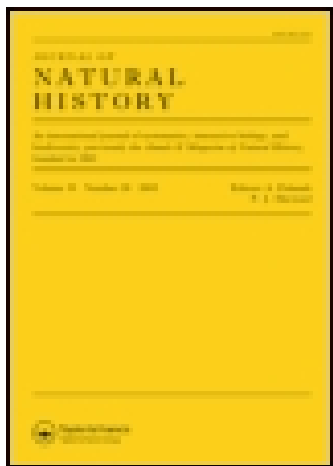


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ECHINODERMATA.

By F. JEFFREY BELL, M.A., Sec.R.M.S.

[Plates XVIII. & XIX.]

The collection of Echinoderms made by Mr. Green is of very great interest and importance; it contains several excellent specimens of *Phormosoma placenta*, the type of which seems to be lost, and was, as Wyville Thomson reports, imperfect. The species of *Echinus* present, as may be expected, considerable difficulty, and it is clear that much to be said with regard to them must be considered as tentative; the range of variation exhibited by *Spatangus Raschi* is enormous, and the possibility of hybrids existing between it and *S. purpureus* will have to be borne in mind. *Asterias rubens* comes from 100 fathoms, a greater depth than any yet recorded; for the first time we are able to enumerate among the British deep-sea Echinoderms a species of the genus which Mr. W. Percy Sladen has lately described under the name of *Nymphaster*; *Astrogonium* is represented by a new species taken at 1000 fathoms, and there is an excellent series of *Astropectens*. There is a remarkable form from the same great depths which appears to be allied to *Hymenaster*; but I think it well to postpone an account of it till I am able to compare it with those described by Mr. Sladen, which will, I hope, shortly find their resting-place in the National Collection. I propose in like manner to defer an account of a remarkable Ophiurid till I have had under my eyes the *Ophiobyrsa hystricis* which was described some time since by Mr. Lyman, but which has not yet been deposited in the Museum; our specimen, which is unfortunately both unique and dry, agrees exactly with Wyville Thomson's description of "a very large Ophiurid with thick arms, upwards of 3 decimetres long, and a large soft disk resembling that of *Ophiomyxa*, to which genus it seems to be allied;"* but it does not correspond at all with another *Ophiobyrsa*, viz. *O. rudis*.

I must not conclude these introductory remarks without giving expression to the opinion that one of the most necessary pieces of work now to be done in marine zoology is the investigation of the deep-sea fauna of the south-west coast of Ireland.

A. PELMATOZOA.

I. CRINOIDEA.

Antedon bifida, Penn.*Antedon rosacea*, auct.

In the present state of our knowledge I must refer to this

* 'Depths of the Sea,' p. 124.

species two specimens from 250 fathoms. Dr. H. Carpenter intends to investigate the limits of this species; it will, I think, be contrary to what usually happens when questions of this kind are closely studied if he should be led to any other conclusion than that we have here to do with what may justly be called a protean species. The depth recorded is greater than any yet given by 150 fathoms.

Antedon phalangium, J. Müller.

A single specimen from 250 fath. Dr. H. Carpenter gives 30-220 fath. as the bathymetrical range of the species. Mr. Green's dredging therefore slightly increases the range.

B. ECHINOZOA.

II. ASTEROIDEA.

Pontaster tenuispinis, Düb. & Kor.

Of this common species several specimens were sent from 315 fath.; "many" were also dredged at ? 250 fath. The finest specimens are unfortunately a good deal injured; but a good series was got, as some of the specimens are quite young.

Astropecten irregularis, Penn.

A number of specimens from various depths, 250, 500, and 1000 fath. The species is so variable that it would be unsafe to regard the arrangement of spines, proportion and number of marginal plates, and so on in these examples as in any way characteristic of deep-sea forms. I cannot, indeed, see any special points in them; but the depths are noteworthy, as Mr. Sladen has none greater than 374 fath.

Luidia ciliaris, Phil.

Two specimens, from 55 fath.

Astrogonium Greeni. (Pl. XIX. fig. 4.)

$$R=27, r=12.5.$$

The curve between the arms is well rounded; there are seven or eight superomarginal and seven to nine inferomarginal plates; those of the upper and lower series do not correspond regularly; the innermost are longer than wide, one or two about the middle of the row tend to be square, and the more external are wider than long; the terminal superomarginal

plate is elongated, and the more so when there are seven than when there are eight plates, while the terminal inferomarginal plate is triangular. The abactinal plates of the disk are uniformly granulated and are irregular in shape, with a not very well-marked tendency to be hexagonal in form. The ultimate, and sometimes also the penultimate, superomarginal of either side of each arm is not separated from its fellow by any of the abactinal plates.

The granules of the plates of the actinal are somewhat coarser than those of the abactinal surface; on each side of the middle line of the arm there are two rows of plates, one of which extends to the end of the arm and the other halfway. The adambulacral spines are short and square at their tip, so that they differ hardly at all from the granules of the adjacent plates; they are arranged in a single row, and there appear to be ordinarily five on each adambulacral plate. The groove is exceedingly narrow and the tube-feet are not to be seen in the single specimen collected. There are no signs of any pedicellariæ, and there are no spines. The madreporite is undistinguishable. The appearance of the specimen in alcohol is somewhat leathery, owing to the comparatively thick membrane with which it is invested.

Dredged at 1000 fath.

I have particularly compared this new species with the description of *Stephanaster Bourgeti**, Perrier, which Mr. Sladen has lately transferred to the genus *Astrogonium* and which was dredged off St. Vincent and the Cape-Verde Islands at 189-317 fath.; but the difference in the proportion of the greater and less rays, the larger number and different form of the marginal plates, and the absence of the remarkable pedicellariæ in our species are quite sufficient to show that there is no close relationship between these two forms.

Nymphaster protentus.

Nymphaster protentus, Sladen, Chall. Rep. Ast. p. 303.

Five specimens, one quadriradiate, from 315 fath.

I was at first inclined to regard these as examples of a new species; but a careful examination shows that they vary a good deal among themselves, and a more careful study of Mr. Sladen's description leads me to the conclusion that it is a *specimen* and not a *species* which he has described. As the 'Challenger' collection of Asteroids has not yet been deposited in its future home, the British Museum, I have had to content myself with the description and figures.

* Ann. Sci. Nat. xix. (1885), art. 8, p. 31.

This species, now for the first time recorded from the British seas, is here represented by specimens all larger than Mr. Sladen's type, for the smallest has the greater radius more than 71 millim., and the largest has a greater radius of as much as 100 millim.; in correspondence with this the number of marginal plates may be much nearer forty than thirty. Mr. Sladen states expressly that there are no spines on the marginal plates, but distinct, though small, spinous tubercles may be developed, particularly on the inferomarginals; but their distribution is so irregular and their presence or absence seemingly so uncertain as to divest this character of any specific value at all. There is somewhat greater irregularity in the disposition of the adambulacral spines than is indicated in the original description. The groove marking the boundaries of the disk-pentagon varies a good deal in distinctness; this may be partly due to the specimens having been, unfortunately, dried; this may, further, explain why the abactinal disk-plates are not so regular in disposition, the primary embryonic plates so distinct, or the madreporite so prominent as they appear to be in the type specimen. None of these characters are, however, of value as indications of specific distinctness. As the 'Challenger' examples were dredged in 1525 fath. south-west of the Canary Isles, the locality at which Mr. Green found his specimens is one which is only probable enough.

Cribrella sanguinolenta, O. F. M.

Taken at 55 fath.

Asterias rubens, L.

Taken at 100 fath. Mr. Green justly remarks that this is a great depth for this species, and Mr. Sladen, in his recently-issued 'Challenger' Report, does not give a lower depth than 53 fath. A larger and more normal specimen was taken at 55 fath.

Brsinga coronata, G. O. Sars.

An injured specimen was brought up from 1000 fath. This depth is interesting, for though the species is known to come from still greater depths, all those reported for examples taken during the 'Porcupine' cruises are less *.

* See Sladen, Chall. Rep., Asteroid. p. 604.

III. OPHIUROIDEA.

Ophiothrix pentaphyllum, Penn.

Two large specimens from 200–315 fath., which would, I imagine, be referred to *O. Luetkeni*, Wyv. Thoms.*; I must own, however, that the variations exhibited among the better known littoral representatives of this species are so great that I cannot bring myself to look upon the specimens before me as anything more than large, well-marked individuals of this variable species.

IV. ECHINOIDEA.

Cidaris papillata, Leske.

Taken at various stations, from 150 to 315 fath.; as usual, in some localities the species was very abundantly represented. The specimens do not exhibit in any marked degree the variation to which Prof. Wyville Thomson has called attention, for they may all be said to have the spines rather long and slender than stout. In a young specimen the echinulation of the spines is more marked than in those which appear to be adult.

Phormosoma placenta.

Phormosoma placenta, Wyv. Th.

The capture of this species was perhaps the greatest of Mr. Green's achievements; so far as English naturalists are concerned the disappearance of the Echinids described by Sir Wyville Thomson in the 'Philosophical Transactions' for 1874 has been a misfortune, as they have never had the opportunity of examining this form for themselves; the other specimens known to have been collected are those which were obtained by the 'Knight Errant' in the Færoe Channel †, and by the 'Blake' in American waters; the only naturalist who has, so far as can be gathered, had the opportunity of examining these specimens is Prof. Alex. Agassiz, who has chiefly occupied himself with describing the changes due to growth and discussing the affinities of these forms. Though such investigations are of interest and importance, we are still in need of that more elementary and less exciting information which consists in an adequate knowledge of the species itself

* 'Depths of the Sea,' p. 100.

† With it should be noted, dredging-apparatus provided at the expense of Sir W. Thomson; cf. Proc. Roy. Soc. Ed. xi. p. 644.

and of allied forms. The marked divergence in the statements which I now have to make with regard to *Phormosoma placenta* from those made by two brilliant and accomplished German naturalists with regard to an apparently allied species is sufficient to show this.

I should add that I have made some use of the material obtained by H.M.S. 'Challenger,' but the unique condition of some of the specimens, the disappearance of the viscera of others, and the absence of the remarkable *P. rigidum* have prevented me from making the investigation as complete as I wished.

In the interesting essay on the Echinothuriidæ *, which Dr. P. and Dr. F. Sarasin based on the beautiful form *Asthenosoma urens*, which they discovered off Ceylon, especial attention was directed to the organs of Stewart; these are of considerable size in the Ceylon species. Notwithstanding the fact that no description of these organs has been given by Thomson or Agassiz, the Doctors Sarasin ascribe to the Echinothuriidæ as one of their distinctive characters a "gewaltige Entfaltung der Stewart'schen Organe," and they say, further, "Sowohl die Cidariden als die Diadematiden besitzen die Stewart'schen Organe, welche bei den Echinothuriden reich entwickelt sind, in rudimentärer Ausbildung." I was somewhat interested to discover how it was that organs so remarkably well developed had not been seen by previous observers. The first example I opened served to settle the question on the same principle as that on which Tilburina could not see the Spanish fleet; the organs of Stewart were not there to be seen. In some anxiety to bring this state of things into conformity with the very absolute statement of the Drs. Sarasin I opened another specimen; here I found the arrangement shown in Pl. XVIII. fig. 2, which is drawn of the natural size, the whole test being 110 millim. in diameter. I come to the conclusion therefore that in *Phormosoma* the organs of Stewart may be present in a rudimentary or vestigial condition, or may be absent; I have been unable to find any trace of their presence in *Phormosoma bursarium* or *P. tenue*; but as these specimens have been several years in spirit, I will not lay much stress on the apparent absence of these organs. I need not do that to show that there is a considerable difference in the anatomical characters of the two genera, differences which most of us have tacitly assumed not to exist, which, possibly, we had no reason to expect to see, but as certainly no reason not to expect.

* Ergebnisse naturw. Forsch. auf Ceylon, I. 3. Ueber die Anat. der Echinothuriden u. die Phylog. der Echinodermen.

One of the most interesting discoveries of the Drs. Sarasin was that of the muscles which divide the test into a series of compartments and appear to be the agents in the vermicular contractions of the living test; this again they have made one of the characteristics of the Echinothuriidæ, and here, again, they have unfortunately argued from the particular to the general. These "Längsmuskeln" are altogether absent from *Phormosoma*. An interesting proof of this may be easily afforded: if a *Phormosoma* be opened and water poured into the test the whole test swells up; if a quadrant of an *Asthenosoma* be laid open and water poured in the whole test does not swell up, and such a specimen if returned to spirit will be found to float with one quadrant upwards, just as though it were provided with air-tight compartments; these, of course, are the "Kästchen" of the Sarasins. I am not, however, sure that, even confining ourselves to the genus *Asthenosoma*, as at present defined, we can always speak of the longitudinal muscles as being well developed; they certainly are remarkably well developed in *Asthenosoma Grubii*, but they are very poorly so in the smaller *A. pellucidum*. With the absence of the muscle is correlated that of the Kästchen, and with that of the Kästchen the peculiar loop of intestine in each alternate compartment. I do not like to lay too much stress on the apparent absence of the organs of Stewart from *Asthenosoma Grubii* and *A. pellucidum*; delicate membranes might well be injured or collapsed in specimens all of which were collected before 1876 (that is, of course, during the cruise of H.M.S. 'Challenger'), and I am not saying they are not to be found in all species of *Asthenosoma*; I have, however, some doubt as to whether or no they are so large or so constant as they seem to be in *A. urens*.

However that may be, the condition which obtains in *Phormosoma* shows that the large size of the organs of Stewart is not a character of the Echinothuriidæ. I need not press this point further by urging that this single fact will dispose of a good deal of the speculation which made Messrs. Sarasin's essay more than usually interesting.

Six specimens were dredged at 1000 fath, five of which are in the possession of the British Museum; the colour of the test preserved in alcohol varies from lightish yellow to a distinct purplish colour; in all cases, unfortunately, the spinulation is practically destroyed.

	Diam. of test. millim.	Diam. of mouth. millim.	Diam of apical area. millim.
A....	125	36	20
B....	110	34	18
C....	100	32	18
D....	95	24.5	15.5
E....	80	21	14.5

The specimens A and B were opened ; before this was done a small hole was made and spirit injected, so as to moderately distend the test ; the height of A was then 40 and of B 30 millim.

ECHINUS.

As will be readily supposed by those who know the difficulties always presented by a number of northern specimens of this genus, I have had to puzzle long over the large number of examples which Mr. Green collected. At this moment the matter seems to me clear enough, but I am by no means confident that if I had taken the set of specimens in a different order I should not have arrived at a different conclusion. I seem to have before me :—(1) *Echinus acutus*, (2) *Echinus microstoma*, and (3) *Echinus esculentus* ; I have had to detail at what will, I fear, be a wearisome length the doubts and difficulties I have experienced as to a fourth species which seems to me to be probably *E. elegans*.

Echinus acutus, Lamk.

First, as to the matter of the name I follow Prof. A. Agassiz (1872) in regarding *E. Flemingi* as synonymous with *E. acutus* ; Sir Wyville Thomson records *E. Flemingi*, Ball, but not *E. acutus*, as having been taken by the ‘ Porcupine.’ Thomson gives no reason for the adoption of Ball’s name, though it is clear from p. 722 of his memoir that he was acquainted with Mr. Agassiz’s ‘ Revision ;’ in the matter of nomenclature, however, these two authors are often at variance, and Thomson holds *E. acutus* over (see p. 744).

E. acutus was obtained by Mr. Green at 55, 110, 500 fath.

E. acutus certainly varies considerably ; there is one well-marked variety in which the spines are a good deal longer than usual and bright crimson at the base when dry ; for example, in a “ typical example ” one of the longest spines measured 37 millim., and in the variety 46 millim., both being from the same haul of the dredge. This long-spined variety was found of different sizes, the proportionately longer spines being visible even in quite moderately sized specimens.

Echinus microstoma, Wyv. Thoms.
(Pl. XIX. fig. 1.)

There is certainly among these Echini a species distinct from *E. acutus* or *E. esculentus*; it has a bright red test and that test is depressed and thin. It is a little doubtful how much stress should be laid on colour and particularly red colour in Echinoderms; depressed tests may certainly be seen in specimens of species which are not always characterized by their possession; but the thinness of these tests is quite well marked. The specific name calls attention to the characters of the mouth; but smallness and largeness are relative terms, and I give, therefore, some measurements which Wyville Thomson omitted to add to his description. I have also thought it necessary to refigure the species, for the representations offered by Thomson are by no means good, and the differences between *E. microstoma* and *E. elegans* are hardly at all indicated. A reference to figs. 8 and 9, pl. lxviii. of Thomson's memoir and to fig. 3, Pl. XIX. of the present paper will show the difference in the form of the C-shaped spicules of these two species.

Diam. of test. millim.	Height of test. millim.	Diam. of mouth. millim.	Diam. of anus. millim.
50	25 *	12	5
	(50)	(24)	(10)
47	20	13	5
	(42·5)	(27·6)	(10·6)
43	19·5	11·5	5
	(45·3)	(26·7)	(11·6)
40	21	10·5	4·5
	(52·5)	(26·2)	(11·2)

Echinus esculentus, L.

Two specimens, one from 50–66 fath., the other from 110 fath.

Both examples are somewhat compressed instead of being globose, and tend towards the "marked variety with a tall, narrow test" spoken of by Sir Wyville Thomson (*t. c.* p. 744). The lowest recorded depth for this species that I can find is 80 fath.; Prof. Agassiz gives no specific information on this point in his 'Challenger' Report.

* As no measurements have yet been given of this species, I give the absolute values; the percentage values, which are much more valuable for the purposes of comparison, are added in brackets. There is no better method for showing the range of variation. For the purposes of comparison I give the following percentage measurements of a rather young *E. acutus*, the diameter of which is 51 millim.:—height 58·8, mouth 35·3, anus 18.

Echinus elegans, D. & K.
(Pl. XIX. figs. 2 and 3.)

I refer to this species four specimens from 250 fath.; but I have had great difficulty in making up my mind about them, for the Museum is very poorly provided with examples of what Sars called an "overordentlig sjeldne Art," though a good many would seem to have been collected by the 'Porcupine.' The four examples now before me are all small, and there would be no reason to suppose that they are sexually mature were it not that Wyville Thomson * has put on record the existence of a small ("pony") race of *Echinus norvegicus*; I am quite unable to settle the question, as the specimens were all dried before being sent to me †.

I cannot see on these specimens the "beautiful vermilion bands, extending from the apex towards the ambitus on both sides of the bare median vertical line," which Prof. A. Agassiz states to be the feature by which *E. elegans* may be "recognized from its congeners" ‡; but I do not see the same bands in a beautiful and perfectly preserved specimen (62 millim. in diameter) which the Trustees have lately acquired from the Bergen Museum, and which was taken in the Hardangerfjord at a depth of 150 fath.; and they agree well enough with the diagnosis of Düben and Koren. They cannot be expected to agree very closely with the figure given by those distinguished naturalists, on account of the marked difference in size.

It often happens that a minute histological character goes a long way in settling doubtful questions of resemblance, and the fact that the spicules in the suckers of these small specimens are exactly similar to the straight-backed C-shaped spicules of the tube-feet of an undoubted *C. elegans* has done much in deciding me as to what name to apply to these specimens. I greatly regret that, though I have made several efforts, I have not yet succeeded in obtaining examples of what other workers in Echinology have called *E. elegans* §.

* 'Depths of the Sea,' p. 117.

† It often happens that one has to lament the fact that while spirit has been saved the specimens have been for some purposes lost.

‡ Rev. Ech. p. 491.

§ With a single exception of some specimens from Norway, sent me by a curator of a museum who had not a very large series, and who had so named some examples of *E. acutus*. Since the above was sent to press the Rev. Dr. Norman has, with his usual generosity, sent me a number of specimens of *Echinus* for examination. An inspection of them leads me to think that I have rightly ascribed the four specimens now under discussion to *E. elegans*.—Nov. 7, 1889.

The 'Challenger' is reported to have collected the species at "St. 46" and off Tristan d'Acunha; but, as the following measurements show, the specimens so determined by Prof. A. Agassiz are much more depressed and have a much longer periproct and a larger anus than the specimen from the Bergen Museum.

	Diam. of test.	Height of test.	Diam. of mouth.	Diam. of periproct.	Diam. of anus.
Bergen specimen ..	62	49	21	13	6
Tristan d'Acunha ..	70	35	20	20	10
St. 46	65	30	20	18	8

If other specimens diverge as widely from a fairly typical example as do those determined by Prof. Agassiz, we are a long way yet from getting either a consensus of opinion or accuracy in comparison.

I will, with the aid of Mr. Highley's pencil, do my best to let my fellow-students understand what I mean by young specimens of *E. elegans*, and I add the following measurements, as they will be of use:—

	Diam. of test.	Height of test.	Diam. of mouth.	Diam. of periproct.	Diam. of anus.
i. . .	19	8.5	7.75	5.5	3
ii. . .	19	9	7.5	6	2.5
iii. . .	15	8	5.5	..	2
iv. . .	12.5	5.5	6	..	2

The spines have the appearance of being broken at their tips; the longest I have found are on tests iii. and iv., on each of which there is a spine 12.5 millim. long. With regard to the broken look of the spines, it is to be noted that the figure illustrative of Düben and Koren's paper illustrates the same point, and that it is also to be observed in the well-preserved specimen from the Hardangerfjord already mentioned.

Spatangus purpureus, O. F. M.

Two specimens, of moderate size, from 50 to 60 fath.

Spatangus Raschi, Lovén.

A fine series from 100 to 180 fath., showing how very considerably this species varies, so much so, indeed, that one is almost inclined to suspect that it forms hybrids with *S. purpureus*. In the latter the primary spines are, as is well known, much longer, stronger, and more prominent than the

secondary or smaller spines; in *S. Raschi*, on the other hand, this difference is, typically, hardly noticeable, and in correspondence with this the tuberculation is much more uniform. In one of the specimens of *S. Raschi* now lying before me the spines are as long and as prominent as in a specimen of *S. purpureus* of nearly the same size; in another, somewhat larger, the spines are much longer than we generally find them in *S. Raschi*; but they are much more uniform in size than in either the first-named specimen or than in *S. purpureus*, and, so far, the latter could not be confounded with the more common species. Nor could the first-named, but for a different reason; it is much higher than a *S. purpureus* of the same length, but the second specimen, though some 10 millim. longer, is about 2 millim. less high, and, of course, looks much less high than its smaller companion.

With the difference in the size of the spines there is, of course, correlated a difference in the size of the tubercles which bear them; an inspection of Prof. Lovén's figure* shows that the difference is not very marked in his type specimen. I removed the spines from a specimen which, in its spinulation, most closely resembles *S. purpureus*, and I find on cleaning the test that some of the tubercles are more than ordinarily larger than the rest; the general facies of this test is, however, distinctly that of *S. Raschi*.

So, again, it may be noted that while some tests are less deep than others, others are more rounded; again, variations may be seen in the depth of the peristome. On the whole the most constant character of the deeper-water species appears to be the form of the labrum; this is always more pointed and convex than in *S. purpureus*.

We may, then, observe with regard to a number of the so-called specific characters of *S. Raschi* that they vary within very wide limits. Of the specimens collected not one would be assigned to any other species, the general facies of *S. Raschi* being maintained throughout; but on analysis the several "specific characters" are found for the most part to vary considerably.

These observations seem to me to have some bearing on the question of the utility of specific characters, for they show that we must exercise the greatest caution in the selection of the points of structure which we use as such marks. It would be preposterous to imagine any zoologist more capable than Prof. Lovén of discriminating between two species of Echinoids, and yet among the characters by which his species

* Öfv. Vet.-Akad. Förhandl. 1869, pl. xiii.

is distinguished from the commoner form he enumerates the spines, *S. purpureus* having "radiolis primariis eminentioribus colore albicante insignibus;" but the differences between the two species in this particular are much reduced when a series is examined. On the other hand, whether specific characters are useful or not, spines are certainly valuable to the individual which possesses them. As the accompanying measurements show, the form of *S. Raschi* may vary a good deal, and these variations must affect such characters as are indicated by such expressions as "ambitu fere orbiculato, dorso multo minus convexo, margine magis rotundato." This brings us to another still unsettled question:—How far are characters that vary within considerable limits to be used as specific characters? and to such a question we can well imagine different systematists giving very different answers.

Questions like these may well be raised, if the answers that are given are tentative and not dogmatic. The only moral I can definitely see is one which has been, but must again and again be, insisted on. The definitions of species are often drawn up from a few specimens, or perhaps only one; with increased knowledge of the representatives of such species our judgment as to its characters is bound to be affected by the variations which will undoubtedly present themselves—very much so when the describer has a small knowledge of the group—to some extent even when the description is by the hand of a master in his science.

Among the specimens is one which is considerably depressed and deformed; but the abnormal characters which it presents do not seem to throw any light on the characters of the species.

Measurements of Spatangus Raschi.

Percentage value of		
Long. diam.	Transv. diam.	Height.
107	86	60·74
91	85·7	70·3
90	97·7	75·5

Brissopsis lyrifera, Forbes.

Two spineless specimens, of ordinary size, were taken in 5 fath.

V. HOLOTHURIOIDEA.

Holothuria tremula, Gunner.

Dredged at 100 and 315 fath.; it was dredged from greater depths than these by the Norwegian North-Sea Expedition.

Holothuria aspera. (Pl. XVIII. fig. 3.)

Although there is but a single specimen of what I think is certainly a new species of *Holothuria*, the spicules appear to be so characteristic that there is no harm in giving a name to a form of which we shall, I hope, soon obtain a supply large enough to enable me to give a complete account of its special points.

This single specimen is a good deal contracted and the tentacles are all withdrawn. The skin has to the touch a peculiar roughness, which is no doubt due to the very dense deposit of spicules in it. Above, the skin is wrinkled, below it is smooth; on each side there is a single row of not closely packed pedicels; no other processes are to be detected. The colour of the skin is a dirty grey. The length of the body is 77 millim. and the greatest breadth 46.

The spicules are particularly difficult to isolate; their general form is well shown in fig. 3, Pl. XVIII.

The processes or arms may touch or overlies one another. As there is only one specimen I have not dissected it.

It was dredged at 1000 fath.

EXPLANATION OF THE PLATES.

PLATE XVIII.

Fig. 1. *Phormosoma placenta* laid open, so as to show the lantern and the parts adjacent thereto. It will be noticed that the organs of Stewart are altogether wanting. Natural size.

Fig. 2. The same, opened as before. s in three radii points to small projecting cæca, two of which are quite small and the third hardly more than a papilla. Natural size.

Fig. 3. Calcareous spicules from the skin of *Holothuria aspera*. $\times 220$.

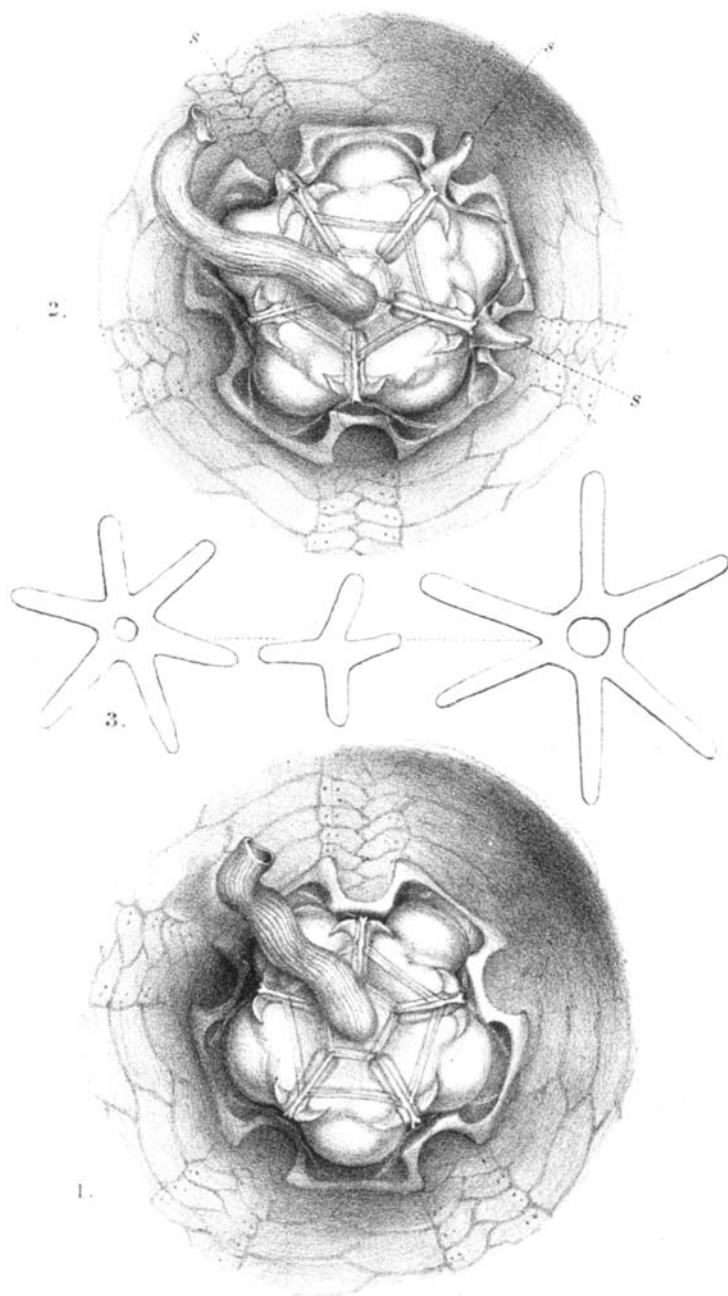
PLATE XIX.

Fig. 1. *Echinus microstoma*. The specimen from which this figure was taken agrees in all essential characters with one which is referred to the same species by the Rev. Dr. Norman and which was collected by the 'Porcupine.' Natural size.

Fig. 2. *Echinus elegans*, small specimen. $\times 2$.

Fig. 3. C-shaped spicule of *Echinus elegans*. $\times 220$.

Fig. 4. *Astrogonium Greeni*, seen from above. $\times \frac{3}{2}$.



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Mintern. Scs imp

1. 2. *Phormosoma placenta*.
3. Spicules of *Holothuria aspera*.

