a form which every student who has examined it, except Dr. Mortensen, allows to be eminently variable; with the exception of Prof. Döderlein, none of these students has given a serious diagnosis of the species, and even his is not altogether what one wants.

Yet another difficulty remains to be mentioned; it is generally agreed that *C. nutrix*‡ and *C. vivipara* are synonyms of *C. canaliculata*; in other words, the form has a marsupial habit, but I cannot detect signs of it in the specimens before me; it may be, of course, as it curiously is in the case of *Hemiaster cavernosus*, that this collection consists of males only; but Mr. Hodgson tells me that he observed no signs of viviparous habit; our experience, in fact, is the same as that of the late Félix Bernard §: "Quoique *G. canaliculata* soit signalé comme vivipare, je n'ai pas constaté aucun jeune sur le corps des adultes."

\* *Op. cit.*, p. 27.

† For some modification of this doctrine, see Prof. Koehler in "Die Fauna Sudwest-Australiens" I. iv. (1907), p. 242.

‡ Prof. Lyman Clark doubts this (see f.-n. next page); of *C. vivipara* of Studer he makes no mention.

§ Bull. Mus. Paris, i. (1895), p. 272.

Specimens were taken at Coulman Island, 100 fms. ; Winter Quarters, 100 fms. ; East end of Barrier, 100 fms.

This species is one that has lately been the subject of some dispute ; Prof. Agassiz,\* who originally described it, suggests that it be placed in a new sub-genus *Centrocidaris*, while Dr. Mortensen † finds it to consist of several species, but he does not appear to be sure of the exact number. ‡

#### ECHINIDAE.

##### ECHINUS MARGARITACEUS.

*Echinus margaritaceus*, Lamk. An. s. V. iii. (1816), p. 47 ; Bell, Coll. 'Southern Cross' (1902), p. 219 *ibique citata* ; Mortensen, Ingolf Echinoid. (1903), p. 101.  
*Echinus diadema*, Studer, MB. Akad. Berlin (1876), p. 456 ; Al. Ag. Chall. Rep. Echin. (1881), p. 117.  
*Echinus horridus*, Al. Ag. *op. cit.* p. 117 ; Mortensen, *op. cit.* p. 102.  
*Stereochinus antarcticus*, Koehler, Echin. Voy. 'Belgica' (1901), p. 8.

This appears to be a circumpolar species, as I remarked when I reported on the collections of the 'Southern Cross.' It was taken by the 'Discovery,' not only at several dates in Winter Quarters, but at the East end of the Barrier Reef, 100 fms. ; at Cape Wadsworth, 8-10 fms. ; off Coulman Island, 100 fms. ; and South of Antarctic Circle, 254 fms.

##### HEMIASTER CAVERNOSUS.

*Spatangus (Tripylus) cavernosus*, Philippi, Arch. f. Nat. xi. (1845), p. 345.  
*Hemiasler cavernosus*, A. Ag. Rep. Ech. (1872), p. 132 ; Meissner, Ergebn. Hamburg Magalh. Sammelreise, v. (1900), p. 13 *ibique citata* ; Bell, Coll. 'South. Cross' (1902), p. 219.  
*Abatus cavernosus*, Loven, Bih. Svenska Vet. Akad. Hdlgr. xviii. 4, no. 1, p. 3.

This species is not very well represented in this collection, and, curiously enough, all the examples are males.

If the late M. Bernard § was right in regarding *Tripylus excavatus* as a synonym, the name of the species ought to be *excavatus*, as that was the first of the three species described by Philippi ; for myself I am inclined to abide by Prof. Agassiz's view.

Taken at Coulman Island, 100 fms. ; Winter Quarters, 20 fms. ; and East end of Barrier Reef, 100 fms.

#### IV. ASTEROIDEA.

The collection of starfishes was rather large, and contained some very fine specimens ; but, as will be shown later, there is very great difficulty in coming to definite conclusions regarding them, and I have preferred to be vague rather than dogmatic in treating of them.

\* Mem. Mus. Comp. Zool., xxxi. (1904), p. 32.

† Ingolf Echinoid. (1903), pp. 25-7.

‡ As the final proof was passing through the press I received Prof. Lyman Clark's latest memoir on the *Cidaridae* (Bull. Mus. C. Z. ii. (1907), no. 7) ; he has instituted a new genus, *Austrocidaris*.

§ Bull. Mus. Paris, i. (1895), p. 247.

## ASTERIAS BRANDTI.

*Asterias brandti*, Bell, Proc. Zool. Soc. (1881), p. 91.

*Asterias neglecta*, id., op. cit. pp. 94 and 506.

Dr. Meissner has suggested that *A. neglecta*, which I described at the same time as *A. brandti*, is the same species. I think he is right; *A. belli* of Prof. Studer and *A. glomerata* of Sladen appear to be also synonymous; with regard to the first three Prof. Perrier suggested the same view in 1891.

My species were described on pp. 91 and 94 of the Proc. Zool. Soc. for 1881; Dr. Meissner's synonymy will be found on p. 7 of the Ergeb. Hamburg Magalhan. Sammelreise, Lief. vii. (1904). I suggested in the report on the 'Southern Cross' collections (p. 215) that the species was circumpolar in its distribution, and so it certainly is.

A large number of specimens were collected; the largest, from 4-10 fms. McMurdo Bay, was the "mother of a number of young after capture" \*; and some other large specimens were taken at No. 3 hole, and some smaller at No. 11. Flagon Point (10-20 fms.), Cape Wadsworth, and Hut Point also yielded examples; the large examples marked '48 and 49 are only said to be from Winter Quarters.

From 100 fms. (East end of Barrier) and 130 fms. (No. 2) specimens were collected which, but for the formidable synonymy of the species, I should be inclined to regard as distinct.

## ASTERIAS LONGSTAFFI.

This fine species is represented by a single specimen, which presents well-marked features. I name it after the generous friend of science whose contribution to the funds of the Royal Geographical Society made the voyage of the 'Discovery' possible.

A large stout form with  $R$  about equal to  $3r$ ; the whole of the dorsal surface is uniformly and densely covered with paxilliform spines of some size. The madreporite is of moderate size; the podia are enormous, the adambulacral spines are long, cylindrical, blunt at the tip, so irregularly set that it is difficult to say whether there are two or three rows; beyond them there are shorter and more delicate, but otherwise similar cylindrical spines very closely set; there are two quite well-marked sets of marginal plates; the inferomarginals are very narrow in the angle of the arm, while the superomarginals in the same region are very short; both sets are covered with coarse granules, among which no pedicellariae are to be detected. The podia within the oral circlet are of enormous size.  $R = 210$ ;  $r = 70$ .

W.Q.; 10-20 fms.

As there is only a single specimen, no comparisons are possible; but it may be

\* These have been made the subject of an interesting separate report by Prof. MacBride and Mr. J. C. Simpson.

pointed out that the closely packed arrangement of the podia, and the distinctness of the two rows of marginal plates are, on Mr. Sladen's basis of classification of Starfishes, mutually destructive; but the well-known observations of Prof. Ludwig on *Echinaster sepositus* justify us in supposing that we have here a case of retarded disappearance of the marginals; the crowding of the podia appears to be a much more important morphological character; but the union of these two strikes, I think, a final blow at the current classification, against which Prof. Ludwig has already raised his voice, and the adoption of which by MM. Delage and Hérouard in their "Zoologie Concrète" came as a great surprise to me.

HEURESASTER\* HODGSONI.

(Plate III.)

Two specimens of a very fine starfish were taken at about 25 fathoms while in Winter Quarters; they appear to me to form the type of a new genus, as to the general position of which there can be little doubt; a still larger specimen was taken from McMurdo Bay at 2 fms.

It has somewhat the appearance of *Porania*, but has, in the larger examples, spines in the interambulacral actinal areas. Prof. Perrier defines the Poraniidae as follows: "Squelette masqué par les téguments; marginales apparentes, mais formant au corps un bord tranchant; squelette ventral formé de séries de plaques allant de chaque adambulacraire à une marginale, squelette dorsal reticulé."

I have invented for it a name which will remind the student both of the name of the ship, and of its indefatigable biologist.

The larger specimens may be thus described: Arms long, tapering to a rather fine point,  $R$  is about = 3. The upper surface is smooth and soft to the touch, and has papulae, in ill-defined areas, spread over the whole of it; the edge is quite sharp, forming almost a ledge, and made up by a large number of small supero- and infero-marginals. The lower interambulacra covered with some eight rows of small regularly set plates covered with rather coarse granules, and, in the angle, with short spines which give a hairy appearance to these areas. The ambulacral groove is bounded by rows of four or five spines, of which the outermost is small and the innermost spatulate and fluted at its free end. The podia are stout. At each oral angle there is a huge spine, the distal third of which is glossy. These specimens are flat, but the smallest example has the disc arched, and this is probably more natural—

$$R = 200 \quad r = 70.$$

$$R = 130 \quad r = 50.$$

$$R = 90 \quad r = 30.$$

Accepting Prof. Perrier's family diagnosis of the *Poraniidae*, we may make the generic diagnosis of *Heuresaster*: Abactinal surface only invested by integument,

\* *Eúpeas*, discovery.

margin very sharp, the inner actinal ambulacrals with spines, the oral angle provided with a large spine. While the specific characters would appear to be that the longer radius is more than twice as long as the shorter radius, the marginal plates are very numerous, and the innermost ambulacral spine is spatulate and fluted at its free end.

The smallest specimen has not quite acquired the generic characters of the larger; the abactinal integument is not so thick as to altogether hide the superficial granules, and the granules on the actinal interambulacra have not developed into spines, so that there is no marked difference between the outer and the inner parts of these areas.

#### PENTAGONASTER INCERTUS.

The single small specimen, is, I think, an ally of the Australian species of *Pentagonaster* (*sens. lat.*), but the arms are proportionately longer than they generally are in this genus; it is, possibly, an immature specimen in which  $R$  would gradually increase in proportion to  $r$ . If it should prove to be an adult, its proportions may be compared to those of *P. duebeni* and *P. gunni*; it is, however, to be distinguished by the fact that there are no large plates on the actinal inter-radial areas, the plates being of the character of, and a little larger than, the small squarish granular plates which bound the marginals; these last number about 12/14 for the side of each arm, and are completed by a large terminal; there are two rows of well-developed spines at the sides of the ambulacra; those of the inner row are nearly twice as long and as numerous as the outer. I propose to call this form *Pentagonaster incertus*; it was taken at 96-120 fms., in MacMurdo Bay.

#### LEPTOPTYCHASTER KERGUELENENSIS.

*Leptoptychaster kerguelensis*, E. A. Smith, Phil. Trans. 168 (1879), p. 278, pl. xvii. 2; Sladen, Chall. Rep. Ast. (1889), p. 184; Bell, Mar. Invert. S. Africa iii. (1905) p. 242.  
*Leptoptychaster antarcticus*, Sladen, *op. cit.* p. 190.

I must own to some temerity in associating a specimen in which  $R = 212$  and  $r = 58$  with a species whose type had  $R = 38$  and  $r = 12.5$ , and a representative of which, hardly much larger, was found to be bearing young; but even the most recent writers on Echinoderms have not yet promulgated the doctrine that difference in size is a specific character, though I am not quite sure that in practice they do not sometimes act as though they had. However, one has only to get a clear idea of the essential characters of this genus to feel sure that one has it here; as to specific characters, it is first to be said that most of the *L. kerguelensis* material is badly preserved, while the condition of *L. antarcticus* is particularly good. Though the differences between the two species appear, from Mr. Sladen's lengthy description, to be considerable, it will, I think, be found on examination of the specimens preserved in the Museum, that *L. antarcticus* is but the expression of some early stages of *L. kerguelensis*. It will be remembered that both "species" come from closely adjacent localities. At any rate, we now know that the specimens of *L. antarcticus*

are small, and that the known adults of the genus are large; it is safe, therefore, to conclude that this specific name may be made a synonym.

Mr. Hodgson collected some quite young examples chiefly in W.Q., and, with the specimens sent by the Government Biologist at the Cape of Good Hope, we have now a very satisfactory series; it was also taken at McMurdo Bay, 96-100 fms.

CYCETHRA VERRUCOSA.

(Plate V., fig. 1.)

*Goniodiscus verrucosus*, Philippi, Arch. f. Nat. 1857, p. 132, *teste* Meissner, Zool. Anz. xxi. (1898), p. 394.  
*Cycethra simplex*, Bell, Proc. Zool. Soc. 1881, p. 96; *id.* Coll. 'Southern Cross,' 1902, p. 215 *ibique citata*.

I was much to blame for neglecting or forgetting, in 1902, Dr. Meissner's very useful note; the alteration of the name is not, of course, of the least importance to any sensible human being, but the knowledge that the species extends nearly as far north as Valparaiso is of great interest and significance, for it shows us that the distribution is far wider than we supposed; had Dr. Leipolt (Zeit. f. wiss. Zool. lix. (1895) p. 602) known of it, he would have spoken with less point than he did, when he doubted Prof. Studer's locality of 38° 10' S.

The variations of this species are truly bewildering; I have had an extreme form figured, and offer a slight account of it; it was long before I could convince myself that it is *C. verrucosa*, and I am doubtful as to convincing others.

The upper surface is uniformly covered by delicate spines which end in a few, not more than ten, paxilli; the space between these spines is soft and membranous; the lower surface is densely covered with spines of moderate length and sharp at the tip; the spines bordering the ambulacral grooves are somewhat irregularly arranged, but are longer and blunter than those that crowd the interambulacral spaces; there is a single glossy spine at each angle of the mouth. The two rows of marginal plates are well defined, and the paxilli are somewhat longer and more numerous than those on the upper surface of the body. The madreporite is very prominent and is not far from the centre; close to this last there is a small tuft of white spines which, I suppose, guard the anus. Colour, light creamy yellow; body flat;  $R = 55$ ;  $r = 20$ .

Examples were taken on various dates at Winter Quarters; off Castle Rock, 14 fms.; Cape Wadsworth; Coulman Island; McMurdo Bay, 20 fms. It does not appear to inhabit deep water.

HENRICIA ORNATA.

*Echinaster (Cribella) ornatus*, Perrier, Ann. Sci. Nat. xii. (1869), p. 251.  
*Henricia ornata*, Bell, Mar. Invert. S. Africa, iii., (1905) p. 250.

*H. ornata* is recorded by Sladen from Campbell Island; his *H. simplex*, which is a synonym, was taken off the Crozets, Marion Island, etc.

One specimen was obtained off Coulman Island, 100 fms.; one from 4-10 fms. McMurdo Bay; and three from 96-120 fms., in the same bay.

## SOLASTER OCTORADIATUS.

*Solaster octoradiatus*, Ludwig, Voy. 'Belgica,' Seesterne (1903), p. 25, pl. iii.

A single specimen of this species was taken at 100 fms., off Coulman Island. As the 'Belgica' took it at four stations between 80° and 88° West, it is, perhaps, a circumpolar species.

Two specimens of Starfish remain to be noticed, which I shall not name, as I feel confident that they have undergone some change either in formalin or otherwise, or are abnormal specimens which will not be again found; one English naturalist has so burdened the literature of Starfishes with generic names based on immature specimens that I may be pardoned for not following in his footsteps.

Both of these specimens are very soft to the touch, owing to the numerous large papulae and the apparent absence of any hard parts on the upper and lower surfaces of the Starfish, with the exception of a large and prominent madreporite, and of a few spicules round the vent; the ambulacral grooves are wide, and the podia of large size; there are two well-marked rows of spines, the more proximal of which are blunter and more flattened than the more distal; beyond the outer row there is some slight difference in the two specimens, for in one the integument rapidly becomes smooth, while in the other regular rows of spines may extend as far as the margin. I have not seen any pedicellariae.

The "register numbers" of these two specimens are: 1906. 1. 22; 2 & 3.

## V. OPHIUROIDEA.

Though the collection of Brittlestars is large, there are not many species; the two new genera signalled by me in the report on the 'Southern Cross' collection are both well represented, and of *Ophiosteira* there is so remarkable a variety that I am constrained to add another figure to those that I have already published. There are many small immature forms which will be of much use in studying the evolution of species, but to which it would be most unwise to give definite systematic names; as it is, I am perhaps a sinner, though not so great as some, for I should be hard put to it to defend myself against the suggestion of MM. Delage and Hérouard,\* that *Ophiocrene* is a young *Astrophyton*.

## OPHIURA KOEHLERI.

Like *O. flagellata* of Lyman, in having the disc covered with smooth skin, in which, in neither of the two specimens, are small scales distinctly visible; the lower arm spines are deeply imbedded in the skin, and thick skin obscures the forms of the

\* Zool. Concrète iii. (1903), p. 159.

oral plates. The diameter of disc is 27 or 20 mm. ; no arm complete ; width of arm at base about 4 mm., upper arm plates broader than long ; about 7 arm spines, the upper free and pointed at their free ends, the lower shorter, imbedded in thick skin, and blunted at the tip ; lower arm plates with narrow distal and proximal edges. Arm insertion of disc well marked and guarded by about 15 spines, of which the median are distinctly the larger.

Colour in spirit : disc sickly white, arms more the colour of human flesh.

Taken at  $67^{\circ} 21' 46''$  S.,  $155^{\circ} 21' 10''$  E. 254 fms.

I am sorry that both the specimens of this interesting species are a good deal broken, as I should have liked to have had something better to offer to the honour of the distinguished French naturalist who has done so much for our knowledge of Ophiuroids.

#### OPHIOZONA INERMIS.

*Ophiozona inermis*, Bell, Rep. 'Southern Cross' (1902), p. 217.

This species, which was not well represented in the earlier collections, was found on numerous dates during the stay of the 'Discovery' at Winter Quarters.

It exhibits a very wide range of variation, so great indeed as to have been at first quite bewildering ; and it may be noted that Mr. Hodgson did not recognise any of them as belonging to an already known Antarctic form.

In the 'Southern Cross' report I figured some of the remarkable variations in the arrangement of the plates of the dorsal surface of the disc of *Ophiosteira antarctica* ; a similar, but less striking, variation obtains in this *Ophiozona*. In *O. antarctica* I described the serrated and keeled appearance of the upper surface of the arm ; this is to be seen also in some examples of *O. inermis*. The most striking differences are to be seen in the height of the disc, and the size of the so-called radial shields ; so that it is by no means always true that the shields are inconspicuous.

Winter Quarters, 10-178 fms. (various dates) ; MacMurdo Bay, 96-120 fms. ; East end of Barrier, 100 fms. ; off Barrier, 300 fms. ; Coulman Island, 100 fms.

In some specimens the dorsal plates of the disc are deeply incised ; this appears to be due to want of sufficient calcareous matter, but as others are infested by a sponge it is possible that it is the cause.

#### OPHIOSTEIRA ANTARCTICA.

(Plate V., fig. 2.)

*Ophiosteira antarctica*, Bell, Rep. 'Southern Cross' (1902), p. 218.

It appears that the 'Southern Cross' did not exhaust the variations in the disc plates of this wonderful species ; the upstanding plates shown in Plate V., fig. 2, are worthy of record, and it may be noted that the single arm left to this disc has the dorsal serration extremely well marked.

In the original diagnosis of the genus I spoke of "a large keel-like plate on the disc, which completely overshadows the radial shields," although I was aware of and figured (Plate XXVI., fig. 3) an angle of the disc in which there appeared to be two large radial shields; in this case, however, three of the angles of the disc conform exactly to the diagnosis.

I have now before me a specimen in which all five angles have a pair of plates. Were it not for the 'Southern Cross' specimens it would not be possible to put this specimen with the genus *Ophiosteira* at all.

When we are asked whether "specific characters are useful," we may retort that generic characters even are not always constant.

Winter Quarters, 13 fms. Coulman Island, 100 fms.

#### OPHIONOTUS VICTORIAE.

*Ophionotus victoriae*, Bell, Rep. 'Southern Cross' (1902) p. 219.

This species was not so abundant; it was taken off the Barrier at 300 fms., near Franklin Island, and from 254 fms. at an unrecorded locality.

#### OPHIACANTHA IMAGO.

*Ophiacantha imago*, Lyman, 'Chall.' Rep. Ophiur. (1882), p. 186 *ibique citatum*.

I hope I am right in referring to this species specimens from Winter Quarters, 30 fms.; Hut Point, 77° 12' 12" S., 167° 27' W., 77° 50' 30" S., 165° 40' E., 100 fms.; but, in sooth, some of the 'Challenger' types of Ophiuroids are hardly mature.

#### OPHIACANTHA VIVIPARA.

*Ophiacantha vivipara*, Ljungman, Öfv. Vet. Akad. Forh. 1870, p. 471; E. A. Smith, Phil. Trans. 168 (1879), p. 278, pl. xvii. fig. 3.

A number of authors have mentioned this species, but, since Dr. Lütken was cited by Mr. Edgar Smith, I.S.O. (Phil. Trans., vol. 168, p. 278), as doubtful of Ljungman's original locality ("Altatam urbem mexicanam"), none seems to have remarked on the apparent peculiarity of the distribution of this species.

Prof. Théel has been so good as to let me see Ljungman's Altatan specimen, and at the same time to inform me that the types of Ljungman's *Ophiacantha vivipara* were brought home from two quite different localities, Altata and Falkland Islands. Ljungman does not give (*op. cit.*) the latter locality, but Lütken (Zool. Record 1872, p. 448), threw grave doubts on the Mexican origin of the specimens, and suggested that Patagonia was the "true habitat of the typical specimen." What is really more interesting is the question whether the brood-pouch habit of a given species is found in the confines of the tropics as well as in the colder waters of the globe.\*

\* For a list of the viviparous Echinoderms of warmer waters, and for their preponderance in Arctic and Antarctic Seas, cf. Ludwig, Zool. Jb. Suppl. Bd. vii. (1904), p. 684.

The single\* six-armed specimen taken by the 'Discovery' at 8-15 fms. off Cape Wadsworth is a good deal stouter than Ljungman's types, but I can see no reason for making it a new species; the arms of the young may be seen projecting from some of the bursae.

OPHIACANTHA COSMICA.

*Ophiacantha cosmica*, Lyman, Chall. Rep. Ophiur. (1882), p. 194 *ibique citatum*.

This widely spread species was taken on various occasions, but many of the specimens have been marked by me "immature"; in connection with this I should like to quote some words of Mr. Lyman: "The specimen just described is unusually large for this division of the genus, which leads me to think that the bulk of those now known are immature, and therefore to be treated with all the more caution."

Winter Quarters. Off Coulman Island, 100 fms. Off Barrier, 300 fms.

OPHIOCONIS ANTARCTICA.

*Ophioconis antarctica*, Lyman, Chall. Rep. Ophiur. (1882), p. 107 *ibique citatum*.

If I have correctly determined some specimens from Winter Quarters, the types of Mr. Lyman's are very far from reaching the size to which this form attains.

AMPHIURA BELGICAE.

*Amphiura belgicae*, Koehler, Res. Voy. 'Belgica' (1901), p. 27.

The Antarctic area appears to be the home of large specimens of *Amphiura*; not only did the 'Discovery' bring home several examples of what appear to be the species obtained by the 'Belgica,' but there is a single specimen off the Barrier at 301 fms., which has a disc diameter of 18 mm.,† and which can hardly, I think, be the fully adult example of the somewhat smaller specimens; but, as it is solitary, I hesitate to regard it as an undescribed species.

Several specimens of *A. belgicae* were taken at Cape Wadsworth, 8 to 15 fms., and off the Barrier at 300 fms.; the latter is, as already said, the locality of the single larger form. Like *Solaster octoradiatus*, *A. belgicae* is probably a circumpolar species.

YOUNG OPHIURID.

(Plate IV.)

I give some figures of a remarkable Ophiuroid, to which it is very difficult to assign a systematic place; it appears to be a young form in which some of the arm-plates are still not consolidated. The exceedingly large size of the bursal slits is perhaps only due to the mode of preservation.

Two specimens, both broken, were taken in Winter Quarters on 2. 1. 04, and two off Barrier.

\* As there is but a single specimen this collection throws no critical light on Prof. Koehler's just-made suggestion that this species exhibits sexual dimorphism; cf. Bull. Sci. France xli. (1907), p. 322.

† That is exactly the same as the disk diameter of *A. magnifica*, of which Prof. Koehler has lately published a brief diagnosis. See Zool. Anz., xxxii., p. 146 (17 Sept. 1907), but the species is not the same.

## ASTROTOMA AGASSIZI.

*Astrotoma agassizii*, Lyman, Ill. Catal. Mus. C. Z. No. viii. II. (1875), p. 24.

Mr. Lyman calls attention to the coarse granulation on his single specimen, which came from the Straits of Magellan; the series now collected shows that the granulation may be more or less obscured by thick skin. It is remarkable that the species was not collected by the 'Gauss.'

McMurdo Bay, 96-120 fms.

Specimens from off Coulman Island, and from  $77^{\circ} 12' S.$ ,  $167^{\circ} 27' E.$ , 2 fms. seem to be sufficiently different to be regarded as varieties.

## DESCRIPTION OF PLATES.

## ECHINODERMA.

## PLATE I.

*Promacochrinus kerguelenensis.*

- FIG. 1.—Disc and base of arms from the side to show the insertion of the cirri, and the form of the cirrus pit, and the shape of the disc.  $\times 2$ .
- FIG. 2.—Disc and base of arms from below; the central boss is more distinctly seen than in fig. 1.  $\times 2\frac{1}{2}$ .
- FIG. 3.—An arm from the side,  $\times 3$ ; the roughened edges of the joints are well seen in this figure; the proximal pinnules only are completely shown.

## PLATE II.

*Antedon adriani.*

General view of this Crinoid.  $\times 2$ .

## PLATE III.

*Heuresaster hodysoni.*

$\times$  not quite  $\frac{3}{2}$ , seen from below, to show the breadth of the ambulacral grooves, their size and arrangement.

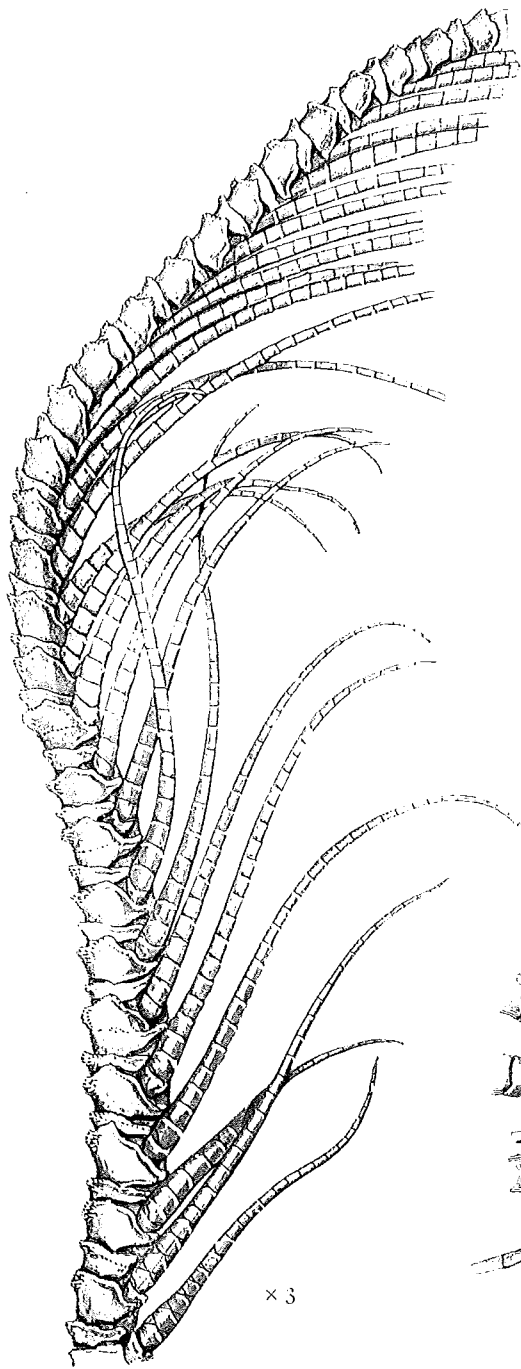
## PLATE IV.

The young Ophiurid (see p. 14).

- FIG. 1.—Aboral view of disc and arm.  $\times \frac{9}{4}$ .
- FIG. 2.—Oral view of same.  $\times \frac{9}{4}$ .
- FIG. 3.—View of mouth to show arrangement of the oral and adjacent plates.  $\times 8$ .
- FIG. 4.—1st, 2nd, and 3rd upper arm-plates.  $\times 10$ .
- FIG. 5.—View of arm from above, at about its middle.  $\times 10$ .
- FIG. 6.—1st, 2nd, and 3rd lower arm-plates.  $\times 10$ .
- FIG. 7.—View of arm from below at about its middle.  $\times 10$ .

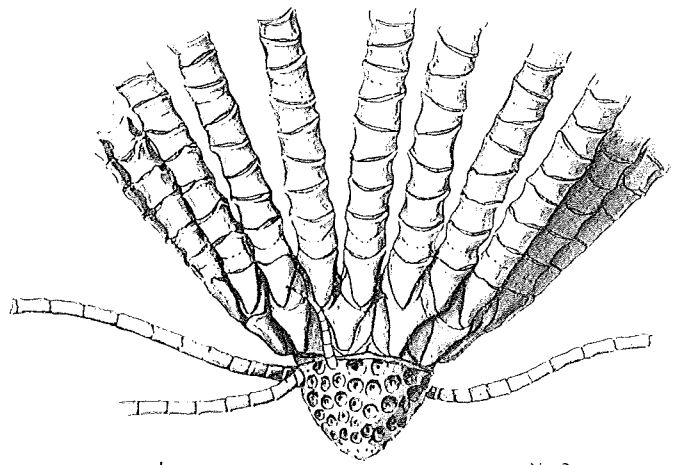
## PLATE V.

- FIG. 1a.—Variety of *Cycethra* (see p. 10) from above; fig. 1b from below; both slightly reduced.
- FIG. 2a.—Disc of an *Ophiosteira* (see p. 12), magnified to show keel-like plates; 2a, seen from above; 2b, seen from the side.
- FIG. 3.—*Pseudopsolus ferrari*.  $\times \frac{3}{2}$ .



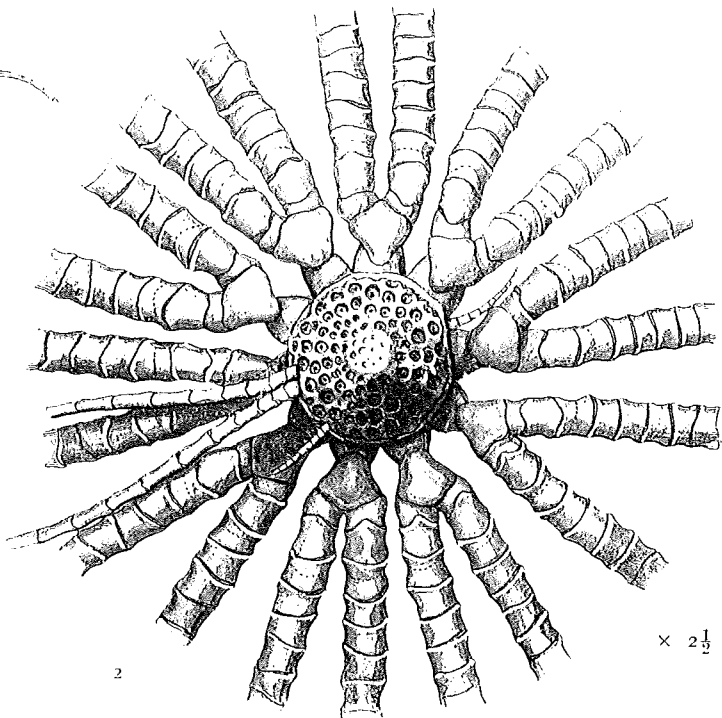
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x 3



1

x 2



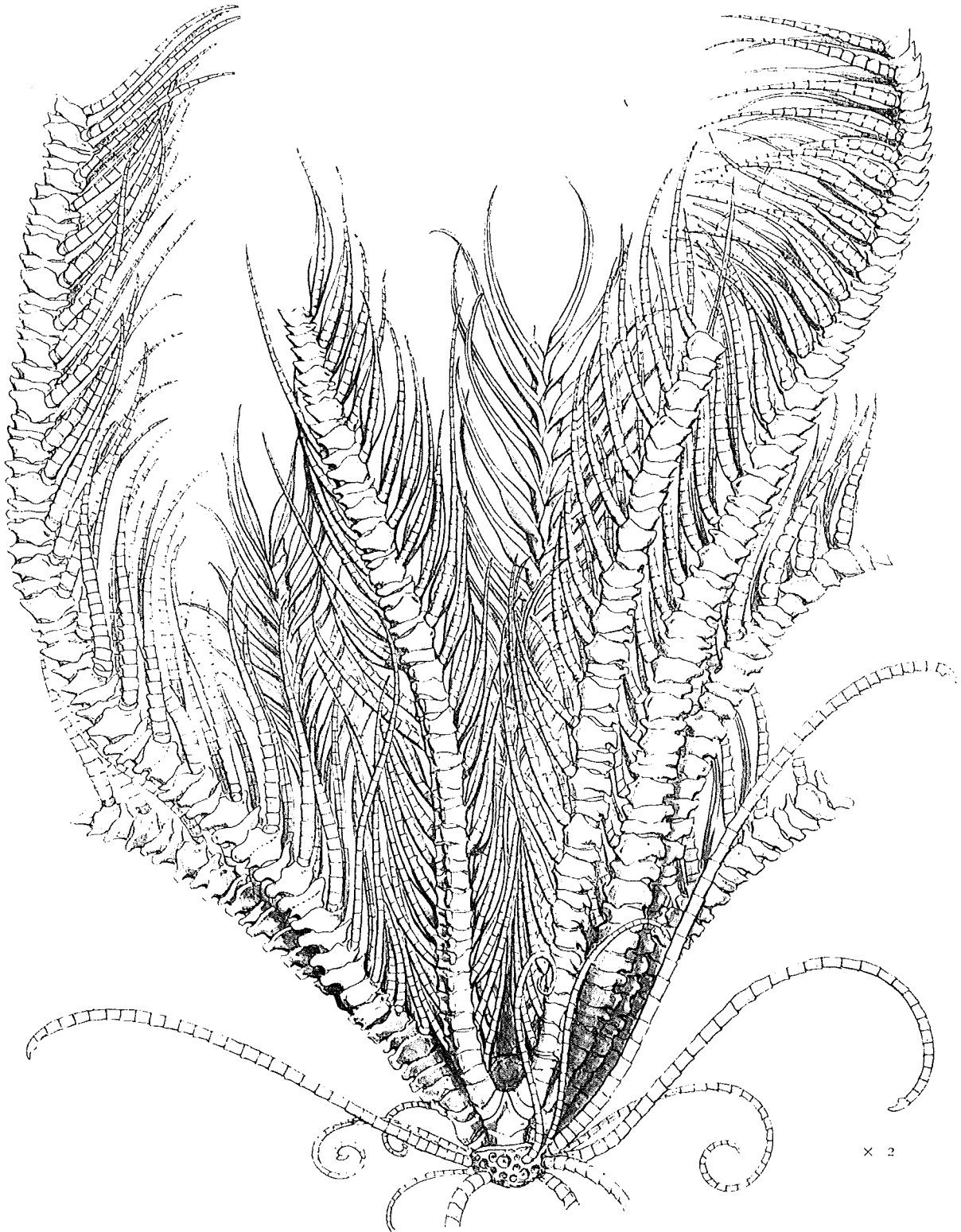
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x 2 1/2

Antarctic (Discovery) Exp.

Echinoderma pl. I.

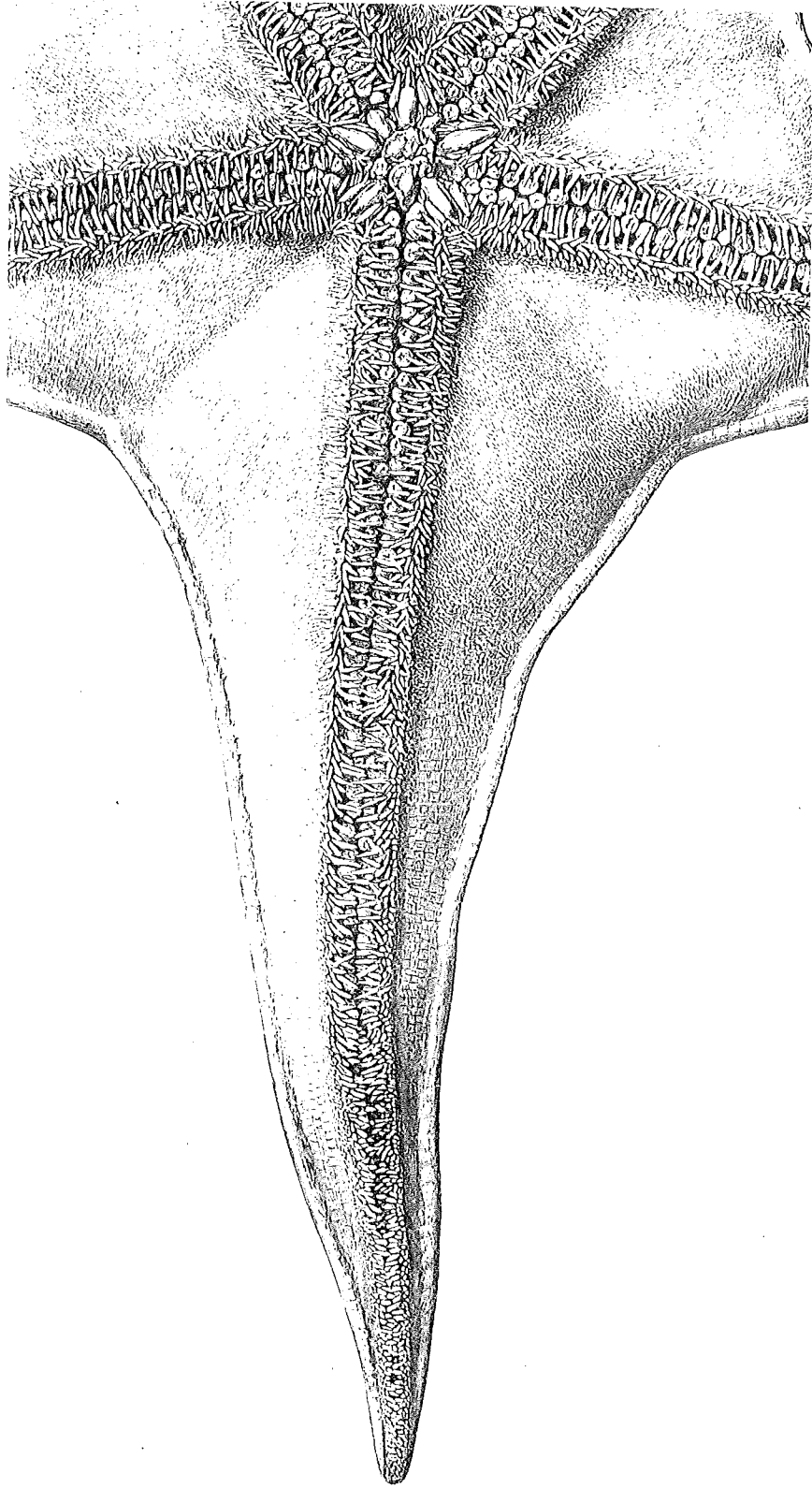
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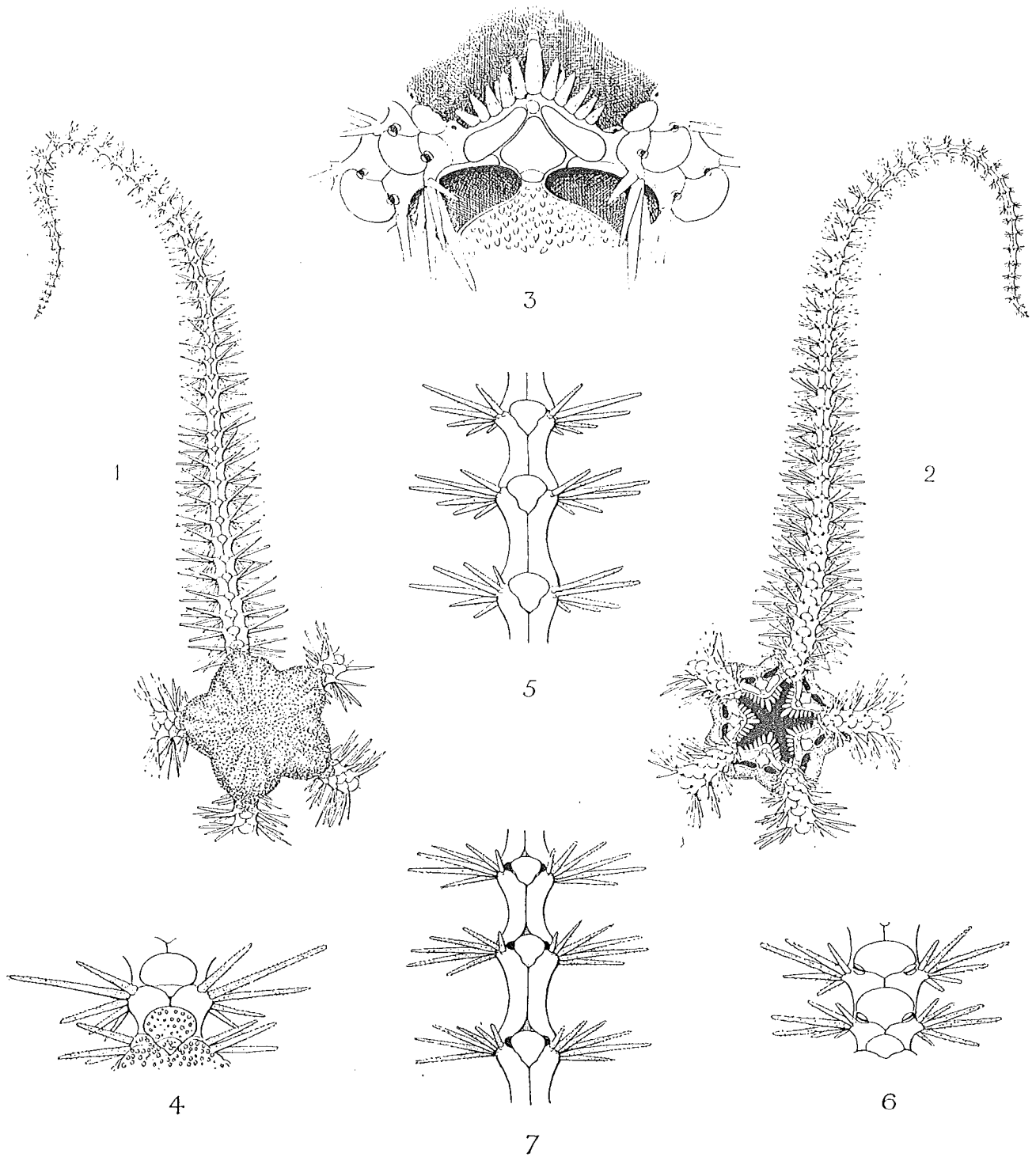
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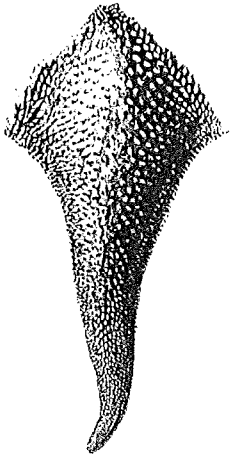
A. J. E. Terzi, del. Butterworth, sc.



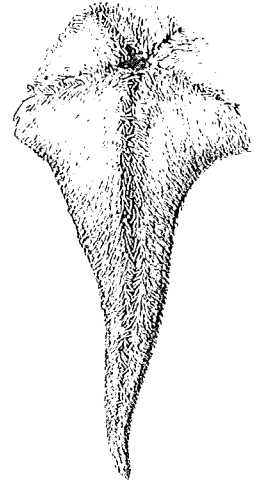
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Berjeau, del. J. Butterworth, sc.

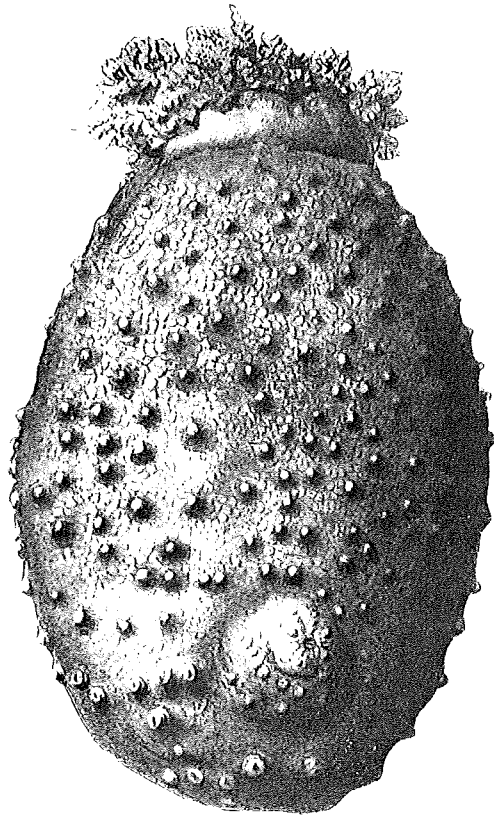
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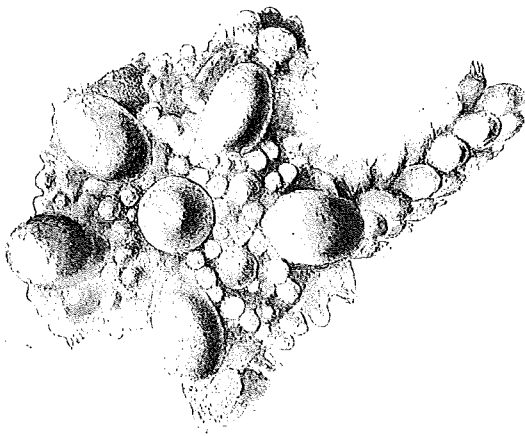
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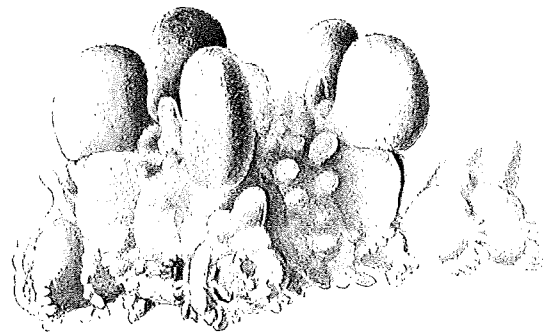
1b



3



2a



2b

Antarctic (Discovery) Exp.

Terzi, del. Huth, del. Butterworth sc.