

On the Fauna of the Outer Western Area of the English Channel.

By

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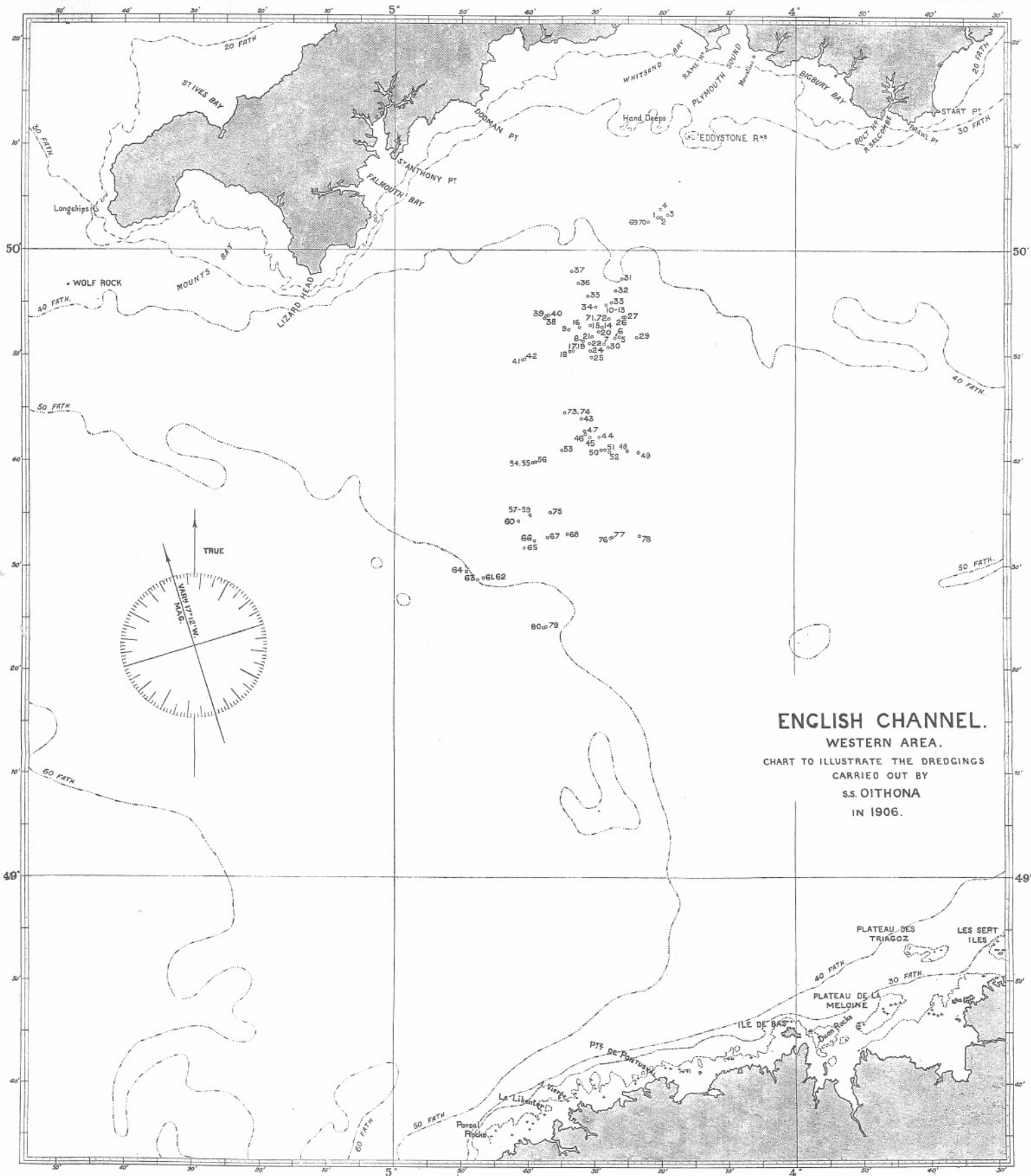
With Plate VI.

IN a previous number of this Journal* a Report was published by Mr. R. H. Worth on the geological collections made in the English Channel by the Association's steamer *Oithona* in 1906, combined with other previously unpublished geological records relating to the same area. The general features of the area concerned, with details of the dredgings on this occasion, were described by me (4) in an accompanying paper. It was hoped that the Report on the Fauna then collected, for which indeed the cruises were specially arranged, would be published long before now; but owing to unavoidable causes the complete working out of the material has been unfortunately delayed for a long interval.

The area of investigation as illustrated by the accompanying chart extends roughly from ten to fifty miles outside the Eddystone Lighthouse, in a S.W. Mag. direction, and ranges from 40 to 53 fathoms in depth, reaching about the mid-Channel line near the latter sounding. A few points already dealt with in the paper referred to may be repeated here. The nature of the ground over the whole area, with the exception of the first few miles, may be generally described as shell, sand, and gravel, largely intermixed with stones, which often reach very considerable dimensions, and show a gradual increase in average size as the distance increases outwards, the highest average being obtained near the outermost point that was reached. The inner limit of exposure of these stones was found at fifteen miles to the south-westward of the Eddystone. At positions falling inside this point the bottom deposit consists of a clean shell sand, much finer than is found at any other point in the area concerned.

As regards the gear employed, the otter trawl was used at Positions 3 and 4, within the fine sandy area last mentioned, and at Positions 7, 8, 49, 64, 66, 68 and 78, outside it; but the frequent occurrence of large stones involved too great a risk to use the otter trawl often at the outer positions, and with the exception of those taken with the Agassiz trawl at Positions 45, 46, 52, 59 and 60, all the remaining

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ENGLISH CHANNEL.
WESTERN AREA.
 CHART TO ILLUSTRATE THE DREDGINGS
 CARRIED OUT BY
 S.S. OITHONA
 IN 1906.

Crawshay. Fauna of Outer Western Area of the Channel.

hauls were made with the dredges. Of these latter, fifteen were bottom samples, most of them not exceeding one minute in working duration; fifteen were made with a 3 ft. rectangular dredge, averaging twelve minutes in duration; eighteen were made with a 3 ft. 6 in. rectangular dredge, averaging eight minutes in duration; and seventeen with an equiangular dredge, measuring 2 ft. on the side, averaging seven minutes in duration. The short length of these hauls must therefore be borne in mind in considering the intensity of occurrence of any of the species recorded. In the following list of hauls all positions are referred to their true bearing from the Eddystone Lighthouse. Samples 16 to 30 inclusive were taken more especially as rock samples, and in consequence only a rough record of species, made on board at the time, was preserved. They have not therefore the value of others in which the unidentified material was brought home for examination. They concern, moreover, a limited area, from eighteen to twenty-three miles outside the Eddystone, and in point of species recorded from them are merely additional to other hauls made within the same area.

LIST OF HAULS.

No.	True Bearing from Eddystone.	Distance. Miles.	Depth. Fathoms.	Gear Used.	Length of haul. Minutes.	Remarks.
1	S. 21° W.	8.3	40	3' 0" Dredge	15	
2	S. 19° W.	8.1	40	{ 1' 6" Dredge with canvas bag }	3	Bottom sample
3	S. 15° W.	7.8	40		Otter Trawl	
4	S. 21° W.	7.6		" "	30	
5	S. 19° W.	20.2	42	3' 0" Dredge	15	
6	S. 20° W.	20.4	42	" "	10	
7	S. 23° W.	21.2	42	Otter Trawl	30	
8	S. 27° W.	21.8		" "	30	
9	S. 31° W.	21.7		3' 0" Dredge	20	
10	S. 26° W.	17.8	42½	" "	5	
11	"	"	42½	" "	10	
12	"	"	42½	" "	10	
13	"	"	42½	" "	17	
14	S. 24° W.	20.0		" "	15	
15	S. 27° W.	20.3		" "	10	
16	S. 29° W.	20.9	44	" "	10	
17	S. 28° W.	23.3	45	" "	11	
18	S. 29° W.	23.4	45	" "	10	
19	S. 28° W.	23.3	45	" "	10	
20	S. 25° W.	20.5	44	" "	10	
21	"	21.2	44	Triangular Dredge	9	
22	"	21.9	44	" "	4	

No.	True Bearing from Eddystone.	Dis- tance. Miles.	Depth. Fath- oms.	Gear Used.	Length of haul. Minutes.	Remarks.
23	S. 25° W.	21.9	44	Triangular Dredge	-	} Bottom sample from previous haul
24	S. 24° W.	22.5		" "	5	
25	"	23.0	46	" "	8	
26	S. 20° W.	18.4	44	" "	8	
27	S. 19° W.	18.3	44	" "	8	
28	} S. 14° W.	19.8	44	" "	7	
29						
30	S. 21° W.	21.5	43½	" "	10	
31	S. 25° W.	15.0	40	3' 6" Dredge	10	
32	"	16.3		" "	7	
33	"	17.5		" "	7	
34	S. 28° W.	18.5		" "	8	
35	S. 32° W.	18.0		" "	8	
36	S. 37° W.	17.5	43	" "	8	
37	S. 41° W.	17.1		" "	9	
38	S. 38½° W.	22.2	44	" "	7	
39	S. 38° W.	21.9	44	" "	4	
40	"	21.7	44	Triangular Dredge	5	
41	S. 36½° W.	26.6	44	" "	7	
42	S. 36° W.	26.4	44	" "	6	
43	S. 21° W.	28.8	45	" "	10	
44	S. 17° W.	29.8	46½	" "	10	
45	S. 18° W.	30.1	47½	Agassiz Trawl	15	
46	S. 19° W.	29.9		" "	15	
47	S. 19° W.	29.7		{ 1' 6" Dredge with canvas bag }	½	Bottom sample
48	S. 11° W.	30.5		" "	½	Bottom sample
49	S. 9° W.	30.4		Otter Trawl	30	
50	S. 16° W.	30.9	43	{ 1' 6" Dredge with canvas bag }	2	Bottom sample
51	S. 15° W.	30.8	43	{ Triangular Dredge 3' 6" Dredge }	{ 5 10 }	} The two consecu- tive samples were labelled "51" in error
52	S. 14° W.	31.0	43	Agassiz Trawl	25	
53	S. 22° W.	32.2	46	3' 6" Dredge	10	
54	S. 26° W.	34.5	49	{ 1' 6" Dredge with canvas bag }	1	Bottom sample
55	S. 25½° W.	34.4	49	" "	1	
56	S. 25° W.	34.3	49	Triangular Dredge	4	
57	S. 22° W.	39.0	49	{ 1' 6" Dredge with canvas bag }	2	Bottom sample
58	"	"	49	3' 6" Dredge	10	
59	"	"	49	Agassiz Trawl	25	
60	S. 24° W.	40.0		" "	30	

No.	True Bearing from Eddystone.	Dis- tance. Miles.	Depth. Fath- oms.	Gear Used.	Length of haul. Minutes.	Remarks.
61	S. 25° W.	46.4	50	{ 1' 6" Dredge with } canvas bag }	1	Bottom sample
62	"	"	50	3' 6" Dredge	7	
63	S. 25½° W.	46.8	50	Triangular Dredge	7	
64	S. 27° W.	46.6	53	Otter Trawl	30	
65	S. 22° W.	42.2	52	{ 1' 6" Dredge with } canvas bag }	1	Bottom sample
66	S. 21° W.	41.1		Otter Trawl	30	
67	S. 19° W.	40.5		Triangular Dredge	10	
68	S. 17° W.	39.6		Otter Trawl	55	
69	S. 25° W.	9.0	40	Conical Dredge	½	Bottom sample
70	"	"	40	3' 6" Dredge	11	
71	S. 23° W.	19.0	43	Conical Dredge	¼	Bottom sample
72	"	"	43	3' 6" Dredge	7	
73	S. 24° W.	28.8	45	Conical Dredge	⅓	Bottom sample
74	"	"	45	3' 6" Dredge	4	
75	S. 20° W.	38.1	49	Conical Dredge	⅓	Bottom sample
76	S. 9° W.	38.9	49	" "	½	Bottom sample
77	S. 11° W.	38.8	49	3' 6" Dredge	7	
78	S. 7° W.	38.3		Otter Trawl	65	
79	S. 16° W.	48.7	51	Conical Dredge	¼	Bottom sample
80	S. 16½° W.	48.9	51	3' 6" Dredge	7	

VII. Records of species made under this Roman numeral refer to a doubtful position in Cruise VII. In the course of this cruise, one of the labels of part of the material that had been collected was lost by a mishap, and it was not possible afterwards to locate the position. The cruise extended over an area of twelve miles in width, covered by the hauls 54 to 68, and the material can only be considered as belonging to one of these positions, ranging in depth from 49 to 53 fathoms.

The Director has given me much assistance with the Polychaeta and in many other ways. The few Gephyrea recorded were identified by Mr. G. Southern. The more difficult of the Polyzoa were worked out by Miss Alice Heath, and against records for which she is responsible the letter (H) is placed, as opposed to my own records followed by the letter (C). I have also to record my thanks to Dr. Hartmeyer for the naming of the Tunicata, with his notes on the species, subject to his most recent revision of that group; to Mr. A. E. Hefford for the identification of some of the Fishes; and to others who have kindly assisted me on special points arising. For the working out of the material, where not otherwise stated, I am myself responsible.

GENERAL REMARKS.

The most marked feature of the fauna of this outer area of the Channel is its close conformity in the main with that of the Plymouth neighbourhood. Regarding the latter as the area enclosed by a line passing from Start Point to the Eddystone Lighthouse and thence to Looe Island, the fauna of the outer area may be compared with that of the Plymouth neighbourhood under three heads, concerning (1) species common to both areas, (2) species occurring in the Plymouth area which are absent from the outer area, (3) species occurring in the outer area which are absent from the Plymouth area.

(1) By far the greater bulk of the material comes within this category. With the exception of those that can scarcely be considered among the commoner species, and which are therefore less often met with generally, and excluding strictly littoral species, the majority of the species were found extending with more or less frequency over the whole area. Reference here then will only be made to those more familiar species the limited records of which seem to point to a limit of distribution, or to species which call for special remark in other ways. Distances where mentioned are from the Eddystone Lighthouse, and roughly to the south-westward in direction.

PORIFERA. *Clathrina coriacea* was only once recorded. The species, usually of littoral habitat, gives place at about 18 miles to forms which I have referred to *Clathrina primordialis*. One of the latter approximates closely in spiculation to *C. coriacea*, and great as is the difference of spiculation between the two extremes, I am bound to admit a certain doubt as to whether a gradual transition may not prove to exist between them associated with a difference of habitat, in one and the same species.

Leucosolenia complicata, though occurring nearly everywhere, was remarkable for its slender, straggling habit of growth, possibly due to a lack of proper food-supply.

Sycon ciliatum was only obtained at two closely approximate positions about 22 miles distant. Outside this, the only closely allied species was the southern species, *Grantia capillosa*, which was obtained as close in as the first position, 8 miles distant. The latter species certainly also occurs near or even inside the Eddystone, though the few Plymouth specimens in the Laboratory Museum are without data of locality.

Leucandra fistulosa, generally distributed in the Sound, only once occurred at the first position, 8 miles distant.

Polymastia mammillaris, common at certain points on rocky ground

in the Sound, was obtained only at 31 and 39 miles, in contrast to *P. robusta*, which occurred fairly commonly over the whole area.

Ficulina ficus, though of common occurrence as far as 40 miles out, was always of remarkably small size—much more so than it often occurs on the Eddystone Grounds. This reduction of growth, as contrasted with the comparatively enormous size it often attains within the breakwater, is no doubt attributable to the diminution of waste organic matter on the distant grounds.

Suberites carnosus, comparatively common on the Eddystone Grounds was only twice found, at 17 and 22 miles respectively. These also were extremely small specimens.

HYDROMEDUSAE. Except at the first few positions, on the fine sand about 8 miles distant, and again at the outermost point reached, where in 51 fathoms two southern species showed a healthy luxuriant growth, the examples recorded were on the whole remarkably small, and the occurrence of well-grown colonies was quite exceptional. In the same connection the dwarfed form of *Plumularia setacea* at two outer positions in about 50 fathoms is remarkable.

Merona cornucopiae was taken as far as 31 miles distant, which was 10 miles beyond the outermost record of its common associate *Dentalium entalis*.

Hydractinia echinata was only taken at 31 miles.

Tubularia was only recorded at the first position, 8 miles distant.

Halecium halecinum was not recorded outside about the 34-mile point.

A fragment only of *Thuiaria articulata* was taken at 18 miles.

Antennularia ramosa, though occurring as far out as 40 miles, was not found common anywhere. The allied species, *A. antennina* was common over the whole area.

Plumularia catharina was the commonest of its genus obtained, *P. pinnata* alone approximating to it appreciably in point of frequency. The creeping variety, which occurred over the whole area, was perhaps the most frequent and certainly the most flourishing in point of growth. It is difficult to assign a cause for this mode of growth. A colony of *Bougainvillia*, reared by Mr. E. T. Browne at the Plymouth Laboratory some years ago (cf. *Journ. Mar. Biol. Assoc.*, N.S., Vol. VIII, p. 37) assumed a persistent stoloniferous habit of growth from the first. It was fed with mixed plankton regularly and grew rapidly, but in the several months of its existence, except in very rare cases, it made no attempt to assume the ordinary branching habit, even though it ultimately succumbed to an overgrowth of small algae. This single instance affords no evidence that food-supply alone in-

fluences the manner of growth where the latter is variable. Yet the seeming scantiness of the Hydroid fauna over most of the outer area, coupled with the frequent records of small colonies, and distinctly dwarfed colonies in the case of *P. setacea* point to conditions that are unfavourable to healthy growth in the group.

ECHINODERMATA. *Palmipes placenta* was not found outside the 17-mile point, and at the latter only as small specimens.

Echinus acutus was not recorded inside a distance of 15 miles, which is about the inner limit of the stony ground. *E. esculentus*, on the other hand, occurred over the whole area, and in considerably greater numbers.

POLYCHAETA. The outer limit of occurrence of *Aphrodita aculeata* was at 20 miles; that of the nearly allied *Hermione hystrix* extended to 46 miles. The latter species seems generally to favour grounds of a coarse character.

Halosydna gelatinosa occurred only at 39 miles.

Onuphis conchilega was not found beyond the 26-mile point.

CRUSTACEA. *Portunus depurator*, often an abundant species in the Sound, and found abundantly by Dr. Allen (1) 3 miles east of the Eddystone, was only once obtained at 17 miles.

Atelecyclus septemdentatus has been recorded from as much as 100 fath. and even 400 fath. (cf. Allen, 1), but in the area here considered it was not found beyond 30 miles. This species is scarcely likely to have been much missed in the work owing to the constant use of the dredges with a special view to deep working. Allen considers that a certain amount of muddy deposit contributes to the most favourable conditions for the species, and it is possible that the almost entire absence of any such deposit on the outer grounds may explain its infrequency and even disappearance at the more distant positions visited.

MOLLUSCA. *Craspedochilus onyx* was not recorded beyond 20 miles.

Capulus hungaricus, taken on five grounds by Dr. Allen between Start Point and the Eddystone, at 30 fathoms, was not found alive in the area here under consideration, though dead shells occurred as far out as 27 miles.

Of *Pecten maximus* there is a noticeable scarcity at all points as contrasted with *P. opercularis*, which was at times abundant. About five living specimens were obtained at three positions, all situated about 20 miles out. At other positions from one to three only occurred, and the total number obtained probably did not exceed forty. On the grounds near the Eddystone it was found by Dr. Allen with much greater frequency, two or three specimens being generally taken in each haul with the dredge.

Dentalium entalis was not found outside the 18-mile point.

Nucula nucleus, which occurs commonly down to 30 fathoms on the Eddystone Grounds, was only obtained at the first position, 8 miles distant, where the large deposit of fine clean sand occurs.

Pectunculus glycymeris, occurring as far as 39 miles out, was remarkable for the small size of specimens obtained.

Cardium echinatum was of rare occurrence, being only once obtained alive at 9 miles distant, while only one dead valve was recorded at a point slightly closer in.

Cardium norvegicum, common on gravel on the Eddystone Grounds, was only recorded at four points, and as far as 31 miles.

(2) Of the members of the Plymouth fauna that are absent from the list, there is little of special interest to mention, these being for the most part essentially littoral species, or those favouring a rocky habitat, or such as are of too infrequent occurrence generally to serve for purposes of comparison. Among the absent species:—

Adamsia polyypus (*Sagartia parasitica*) was conspicuously absent despite the frequent occurrence of its host *Eupagurus bernhardus*. On the Eddystone to Start Point Grounds, it is an interesting fact that on gravels Dr. Allen always found this hermit-crab without the anemone, though on the fine sands it was commonly associated with it. It is true the anemone did not occur in the few hauls made on the fine sand of the outer area at about 8 miles, yet its non-occurrence in other hauls suggests that the generally coarse ground of the latter, as in the case of the Eddystone to Start Point gravels, may account for its absence.

Holothuria nigra is generally found at Plymouth in close proximity to rock ledges. Such too was the case in the Eddystone to Start Point fauna where the species occurred only on gravel adjoining the Eddystone rocks. It is not improbable that such rock ledges are still exposed in places on the more distant grounds here dealt with, but there was no clear evidence of this fact afforded by the rock material dredged up at any point.

Antedon bifida, which extends southward to the Mediterranean, and as deep as 100 fathoms (cf. Bell, 65), has not been recorded in the Plymouth fauna outside the Mewstone Ledge.

Echinocardium cordatum occurs on fine sand on the Eddystone Grounds to 35 fathoms, and was obtained occasionally by Dr. Allen on similar ground between the Eddystone and Start Point. It is recorded by Ludwig (72) from southern waters at Marseilles, Naples, and the west coast of Italy, and as deep as 85 fathoms.

Maia squinado is moderately common, especially among rocks in the

Plymouth area, extending as far as the Eddystone Grounds. A few specimens only were obtained by Dr. Allen, on fine sand, between the Eddystone and Start Point.

Corystes cassivelaunus appears to be exclusively associated with deposits of a fine nature, and such as were only met with on the first position at about 8 miles.

With these few species may also be considered certain of those mentioned under the preceding heading, the infrequency of which almost amounts to their absence from the outer fauna. Such are *Suberites carnosus*, *Hydractinia echinata*, *Tubularia* sp., *Thuiaria articulata*, *Halosydna gelatinosa*, *Capulus hungaricus*, and especially *Portunus depurator* and *Cardium echinatum*.

(3) Of the species hitherto unrecorded from the Plymouth area, *Clathrina primordialis*, as regarded by Haeckel (14), is of almost universal distribution. The remainder are divided as follows, the present records for the English Channel being included in the distribution:—

(A) From Scandinavia through the region of the Shetland Is. and Hebrides to Irish Waters and English Channel.

Sertularella tenella. (Including also Arctic regions; S.W. Atlantic, and Pacific.)

Pectinaria pusilla. (Scandinavia and West of Scotland only.)

Thyone raphanus. (Excluding Scandinavia.)

Tritonofusus propinquus. (Including North Sea.)

Anapagurus hyndmani. (Excluding Scandinavia, and including Channel Is.)

Gobius scorpioides. (Excluding Shetlands and Hebrides.)

(B) The same area, and including the Mediterranean.

Peltogaster sulcatus. (Excluding Shetlands, Hebrides, and Ireland, and including Brazil and Pacific.)

Gonothyrea gracilis. (Including North Sea and S. America.)

(C) The same as (A), including the Bay of Biscay and Azores.

Ditrupa arietina. (Including Mediterranean, Canary Is., and Pacific.)

Inachus leptochirus. (Excluding Scandinavia and Irish Waters, and including Channel Is., Adriatic, and Cape Verde Is.)

Diphasia alata. (Excluding Irish Waters.)

Polyplummaria flabellata. (Excluding Shetlands, Hebrides, and Irish Waters.)

Portunus tuberculatus. (Excluding Scandinavia and Irish Waters, and including Mediterranean.)

(D) From Irish Sea southwards.

Xantho tuberculatus. (Including Bay of Biscay, Coast of Portugal, N.W. African Coast and Cape Verde Is.)

Bathynectes longipes. (Including Channel Is., Mediterranean, Adriatic, and Black Sea). Frequent at Plymouth in recent years.

(E) From English Channel to Azores.

Clathrina contorta. (Including Mediterranean.)

Rhizaxinella elongata. (Including Mediterranean.)

Polymastia agglutinans.

(F) English Channel and Adriatic.

Grantia capillosa.

PORIFERA.

Calcarea.

CLATHRINIDAE, Minchin.

Clathrina coriacea (Fleming).

One small specimen on a dead *Pecten* shell, at Position 33.

Depth, 42 fath.

Clathrina primordialis (Haeckel).

At Position 34, one, on shell of *Fusus*, occupied by *Eupagurus*.

Greatest measurement 9 mm.

„	38, one, on tube of <i>Pallasia</i>	„	„	10	„
„	45, one, on <i>Inachus</i>				
„	59, two, on dead valve of <i>Pecten</i>	„	„	10	„
„	62, one, on <i>Volsella</i>	„	„	4	„

Depth 42-50 fath.

These five small specimens which I have assigned to Haeckel's *Ascetta primordialis* show a good deal of individual variation. The habit of growth is in every case that of a simple network of anastomosing tubes, with a few short oscular processes, forming a thin investment on the object of attachment. The skeleton is composed almost entirely of equiangular triradiates with the component rays often of slightly unequal length. The size of the spicules is fairly uniform in individuals, but between different individuals the average dimensions of the spicular rays range from about $65\mu^*$ in length by 6.5μ in width at base of ray, to about 110μ in length by 10μ in width. The rays are gradually tapered to a rather sharp or sometimes a somewhat blunt point, the tapering being more strongly marked in the distal half of the ray. In one specimen (No. 240), the rays are more linear and almost *coriacea*-like. In two specimens the skeleton is entirely composed of triradiates.

* The sign μ is used to designate $\cdot 001$ mm.

In the three others a few quadriradiates of the same ray-form and size are present, in which the fourth ray is rather smaller but not much shorter than the basal rays. These quadriradiates are so scarce that they might easily escape observation.

Under his "Connexive Varietäten" of *Ascetta primordialis*, and later in the text, Haeckel (14) mentions the existence of this variety with a tendency to form a gastral ray as *Ascallis primordialis*, though he gives no data concerning its occurrence. In the present case it may be noteworthy that the three specimens possessing quadriradiates were obtained from depths between 42 and 44 fathoms, while those without them were from between 47 and 50 fathoms.

Excepting specimens recorded by Hanitsch (15) from the Liverpool District which he subsequently referred (16) to *C. lacunosa*, the species does not seem to have been recorded north of the Mediterranean.

Clathrina lacunosa (Johnston).

At Position 34, one, on shell of *Fusus*, growing beside *C. primordialis*,

Length 6 mm.

„ 47, one, on *Scrupocellaria*

„ 5 „

„ 62, one, on *Sertularella*

„ 7 „

Depth, 42-50 fath.

Clathrina contorta (Bowerbank), Minchin (28).

A small patch of spicules undoubtedly belonging to this species was found attached to a surface section of a *Reniera* from Position 58, on or in close proximity to which the specimen would seem to have been growing.

A single quadriradiate spicule, apparently also of this species, occurs similarly on a section of *Raspailia stuposa* from Position 67.

Depth, 49-52 fath.

Though it may appear somewhat hazardous to record the occurrence of this species on the evidence of a few spicules, and in the second case, of a single spicule, I have no doubt, after examining a specimen of *contorta* which Prof. Minchin kindly gave me, concerning the identity of the first record, and little doubt as to the second. In the former case, both of two marked features of *contorta* are very distinct, namely, the very high proportion of quadriradiates, and,—more important,—the long and slender gastral ray of these. In the latter case, the single quadriradiate spicule is of the same form. Monaxons are absent from the fragment from Position 58, a condition which Minchin regards (28, p. 14) as a juvenile feature. It is of interest to note that the two positions lie close to one another, that is, as nearly as the reckoning fixes them, not more than about two miles apart.

The species has been recorded from the Liverpool district by Hanitsch (16, p. 233). An earlier British record by Carter is questioned by Minchin (28, p. 18), who also leaves localities given by Bowerbank (Channel Islands, Scarborough?) open to doubt, owing to a confusion of species in his material. The natural habitat of *C. contorta* is in the more southern waters: Sark, Luc-sur-mer (Topsent, 35); Roscoff (Topsent, 37; Minchin, 28); Belle Isle (Topsent, 36); Banyuls-sur-mer, extremely abundant (Minchin, 28); Azores, abundant (Topsent, 38); Adriatic (Lendenfeld, 22, pars. (?)—cf. Minchin 28, p. 14). It is apparently one of those species that extend with difficulty within the border line of the British Fauna.

LEUCOSOLENIIDAE, Minchin.

Leucosolenia complicata (Montagu).

Recorded from 24 positions—1, 3, 4, 11-15, 31-37, 40, 43, 45, 49, 51, 52, 58, 59, 64.

Depth, 40-53 fath.

Mostly on Hydroids, *Cellaria* and *Cellepora*, also on shells of *Pecten* and tubes of *Pallasia* and on *Inachus*. At some positions several specimens were obtained, at twelve positions a single one only.

The habit of growth, which varies little among all the specimens obtained, is very different from that of the ordinary shore form. This is a straggling growth, often a confused tangle of slender rambling tubes, in no case exceeding 1 mm. in diameter, usually considerably less, and with no tendency to specialization. Many of the specimens are extremely small. Of the larger ones two especially deserve mention: the first from Position 32, a thickly grown specimen with rambling tubes of less than 1 mm. in diameter, on *Cellepora*, measuring about 35 mm. in extent; the second from Position 37, a very fine specimen of 50 mm. in breadth and 60 mm. in height, forming a tangled shrub-like growth on a shell of *Pecten opercularis*.

SYCETTIDAE, Dendy (13).

Sycon ciliatum (Fabricius).

At Positions 38 (five), 40 (one).

Depth, 44 fath.

I make use of the name *ciliatum* provisionally for the specimens here recorded, on grounds of priority, because after examination of many specimens I am quite unable to separate this form from Haeckel's *Sycaandra coronata* as defined by him. In the main they conform more to the latter type than to *ciliatum* in point of the

relative length of the gastral ray to that of the facial rays in the gastral quadriradiates; while in regard to the second point used by Hæckel (14), namely the relative width of the monaxons to that of the triradiates and quadriradiates, the character appears to me to be too variable to serve for purposes of distinction. As regards the first character, however, both types are exemplified in the Plymouth forms with every gradation between the two extremes, and further, the short gastral ray of the *ciliatum* type is apparently more characteristic of the in-shore specimens, while the longer corresponding ray of the *coronatum* type commonly occurs in the deeper water. A still more important point arises in the occurrence of at least one instance I have seen, in which both the short and the long gastral ray are present in the same specimen. A careful examination of a larger number of examples is needed to establish the point satisfactorily, but in the meantime I am unable to regard the two forms as specifically distinct.

In three of the six specimens here considered the relative length of the gastral and facial rays is roughly as 7 to 8, 3 to 4, and 1 to 3, severally; while the average relative width of the monaxons and radiates is about $1\frac{1}{2}$ - $2\frac{1}{2}$ to 1.

GRANTIDAE, Dendy.

Grantia capillosa (O. Schmidt).

At Positions 1 (one), 3 (one), 4 (three), 36 (one), 37 (two), 49 (one very young), 53 (one very young), 70 (two), 80 (one).

Depth, 40-51 fath.

The genus *Grantia*, to which this species is referred, is here regarded as it is defined by Dendy (13), but with the modification that it does not of necessity exclude the occurrence of the monaxons in bundles at the distal ends of the radial tubes. This reservation would seem alike to involve Dendy's family *Grantidae*, although as defined by him (13) it is not literally restricted on the point. In other respects the species *capillosa* seems to have its proper position in this family and genus, owing to the presence of a distinct dermal cortex covering the distal ends of the radial chambers. The arrangement of the monaxons is rather irregular. For the most part they are grouped in bundles about the ends of the radial chambers, this arrangement being often retained even where the latter are subject to branching, as frequently occurs at the extreme apex. Less frequently they are disposed without much regularity. But they are always large and stout, and usually penetrate for a considerable distance towards the gastral surface. Their disposition is in fact near the border line between the two forms of arrangement which Dendy defines for the Sycettidae and implies for the

Grantidae respectively. Since, however, the arrangement of the monaxons depends, as Dendy observes, on the variation of the canal system, it seems to me inadvisable to limit the latter family too stringently in regard to this character, which may in greater or lesser degree still retain the Syconoid form, as in *capillosa*, after the branching of the chambers has begun and a definite cortex has been assumed.

Mr. C. F. Jenkin first called my attention to this sponge among some unnamed material, and identified it as this species on Haeckel's description. Recently Mr. Kirkpatrick has kindly afforded me the opportunity of examining at the British Museum a co-type of Oscar Schmidt's labelled "*Sycon capillosum*" in his own handwriting, which enables me without doubt to confirm Mr. Jenkin's identification. It will not improbably be found that some confusion has arisen concerning the identity of the species, like many other Calcarea. Particular features which characterize it are: (1) its tendency to interruption of outline, as though through injury, in the region of the osculum, as figured by Schmidt (32, Pl. I, Fig. 6); (2) the shape of the dermal triradiates, approximating somewhat to the remarkable form of those in *Leucandra fistulosa*, though much stouter, with longer basal ray, and smaller unpaired angle than in that species; (3) the slender sub-gastral triradiates with very long tapering basal ray, shorter lateral rays nearly at right angles to it, and often with a fourth ray developed in about the same plane as the latter.

The species was originally recorded by Schmidt from Lebenico in the Adriatic (32, p. 17). Haeckel (14) also records it from Lesina on his own authority and that of Heller. Lendenfeld (22) adds Muggia, Pirano, and Rovigno to these localities. It has also been said to occur at Naples, but as the only slide I have seen so labelled from that locality is undoubtedly of a different species, the latter record seems to need confirmation, and apart from this there is apparently no previous record of its occurrence outside the Adriatic.

***Leucandra fistulosa* (Johnston).**

One specimen at Position 1.

Depth, 40 fath.

Monaxonida.

HADROMERINA, Topsent (40).

TETHYIDAE.*

***Tethya lyncurium* (Linnaeus).**

One specimen at Position 62.

Depth, 50 fath.

* Dr. Hartmeyer on p. 379 uses this name for an Ascidian family on the ground that the Ascidian genus *Tethyum* is of earlier date than the Sponge genus *Tethya*.

CLIONIDAE.

Cliona sp.

Specimens of *Cliona*, in all cases I believe boring in dead shells of *Pecten*, *Pectunculus*, *Lutraria*, etc., were obtained, sometimes very commonly, at Positions 4, 8, 9, 10, 11, 13, 18, 34, 44, 46, 59.

Depth, 40-49 fath.

The specimens were unfortunately not retained for further examination, and the species must therefore be left unnamed.

POLYMASTIDAE.

Polymastia robusta, Bowerbank.

Six specimens were obtained as single examples at the Positions 8, 14, 51, 55, 77, 80.

Depth, 43-51 fath.

Particulars are as follows, the measurements being made after preservation in spirit:—

- At Position 8. Form, depressed hemispheroidal, with fistular processes very numerous. Measurement, $55 \times 50 \times$ about 30 mm. in height. On a flat stone. Depth, 43 fath.
- „ 14. (Specimen not retained.)
- „ 51. Form tending to bulb-shaped, with surface very even, and most of the fistular processes fusing together as one combined outgrowth from the upper surface. Measurement, $35 \times 28 \times 35$ mm. in height. Depth, 43 fath.
- „ 55. Fistular processes numerous. Measurement, $50 \times 40 \times 35$ mm. in height. Broken from base.
- „ 77. Fistular processes numerous. Measurement, $95 \times 75 \times 50$ mm. in height. Depth, 49 fath.
- „ 80. Fragment, torn from an apparently large specimen. Depth, 51 fath.

Polymastia mammillaris (O. F. Müller).

At Position 51. One specimen; forming an investing growth on dead *Pecten* valve, with about a dozen processes. Extent, 23×12 mm. Depth, 43 fath.

At Position 58. One specimen; forming an investing growth on dead *Pecten* valve, with base strongly hispid, 50 × 30 mm. in extent, and with seven large smooth fistular processes 20–22 mm. in height. The differentiation between basal and fistular areas exceptionally well shown. Depth, 49 fath.

Polymastia agglutinans, Ridley and Dendy.

Single specimens at Positions 13, 32 or 33 (?), 46, 55, 59.

Depth, 42–49 fath.

The form of the specimens is in all cases that of a depressed, more or less regular spheroidal or ovoid mass from 10 to 25 mm. in horizontal measurement, with from one to eight fistular processes of 6 to 12 mm. in height, radiating from different points of the surface, the body of the sponge forming an investing growth cementing together small pebbles and fragments of shell into a compact mass. This peculiar habit is common to all the specimens, and there seems no doubt of their identity with Ridley and Dendy's *agglutinans* (31), of which the external form and habit is so very similar. Professor Dendy, who kindly examined some slides I sent him and allowed me to see some preparations of his original material, considers that there is no difference of sufficient importance to constitute specific distinction. The main characters of the skeleton are almost identically the same, though in the dimensions of the spicules there is a considerable difference. Ridley and Dendy's measurements for the large tylostyli are 1200 μ by 15·7 μ ; for the microsclera, 175 μ by 4 μ . In the specimens here considered the megasclera average from 450 to 500 μ , and sometimes exceed 700 μ , but in no case have I seen one reaching 800 μ . The width of the largest is 14·8 μ . The microsclera average about 140 μ by 3·7 μ . The difference may be a local one. The megasclera are rather more like those of *robusta* than those of *mammillaris*. The microsclera are like those of *mammillaris*, but with much more pronounced heads.

The *Challenger* specimens (two) were taken off the Azores in 450 fath. on volcanic mud.

SUBERITIDAE.

Ficulina ficus (Linnaeus).

Most of the specimens of this sponge obtained were of the massive carcinoecious form, and generally occupied by a Pagurid, but none were of large size. Occasionally, as where stated in the following particulars, they occurred in the earlier stage of these investments on shells of molluscs.

At Position	1, one.	Greatest measurement	20 mm.
"	7, one.	"	28 "
"	34, one.	Small.	
"	35, two.	Greatest measurement	23, 35 mm.
"	37, one.	"	16 mm.
"	43, one.	"	22 "
"	52, eight.	"	16, 17, 22, 24 mm., and four, thinly investing shells of <i>Natica</i> , <i>Tro-</i> <i>chus</i> , etc.
"	59, four.	"	15, 19, 20, 26 mm.
"	60, one.	"	12 mm., investing shell of small Gastropod.

Depth, 40-49 fath.

In all of three specimens closely examined, namely those from Positions 7, 43, and 60, the centrotylote microsclera are abundant but extremely variable in size and form.

Much confusion has arisen about the identity of this species, which has frequently been referred to as *Suberites domuncula*, a species which apparently does not occur in the British fauna. For a discussion of the species with full synonymy, see Topsent's valuable account (41, p. 203). The extremely large growth often attained by the species on the inner grounds inside the breakwater seems never to occur in the deeper water, the difference being apparently due to food-supply.

Suberites carnosus (Johnston).

At Position	9.	One small detached specimen.	Greatest measurement	5 mm.
"	32 or 33 (?).	One small specimen of ovoid form growing on the basal portion of <i>Polymastia agglutinans</i> .	Greatest measurement	10 mm.

Depth, 42 fath.

Rhizaxinella elongata (R. and D.), Topsent.

A single specimen, evidently belonging to this species, was obtained at Position 38, in 44 fathoms. Some uncertainty was felt as to its identity owing to the presence of an important internal character to which no allusion has been made in records of the species. This is the possession of a series of longitudinal belts of spicules in the form of a broken hollow cylinder surrounding and distinct from the axial core. It is difficult to understand that no mention should be made of a char-

acter that is definitely shown in the longitudinal and the transverse sections, but in all other respects it conforms so closely with the descriptions of *elongata* that I can only regard it as the same species, and conclude that the point referred to has been overlooked.

The specimen forms a slightly bent column of 60 mm. in height, widening gradually in diameter from 5 mm. at base to 8 mm. near the middle, beyond which it is sub-cylindrical, with the apex rounded. The colour in spirit is pale yellowish white. There are numerous small oscula scattered at irregular intervals over a great part of the surface, without any particular reference to the apex. The specimen was broken from its attachment, but two small rootlets are preserved in connection with a rounded base. The texture is very tough and compact.

The skeleton consists of a very compact central axial core of stylote spicules with a quantity of spongin, surrounded by a clear area, beyond which is a ring of spicular belts running parallel to the axial core, the component belts following a spiral course. In the transverse section these belts are marked off from one another by slender strands of few spicules that radiate sub-spirally outwards and upwards from the axial core, across the clear area, and through the belts to the surface. Similarly, spicular strands separate off independently from the outer side of the belts themselves and branch in a spreading fashion on their way to the surface, beyond which many of the spicules extend. At the surface they combine with innumerable radiating fasciculi of smaller and shorter styli, to form the dermal hispidation, which has the form of a closely approximating series of defensive brushes.

The spicules of the longitudinal belts and their branches, and those of the axial core, are slender styli, often slightly curved, with simple rounded base, sometimes faintly tylote, and with sharp tapering points. They range from 900 to 1600 μ (averaging 1300 μ) in length, and from 7 to 11 μ (averaging 9 μ) in width. The spicules of the dermal fasciculi, which are also present in small numbers, scattered between the longitudinal belts and the surface, are styli of 200 to 440 μ (averaging 280 μ) in length, and 2 to 6.5 μ (averaging 4.5 μ) in width. Many of them are simple, but a large number—perhaps the majority—are strongly tylote, and usually with a second ring-like expansion beyond the basal one, as in the spicules, e.g., of *Suberites carnosus*. The bases of these dermal tylostyli are extremely like those of the latter species, and in the vertical view of the outer surface there is a striking similarity between the two sponges.

— The noteworthy points of difference from Ridley and Dendy's original

description of *Suberites elongatus* (31) are, besides that referred to, the more slender form of the large styli, and the absence of a true pedicel. In regard to the last point, several specimens of the same species were collected during a subsequent cruise at a more distant and deeper position in the Channel. These all show the typical slender pedicellate growth, characteristic of *elongata*, while the spiculation of two specimens examined shows no appreciable difference from the foregoing description, except that the numerical proportion of tylote to simple styli in the dermal fasciculi is lower.

The species has been recorded from the Bay of Biscay: one, in 248 m. (Topsent, 38); one, in 180 m. (Topsent, in 10); Coast of Roussillon, two, in 94 m. (Topsent, in 10); Azores, eight, in 450 fath. (Ridley and Dendy, 31).

HALICHONDRINA, Vosmaer.

HAPLOSCLERIDAE, Topsent.

CHALININAE, Ridley and Dendy.

Siphonochalina montagui (Bowerbank)?

At Position 46, one specimen, broken from attachment—possibly *Lepralia*; forming an erect compact growth of irregularly inosculating, more or less tubular branches, the whole somewhat depressed laterally and with some external resemblance to certain broadly expanded forms of *Alcyonidium gelatinosum*; with several oscula raised on low prominences of 2–4 mm. in diameter. Height, 65 mm. Width, 62 mm.

„ 68, one broken specimen, on *Lepralia foliosa*; with massive basal portion, 50 × 40 mm. in extent, tunnelled by tubular ramifications and surmounted by at least one large tubular process, 60 mm. in height by 25 mm. in diameter, with an osculum at summit, 9 mm. in diameter.

Depth, 47–52 fath.

The texture of the first specimen is compact and rigid, and similar in general appearance to Bowerbank's figures for the species; that of the second, except for a certain rigidity about the base, is quite the opposite. In external characters the two specimens are quite distinct, but the internal structure of both, including the form and dimensions of the spicules, shows so little difference that there seems no justification for separating them. The skeleton is composed of two distinct elements:—

(a) A primary interlacing network, ramifying through all parts of the sponge, of very clearly defined (? keratose) fibres, each composed of bundles of fibrillae, and commonly enclosing a variable number of oxeote spicules running longitudinally within them. Sometimes the enclosed spicules are very numerous, but often they are entirely absent from the fibres. In a tangential section of one specimen some of the larger fibres attain, even close to the surface, a thickness of as much as 100 μ . In a tubular portion of the same specimen a thick fibre traverses the centre of the tube, throwing off subdividing branches to the periphery. Oxea occur likewise, though with extreme scarcity in this axial fibre and even in its slender branches to the wall of the tube.

(b) A secondary *Reniera*-like, and to some extent regularly disposed network of unispicular meshes, with a decided tendency to assume in the main lines an outwardly radiating direction from interior to surface. This appears to be quite independent of the primary network. The ends of the spicules are cemented together with deposits of spongin, usually to a distance of about 20 μ down the shaft from the point. The spicules composing this network are oxea of fairly uniform dimensions averaging about 90–100 μ in length by 5 μ in width. With them are associated, irregularly disposed, smaller oxea of about the same length, and half or less than half the width, and very fine hair-like oxea of about 50–60 μ by 1 μ .

The spicules of the primary skeleton are similar in form and dimensions to those of the secondary skeleton, and include the slender hairlike forms of the latter. The dimensions of the large oxea shown by Bowerbank's figure for the species are rather larger—about 124 μ by 6.5 μ .

The tubular tendency of the sponge seems to place the species in the genus *Siphonochalina* as defined by Schmidt (33, p. 7), and by Ridley and Dendy (31, p. 29); but the remarkably composite structure of the fibres of the primary skeleton, very different from the clear fibres of, e.g., *Chalina oculata*, leaves some doubt as to its identity with the species to which it is here assigned, or indeed of its true position among the Chalininae. The fibrillae of which the fibres are composed have themselves individually the form of a string of beads, each bead contributing internally a separate rod-shaped element to form a centrally-placed strand running along the string. Loisel* describes an almost identically similar condition in certain species of *Reniera*, so called. But in the present examples I find no evidence of the bead-like cells which secrete the elemental rods ultimately breaking down, as Loisel describes, so as to have a simple con-

* *Contribution à l'histophysiologie des éponges.* Journ. de l'anat. et de la physiol., XXXIV. 1898.

tinuous strand. They appear, on the contrary, to be permanent, while the contained rods remain separated at their ends from one another by a narrow interval between adjacent beads. These fibrillae, and their contained rods in particular, give a deeper reaction to stains like eosin and methylene blue than the deposits of spongin about the ordinary skeleton, and this fact, coupled with that of the independence of the two skeletons, suggests that the substance of the primary skeleton may be of a slightly different constitution from that of true spongin.

RENIERINAE, Ridley and Dendy.

Halichondria sp.

A fragment of a *Halichondria*, too small for determination, occurred on *Inachus dorsettensis* at Position 3.

Depth, 40 fath.

The skeleton is very irregular, with a confused and broken network of loosely constructed spicular bundles forming the main lines. It is chiefly composed of large oxea 250–350 μ in length and 7–10 μ in width, together with smaller oxea 200–250 μ in length and 2–3 μ in width, not very numerous; and thinly scattered very slender oxea, 100–200 μ in length and 1 μ in width. The spiculation approximates nearly to that of Bowerbank's *H. caduca*.

Reniera, Nardo.

Without yet having had an opportunity of examining any of Bowerbank's original specimens of this difficult genus, the species here considered are named so far as possible from his descriptions and figures alone.

Reniera indistincta (Bowerbank).

At Position 3, two specimens, each forming a shallow investing growth on *Inachus*.

„ 12, one specimen, forming an irregular growth on a *Pecten* valve, with tubular processes; 10 mm. in extent.

„ 14, two specimens, one forming a shallow investing growth on *Inachus*, the other an irregular mass, 30 \times 20 mm. in extent, intermingled with Hydroids and forming tumulous elevations.

„ 25, one specimen, with basal attachment 15 mm. in diameter, and one lateral prominence, surmounted by a tubular process 15 mm. in height; on a *Chaetopterus* tube.

Depth, 40–46 fath.

The large oxea range from about 140 to 170 μ in length by 5-6 μ in width, as against dimensions shown by Bowerbank of about 158 μ by 4 μ . With these occur numerous more slender oxea, 120-140 μ by 2 μ , and also slender hair-like oxea scattered irregularly, averaging about 100 μ by 1 μ or less.

Reniera sp. (A.).

At Position 56, one specimen, forming a small growth on *Inachus leptochirus*.

Depth, 49 fath.

Skeleton mostly unispicular and very similar to that of the preceding, but the main skeleton spicules are longer and more slender in proportion, ranging from 150 to 200 μ by 4 to 5 μ . Smaller oxea and fine hair-like oxea occur as in the last species.

Reniera sp. (B.).

At Position 6, one specimen, forming an irregular massive growth on stems of *Antennularia*, etc.

Depth, 42 fath.

Skeleton almost entirely unispicular, but with the reticulation very irregular. Large oxea of much the same length, 150-170 μ , as in specimens referred to *indistincta*, but much wider, 7-8 μ , and remarkably uniform in size. Slender hair-like oxea scarce.

Reniera pygmaea (Bowerbank).

At Position 40, one specimen growing from dead base of *Antennularia*.

Depth, 44 fath.

The specimen forms a short bifurcated growth of about 25 mm. in height, and 6 mm. in diameter of branches, arising from a narrow stem. In appearance and general texture it bears a certain resemblance to a small *Chalina oculata*, as Bowerbank remarks of specimens before him. A comparatively large quantity of spongin occurs at the ends of the spicules, which at times seem almost entirely invested by a thin layer of it. The oxea of the main skeleton, averaging 110 by 5 μ , are more slender than Bowerbank shows for *pygmaea* as 118 by 7 μ . A number of more slender oxea occur in addition.

Reniera densa (Bowerbank).

At Position 1, one specimen, forming an irregular mass of dense texture about Hydroids. Height 25 mm.

Depth, 40 fath.

The radiating lines of the main skeleton are distinct and largely

multispiculous. The remainder of the reticulum is somewhat irregular. Spicules exceptionally uniform, with an almost entire absence of slender forms. Dimensions from 120 by 6 μ to 140 by 9 μ . The measurements shown by Bowerbank are 130-145 μ by 10 μ .

Reniera sp. (C.).

At Position 62, one specimen.

Depth, 50 fath.

The specimen is a fragment torn from its base, consisting of a thimble-shaped process, 25 mm. in height by 17 mm. in width, with an osculum of 5 mm. in diameter at the summit. Texture soft and flexible. Skeleton rather irregular, with spongin very little developed. Average measurement of large oxea about 190-200 μ by 8-10 μ . A few styli of about the same width but a little shorter are intermixed abnormally, also very occasionally short smooth strongyla of the same width. Slender oxea rather numerous and scattered, ranging in size from about 100 by 2 μ to 150 by 3 μ .

POECILOSCLERIDAE, Topsent.

ESPERELLINAE, Ridley and Dendy.

Esperiopsis paupera (Bowerbank).

At Position 3, one specimen, forming an irregular growth on *Sertularella gayi*. Length 25 mm.

„ 33, one small specimen on dead *Pecten* shell, 11 mm. by 5 mm., with one osculum, with ova at base.

„ 36, one specimen, forming a small column, 9 mm. in height, with narrow spreading base. On *Porella compressa*.

„ 38, one specimen, an irregular creeping growth, about 10 mm. by 4 mm. in extent, with a free raised lobe. On *Pallasia* tube.

„ 49, small patches on *Inachus leptochirus*.

Depth, 40-47 fath.

Ridley and Dendy (31) have included the *Isodictya paupera* of Bowerbank, with a query, among the synonyms of his *I. edwardsi*, and it may be that the two forms are merely varieties of the same species. I have retained, however, the former name for the five specimens here considered, because in no case do the main skeleton spicules approximate to those shown by Bowerbank for *I. edwardsi*, while their difference from those of *paupera* is inappreciable. Excepting that from

Position 33, in which there is a small raised osculum and the texture is rather more compact, the specimens have all the same meagre straggling habit of growth, with loose attachment to their base. The skeleton has a more or less regular arrangement of compact multi-spicular lines following a sinuous course from base to surface, with spicules connecting these largely at right angles in such a way as often to enclose with the main lines a series of rough rectangles, in the vertical section. The spicular dimensions are very variable. The larger main skeleton styli average about 180–200 μ in length, by 6–7 μ in width. In the specimen from Position 36, the average width is lower—about 5 μ . There is no clear line of separation between these and the secondary styli, averaging about the same length and half the width. Very slender, irregularly disposed, hair-like styli of 120 to 150 μ by 1 μ , or less than 1 μ , and isochelae averaging 18 to 20 μ in length, are both usually very numerous. In the specimen from Position 49 both are comparatively scarce. Except in this last-named example abnormalities are frequent, in the form of medial bulb-like swellings in the spicules. Sometimes these occur more especially in the intermediate-sized styli; often rather more so in those of the main skeleton. The tendency is very pronounced in the specimen from Position 38, in which a considerable proportion of the larger styli show this abnormality, and occasionally two such swellings appear in the shaft. In this specimen a large oxeote spicule occurs in one section, with the same swelling in the centre.

Esperiopsis sp.

At Position 5, one specimen, forming large nodulous growths, almost entirely covering a large specimen of *Inachus dorsettensis*; with two large oscula, 5 mm. in diameter, raised on prominences, and numerous small ones, 1 to 2 mm. in diameter, scattered over the surface.

Depth, 42 fath.

While very distinct in its external form and more compact texture from the preceding species, the internal structure and spiculation of this specimen differ little from it. The main lines of the skeleton have nearly the same arrangement. The chief difference lies in the dimensions of the spicules, and this is not very considerable. The larger styli average about 150 μ by 7 μ ; intermediate styli, 150 μ by 2–3 μ ; hair-like styli, occasionally centrotylote, 100–150 μ in length, not very numerous; isochelae of the same form and size as in the last species, very scarce. But for Bowerbank's remark concerning the great irregularity of the main skeleton of *imitata*, which

can hardly be applied to this specimen, it would seem to approximate closely to that species.

Esperella sp.

At Position 72, one specimen, forming a thin even investment on one valve of living *Pecten opercularis*.

Depth, 43 fath.

I find no described species to which this specimen seems referable. The main lines of the skeleton are composed of smooth styli, decidedly but not strongly clavate; fairly uniform in size, and averaging about 240μ by 4μ . These arise as numerous loose fasciculi, composed of about a dozen spicules, which subdivide and occasionally anastomose in rough curves, and split up internally or at the surface in fan-like extensions. Irregularly disposed styli in the interspaces are not very numerous. The microsclera are of five forms: (1) large palmate anisochelae averaging about 30μ in length, arranged mostly in rosettes; (2) large bidentate anisochelae of same size, often associated in rosettes with the preceding, and possibly an immature form of them; (3) small bidentate anisochelae, variable in size, but averaging about 12μ in length, mostly scattered, not very numerous; (4) sigmata, about 30μ (one only was observed in a preparation lying in an unsuitable plane for measurement); (5) very slender toxa about 130μ in length. The toxa are chiefly associated with embryos at the base of the sponge, and one pole of one of these embryos is covered with rosettes of the third form of anisochelae as close to one another as they can lie. It is quite possible that this specimen is an irregular form of Bowerbank's *Raphiodesma floreum*. In habit of growth and in most of its characters it strongly resembles his description of that species. The noteworthy differences are that in the latter Bowerbank makes no reference to the small anisochelae as tension spicula, but refers to numerous small sigmata in their place which do not seem to occur at all in this specimen. That he should make no mention of toxa is perhaps not surprising, since they scarcely seem to exist in the specimen apart from the embryos, whatever their function in this respect may be. Very fine styli of about 140μ in length are likewise associated with these embryos, and almost exclusively so.

Desmacidon fruticosus (Montagu).

At Position 7, one, on valve of *Pectunculus glycimiris*. Small sigmata very numerous.

„ „ one large specimen. Small sigmata scarce.

„ 58, two detached specimens; the largest 70 mm. in height. Sigmata and chelae very scarce.

At Position 59, one very young specimen, 7 mm. in diameter by 4 mm. in height. On dead valve of *Pecten opercularis*. Sigmata numerous. Several of the slender oxea were observed to be strongly centrotylote.

„ vii., one, of irregular form, measuring 100 by 25 mm. Sigmata numerous.

„ 77, one large specimen.

Other examples, not retained, occurred at Positions 8, 14, 34, 43, 44, 68, 76 (a few), 78 (a few).

Depth, 42-52 fath.

DENDORICINAE, Topsent.

Dendoryx incrustans (Esper).

At Positions 3 (five), 4 (two), 13 (one), 14 (one), 43 (one), 52 (one), 60 (one), 64 (one).

Depth, 40-53 fath.

The specimens varied in habit from that of a thin investment on *Inachus*, *Cellaria*, etc., to that of an irregular more or less massive growth on Hydroids and other objects, the largest measuring 65 mm. in height by 70 mm. in width.

Dendoryx (Iophon) nigricans (Bowerbank).

At Positions 46 (one), 59 (one).

Depth, 47-49 fath.

Ridley and Dendy (31) united Bowerbank's four species *Halichondria pattersoni*, *H. scandens*, *H. hyndmani*, and *H. nigricans*, as varieties of the one species *pattersoni*, under the genus *Iophon*, which is distinguished by the presence of bipocilli as microsclera. Topsent (31) objects to this, and particularly to the inclusion of *pattersoni*, on the grounds that Bowerbank makes no mention of bipocilli occurring in that species. I follow Topsent in treating *Iophon* as a sub-genus of *Dendoryx*, and refer the two specimens here considered to *nigricans* as more nearly in conformity with Bowerbank's description of that form, though in some particulars they vary from it.

The specimen from Position 46 is a large one, of very irregular, partly massive, partly branching and anastomosing growth, evidently attached to *Lepralia foliosa* and partly intermingled with a few hydroids. The dimensions are about 140 mm. by 100 mm., the latter probably having represented the height of the specimen, which was broken. That from Position 59 formed an irregular spreading growth on a fragment of a *Maetra* valve, measuring 25 by 20 mm. in extent. Both examples are of a soft spongy texture, with irregular corrugated surface, and dark purplish brown in colour.

The styli of the main skeleton are faintly, sometimes strongly spined, chiefly at the base, and the majority are curved. The average length is in the first specimen about 200 μ ; in the second about 190 μ . In neither case does it exceed 230 μ , which is a good deal less than Bowerbank's figure shows. Many of the spicules are slightly wider in the middle. The width is very variable, ranging from 4 to 7 μ , and averaging about 6.5 μ .

The tylota average in the first specimen about 205 μ by 4.5 μ , in the second about 215 μ by 5 μ . The ends are feebly expanded or often simple and faintly spined. The intermediate portion is smooth, with the central part usually the widest.

Extremely slender hair-like styli often curved, of about 150 μ in length, irregularly dispersed, are numerous.

Anisochelae very scarce; length 22 μ .

Only very few bipocilli were observed after careful searching. These measure about 7 μ in length, and are of the form figured by Bowerbank for the species.

Dendoryx robertsoni (Bowerbank).

At Position 78, one specimen. Form massive, irregular, 70 \times 50 \times 40 mm. in height. Broken from attachment—probably a stone.

Depth, 49 fath.

Both in external form and skeleton, the specimen closely agrees with Bowerbank's description of the species.

Megasclera. Spined styli averaging about 185 μ in length, and mostly from 4 to 7 μ in width. Tylota with ends sometimes bluntly pointed, of about the same average length, and 4.5 μ in width at centre of shaft.

Microsclera. Sigmata, 33 μ ; large isochelae, 33 μ ; small isochelae, 18 μ . None of the microsclera are very numerous.

Dendoryx dujardini (Johnston).

At Position 49, one specimen, thinly investing a living valve of *Pecten opercularis*.

„ 67, one specimen, forming small patches on *Inachus leptochirus*; with a quantity of brown pigment present.

Depth, 47–52 fath.

The skeleton has a rough arrangement of sinuous multispicular lines with a large number of isolated spicules, irregularly dispersed between them, and supporting a somewhat dense and very confused dermal network. The strongyla, of which the ends are often faintly tylote, mostly

range in the first specimen from 190 μ to 220 μ in length, by about 3 μ in width. In the second specimen they are longer and much more slender on the average, about 220 by 2 μ . Spined tylostyli are extremely scarce, one only, in fact, having been observed in one specimen, and none in the other. This spicule has the characteristic prominent head, and measures about 92 μ . Embryos are present in both specimens; several in one case, irregularly located. In a few instances the tyloata have a prominent bulbous swelling at the centre, or some way from one end. The proportions of the spicules seem very instable in this species. In a specimen obtained from within two miles of the Eddystone Lighthouse they average about 185 μ (many falling to 120 μ) by 1.5 μ , or less, while in a preparation of another specimen only a few are to be found at all.

BUBARINAE, Topsent.

Bubaris vermiculata (Bowerbank).

At Position 15 (four), 38, 43, 44 (two), 47 (five), 59, 60.

Depth, 44-49 fath.

The examples have all the form of a thin cementing investment about dead valves and fragments of *Pecten*, *Cardium*, *Lima*, etc., and larger or smaller pebbles. The maximum extent ranges from 9 to 45 mm.

ECTYONINAE, Ridley and Dendy.

Stylostichon plumosum (Montagu).

At Position 10, one specimen, forming an irregular growth coating tubes of *Pallasia murata*, etc. Measurement, 85 \times 45 \times 25 mm.

„ 49, one specimen, forming a nodulous investing growth, cementing together shell fragments and gravel, with *Cellaria*, etc. Measurement, 50 \times 33 \times 20 mm.

Depth, 42-47 fath.

Acanthostyli: *Large*, 180-280 μ (average about 226 μ) in length, and 5.5-7.4 μ (average about 7.2 μ) in width. *Small*, 85-160 μ (average about 120 μ) in length, and 5.5-7.4 μ (average about 6.8 μ) in width. There is no distinct line of separation between these and the preceding.

Oxea. Straight, suddenly pointed: 185-207 μ (average 195 μ) in length, and 3.5-5.5 μ (average 5 μ) in width.

Isochelae. Mostly bidentate, but many tridentate: 14.5-18.5 μ .

Bowerbank mentions this coating variety, thinly investing stones, from the Diamond Grounds, off Hastings.

AXINELLIDAE, Ridley and Dendy.

Raspailia hispida (Montagu).

Specimens referred to this species occurred at Positions 3, 4 (two), 7, 8, 33, 38, 40, 43, 52, 53, and 80 (two).

Depth, 40-51 fath.

Seven other specimens were obtained at positions of which the record was lost, but which probably all lay between ten and twenty miles to the south-westward of the Eddystone.

Among the numerous and often considerable differences in external form and spiculation of these several examples, there appears to be no single character that may be regarded as affording safe grounds for separating them. In the form and proportions of the spicules especially, the extent of variation is so great, not only between one individual and another but often in the same individual, that careful examination has led me to include them all together as variations of the *Dictyocylindrus hispidus* of Bowerbank. A single specimen has the external form on which Bowerbank founded a separate species under the name of *Dictyocylindrus rectangulus*, but there is nothing in the spiculation to justify its separation from several examples having the simple, upright branching habit of growth throughout. Three specimens are of the free form (one being the *rectangulus* type referred to), branching at one or both ends, as figured by Bowerbank for *D. hispidus*, and apparently referred to by Montagu. Others have a similarly slender growth with few branches from their base of attachment. In another specimen three branches arise almost simultaneously from a common stem about 8 cm. from the base of attachment. In some others the growth is much stouter, and roughly dichotomous. In most cases growth extends in about the same vertical plane. The greatest length is attained in a free form of 36 cm. Four specimens are deeply pigmented (with a dark ruddy brown colour, in spirit); the others were, from recollection, pale or brighter yellow in life.

The axial skeleton is somewhat loose and irregular, with a large number of the spicules crossing one another at varying angles, and often lying nearly or quite at right angles to the main axis. From it, with their bases often deeply placed, spicules arise separately or in indefinite groups and nearly at right angles outwards, and extend far beyond the surface. Most of the latter are styli, but some strongyla occur among them. They are generally very similar in size to those of the axial skeleton, but often rather stouter. Sometimes their points are directed inwards. At or near the surface many of them are surrounded by a radiating fasciculus of small slender styli of about

400–450 μ in length by 3 μ in width. A varying number of similar slender styli and oxea, of the same dimensions and larger, run longitudinally or irregularly through the column, and especially close below the surface. These are occasionally strongly curved and almost sigmatoid, and often occur in pairs. The axial megasclera are extremely variable in form and dimensions. They consist mainly of styli, usually with strongyla and oxea intermixed in greater or lesser proportion.

Styli often much curved, rarely (specimen from Position 40) very sharply pointed, usually bluntly pointed or even rounded, leading to the strongylous form. Base generally simple, often more or less tylote, or, in individual spicules in certain specimens, very strongly so. Dimensions, 700–1900 μ in length and 11–22 μ in width; averages in different specimens, 1100–1700 μ in length and 14–17 μ in width, respectively.

Strongyla were not observed in specimens from 38, 40, 43, and 53; scarce in those from 4, 7, and 8; common or numerous in those from 3, 4, 33, 52, 77, and 80. They vary from short stout forms of 180–450 μ in length and as much as 33 μ in width to more slender forms of 800–1200 μ in length and 15–18 μ in width. The short stumpy forms were observed only in specimens from 3, 4, 52, 77, and in one of those of doubtful position, and appear to be often associated with the more slender habit of growth. The fact that Bowerbank does not mention the occurrence of strongyla in his description of *R. hispida* cannot, I think, be considered of sufficient importance to exclude from that species specimens which have them, often in large numbers. It is inconceivable that Montagu's original specimens, including the familiar type he figures (29, Pl. V), obtained by trawlers off the Devon coast, were distinct from some specimens here considered of identically similar habit, in which numerous strongyla occur.

Oxea were not observed or scarce in specimens from 3, 4, 8, 40, 53, and 80; numerous or very numerous, often strongly curved, in those from 7, 8, 33, 43, and 77. In number they sometimes nearly equal or exceed that of the styli. Their dimensions range from 700 to 1200 μ in length and 8 to 19 μ (average about 15 μ) in width.

Acanthostyli were not observed or scarce in specimens from 3, 4, 7, 8, 33, 40, and 80; numerous or very numerous in those from 4, 38, 43, 52, and 53. Length, generally 85 to 100 μ , occasionally reaching 140 μ . Width at base (not including basal swelling when present), 5 to 7 μ .

Raspailia ramosa (Montagu).

Single specimens at Positions 46, 49, 67, 77.

Depth, 47–52 fath.

The four examples which I assign to this species, though closely allied to some specimens of the preceding species in general characters, are distinct from them in certain details, and notably in the shape of the acanthostyli, which with comparatively rare exceptions are much longer, more slender, and more finely pointed. In external form, two of the specimens rather closely resemble that of Ridley and Dendy's figure of *Dendropsis bidentifera* (30); one, from Position 46, is of slender, straggling, long-branched growth; the fourth occupies an intermediate position between these two forms. One is lightly, the others deeply pigmented, with a rufous-brown colour in spirit.

The main features of the spiculation are very similar to those described for the preceding species, but the spicules of the axial column are rather more irregularly disposed. The large *styli* are comparatively stout. These range from 800 to 1600 μ in length, with an average of about 1100 μ (higher or lower in different examples), and from 11 to 18 μ , with an average of about 16 μ , in width. *Strongyla* are present in specimens from 46 and 67; length, 450 to 1000 μ (average about 650 μ); width, 16 to 22 μ (average about 19 μ). Round-ended styli occur in the specimen from 49, but true strongyla were not observed in this or the specimen from 77. *Oxea* occur in the specimen from 46 only; length 800 to 1100 μ ; width 15 μ .

Very slender styli and oxea occur, scattered more or less numerous through the column, and commonly in pairs or small groups, as in the preceding species. There is some difficulty in distinguishing many of these paired forms from what appear to be elements in process of constructing the larger styli.

Acanthostyli longer, more slender, and more sharply pointed than in the preceding species. Length, 95 to 166 μ (average about 129 μ). Width, 4.5 to 6.5 μ (average 5 μ).

Acanthoxea occur in very small numbers, intermixed with the acanthostyli, in specimens from 46 and 49, but I have been unable to find them in the other two. The example from 49 is one of the two already referred to as rather closely resembling Ridley and Dendy's figure of *Dendropsis bidentifera*. It is an interesting fact that this species is especially characterized by the presence of small acanthoxea, and the genus *Dendropsis* was founded to receive it. In the present case, however, I can only regard these spicules as abnormalities of the acanthostyli, which vastly outnumber them. They are nearly always centrotyle, and in one instance observed the tylote expansion is elongate with a distinct constriction in the centre of it. Length, 118 to 225 μ (average 187 μ). Width, not including expansion, 4.5 to 5.5 μ (average 5 μ).

Raspailia stuposa (Montagu).

Single specimens at Positions 31, 32, 51, 53, 60, 67, 80.

Depth, 40-51 fath.

The smallest example is 22 mm., the largest 50 mm., in height. The growth is fairly uniform and symmetrical, the branches spreading roughly in the same plane, and being much compressed laterally in a plane at right angles to that of the growth. Pigmentation (in life dark brown) is absent in specimens from Positions 51, 53, and 60; moderately strong in those from 31 and 80; very deep, giving an almost black appearance superficially, in those from 32 and 67.

The stellate microsclera are very abundant in all the specimens.

COELENTERATA.**HYDROMEDUSAE.****CLAVIDAE.****Merona cornucopiae**, Norman.

On *Dentalium entalis* at Positions 1 (common); 11 (two; one with gonophores); 36 (one); and on *Pectunculus glycimeris* at Positions 46 (one), and 51 (one).

Depth, 40-43 fath.

HYDRACTINIIDAE.**Hydractinia echinata**, Fleming.

One colony on a young shell of *Fusus islandicus* at Position 52.

Depth, 43 fath.

PODOCORYNIDAE.**Podocoryne** (?) sp.

At Position 49, in 47 fathoms, a small Hydroid colony was found growing on a *Macropodia*, which, though lacking in certain adult characters of this genus, is provisionally recorded under it because there seems to be no other genus with which it can be associated.

The colony consists of a large number of simple short polypes arising directly from a hydrorhiza, which is composed of a close network of anastomosing tubes. I have not been able to detect any trace of a chitinous perisarc investing the hydrorhiza, or any cup-like processes from the hydrorhiza surrounding the bases of the hydranths. The hydranths, which number about 200, are closely crowded together, and arise from a somewhat constricted base in direct continuation with the simple tubular stolon. They were not examined in life, but in

their semi-contracted condition in spirit the largest do not exceed 1.5 mm. in height, while the majority are considerably smaller than this. The form of the more extended ones is nearly cylindrical with a width equal to about one-fourth or one-fifth of the height, with the apical portion somewhat claviform and surmounted by a rounded conical hypostome. A short way below the hypostome there is a single row, or, perhaps more correctly, a double row of simple tentacles, which often show a distinct arrangement of large and small ones alternately, the smaller ones apparently arising slightly below the origin of the others. The tentacles number from eight to twelve. There is no gonosome present in the colony.

EUDENDRIIDAE.

Eudendrium capillare, Alder.

Small colonies at Positions 3, 6, 10, 11, 38, 40, 49, 59, 80. On *Cellaria* and Hydroid stems and *Chaopterus* tubes.
Depth, 40-51 fath.

Eudendrium sp.

A very small species, much like the preceding, but of rather stouter habit, and perhaps distinct from it, was obtained at Positions 14, 32, 40, and 53. On *Cellaria* and Hydroid stems.
Depth, 42-46 fath.

Eudendrium ramosum (Linn).

Several small colonies at Position 34, and four colonies, from $\frac{1}{2}$ to 1 inch in height, on a fragment of a bivalve shell at Position 56.
Depth, 42-49 fath.

BOUGAINVILLIIDAE.

Bougainvillia ramosa (van Beneden) ?

Small branching colonies of a *Bougainvillia*, probably referable to this species, but with none bearing gonophores, were obtained at Position 5, on *Inachus dorsettensis*, and at Positions 14, 35, and 59, on Hydroids and *Cellaria*.
Depth, 43-49 fath.

TUBULARIIDAE.

Tubularia sp.

A single small *Tubularia*, which was not identified, was taken at Position 1.
Depth, 40 fath.

CAMPANULARIIDAE.

Clytia johnstoni (Alder).

Only observed at Position 5, on *Inachus dorsettensis*.
Depth, 42 fath.

Campanularia flexuosa (Hincks).

At Positions 14, 31, 32, 35, 38, 43, 49, 51, 59, 60, 62, 80. Chiefly on *Cellaria*, also on other Hydroids, and one on a shell fragment. Mostly small colonies, not exceeding 8 mm. in height. The largest occurred at Position 62, on a small shell fragment with several branching growths arising from the basal stolon. Specimens from 32, 51, and 62 bore gonangia. A few of the others incline to the more slender form of *angulata*, but there seems little doubt that they all belong to the same species.

Depth, 40-51 fath.

Campanularia hincksi, Alder.

At Positions 3, 4, 7, 12, 13, 31, 32, 33, 34, 35, 38, 42, 43, 45, 47, 49, 53, 56, 60, 62, 80.

Depth, 40-51 fath.

On Hydroids, *Cellaria*, dead shells, and one on *Scalpellum*. A single colony only occurred with gonangia at Position 62.

Campanularia verticillata (Linnaeus).

One colony at Position 3, on *Cellaria*.
Depth, 40 fath.

Campanularia raridentata, Alder.

Scattered polyps, apparently identical with this species, were observed at Positions 4, 12, 13, and 49.

Depth, 40-47 fath.

Gonothyrea gracilis (Sars).

At Positions, 14, 33, 35, 51, 58, 59, 62.
Depth, 42-50 fath.

On *Cellaria*, occurring in most cases as single scattered polyps, but occasionally of erect branching form. Gonangia were borne on specimens from Positions 14, 35, and 58.

This species which has not hitherto been recorded in the Plymouth fauna has a wide distribution:—Norway, Baltic, Helgoland, Connemara, Liverpool Bay, Pas de Calais, Messina, South America (cp. Hartlaub, 53; Broch, 50; Thornely, 63).

CAMPANULINIDAE.

Opercularella lacerata (Johnston).

At Positions 4, 10, 11, 13, 14, 32, 40, 62, 64, vii.

Depth, 40-49 fath. or over.

On Hydroids and *Cellaria*. The species is probably of commoner occurrence over the area than these records show. Growth in most cases simple, with single polyps arising from a stolon. Branching specimens occurred at Positions 13, 14, and 32. One specimen with gonangium at Position 32.

LAFÖEIDAE.

Laföea dumosa (Fleming).

In varying-sized colonies, creeping or branched, at nearly every position, including the last, 80.

Depth, 40-52 fath.

Laföea fruticosa, M. Sars.

At Positions 1, 11, 12, 31, 32, 36, 45, 49, 58, 60, 62; occurring mostly in very small colonies.

Depth, 40-50 fath.

Calycella fastigiata (Alder).

Only observed at Positions 36 and 40, on *Porella* and *Cellaria*.

Depth, 43-44 fath.

Cuspidella costata, Hincks.

At Positions 3, 49, 59, vii; growing on *Cellaria*.

Depth, 40-49 fath. or over.

HALECIIDAE.

Halecium beani (Johnston).

At Positions 4, 35, 38, 43. Very small colonies, excepting a large specimen at Position 35, on which gonangia were borne.

Depth, 40-45 fath.

Halecium halecinum (Linnaeus).

At Positions 1, 3, 10, 12, 33, 51, 53, 56.

Nowhere obtained in large quantities, and usually occurring as quite small colonies.

Depth, 40-49 fath.

Halecium muricatum (Ellis and Solander)?

At Positions 14 and 32.

Two small colonies in each case, growing on *Cellaria* and the dead stem of a *Sertularian* respectively. Height, from 8 to 27 mm. These specimens appear to belong to this species, but in the absence of any gonothecae their identity is left in doubt.

Depth, 42-44 fath.

Halecium labrosum, Alder.

At Position 12; one small colony of 20 mm. in height, growing on a tube of *Pallasia murata*.

Depth, 42 fath.

Halecium tenellum, Hincks.

At Positions 49, 59, 62, 80.

On *Antennularia*, *Cellaria*, etc. Plentiful at the two last-named positions.

Depth, 47-51 fath.

SERTULARIIDAE.

Sertularella gayi (Lamouroux).

At nearly all positions, including the last, 80.

Depth, 40-51 fath.

The species occurred rather plentifully on the fine sandy ground covered by the first cruise, i.e. within 10 miles of the Eddystone. On the rougher ground outside this, fair-sized colonies were found at Positions 60 and 80, some specimens at the latter point bearing gonangia. But in the great majority of the hauls the material obtained was small in quantity, and in many cases only very young colonies were observed.

Sertularella polyzonias (Linnaeus).

This species was only recorded from Positions 33, 49, and 62, in small colonies. It is not improbable that it was overlooked in some cases among the material of the preceding species.

Depth, 42-50 fath.

Sertularella tenella (Alder).

At Positions 11, 14, 31, 35, 42, 49, 53, 56, 67, 80.

Depth, 40-51 fath.

On *Sertularia abietina*, *Sertularella gayi*, *Diphasia attenuata*, *Hydrallmania*, etc., and on *Cellaria*; many colonies occurring at Positions 14, 35, and 56.

The species has not hitherto been recorded in the Plymouth fauna.

Distribution: Northumberland; South Devon; Filey, Yorks; Peterhead; Wick; Hebrides; Shetland (cp. Hincks, 55); Isle of Man (G. Wood, 64); Cuba; California; Rio de Janeiro (cp. Nutting, 60); Davis Strait; Smith Sound; Jones Sound; Jan Mayen; Spitzbergen; also in Sub-Antarctic Seas (cp. Broch, 50).

Diphasia attenuata (Hincks).

At Positions 14, 35, 49, 53, 56, 59, 60, 62, vii, 80.

Depth, 43-51 fath. or over.

Chiefly on *Cellaria*; occasionally on other Hydroids; at one position on a *Pallasia* tube. Several colonies at most of the positions enumerated. Especially well-grown colonies occurred at Position 62 with a few male gonangia, and at Position 80, with numerous female gonangia, respectively.

Diphasia pinaster (Ellis and Solander).

At Positions 1, 3, 6, 8, 10, 12, 13, 14, 51, 60, 80.

Depth, 40-51 fath.

A large colony occurred at Position 8. In other cases the specimens were of rather small size or quite young colonies.

Diphasia pinnata (Pallas).

One or two specimens at Positions 14, 35 (dead), 43 (fragment), 60, 62, vii, 80.

Depth, 43-51 fath. or over.

Female gonangia were borne on colonies from 14, 60, and 62.

Diphasia alata, Hincks.

Only obtained at Position 80, where a well-grown colony occurred. Depth, 51 fath.

It is doubtful whether this species occurs in the Plymouth fauna. There is one specimen in the Laboratory without data, and a second—a good-sized colony, separated from its attachment—which was dredged up on the Mewstone Ledge in June, 1908. It is not certain that the latter specimen may not have found its way there through the medium of trawlers from outside, but in view of the fact that the natural habitat of the species is on the rough ground in the deeper water of the Channel, and far outside the ordinary trawling grounds, it seems more probable that the specimen grew where it was obtained. In the course of a cruise made by the *Oithona* in 1910, the species was found growing luxuriantly in the deeper water between the 50-fathom and 60-fathom lines—that is to say, immediately outside the limits of the cruises dealt

with in the present report. Hincks (54) gives as localities of its occurrence: Shetland, and in 40 fathoms; Hebrides, Falmouth, Cornish coast. The distribution of the species outside British waters appears to be very limited: Stavanger, Norway, 50-100 fathoms (G. O. Sars, 62). *Hirondelle*: Bay of Biscay, 131-300 m.; Azores, 130-318 m. (Pictet et Bedot, 61). *Travailleur*: Bay of Biscay, 411 m. *Talisman*: Azores, 115 m. (Billard, 48).

Sertularia abietina, Linnaeus.

At Positions 9, 11, 14, 35, 43, 45, 49, 53, 59, 60, 62, 67, vii, 80.

Depth, 42-52 fath. or over.

On dead *Pecten* shells, etc. Few of the examples were in healthy condition, and several were dead and overgrown.

Sertularia argentea, Ellis and Solander.

At Positions 3, 7, 11, 12, 44, 49, 53, 56, 60, 80.

Depth, 40-51 fath.

On shells of *Pecten opercularis*, *P. maximus*, *Lutraria*, *Modiola*, etc. Mostly small or young colonies.

Hydrallmania falcata (Linnaeus).

This species was found generally distributed over the whole area, and was recorded at nearly all positions, including 62, 64, and 80. It was commonly attached to shells of *Pecten*, etc., and once *Porcella*. It occurred very commonly on stones dredged up nearly everywhere, and in such cases often as good-sized colonies.

Depth, 40-51 fath.

Thuiaria articulata (Pallas).

A fragment only was obtained at Position 13.

Depth, 42 fath.

PLUMULARIIDAE.

Antennularia antennina (Linnaeus).

At Positions 1, 3, 4, 6, 7-12, 14, 15, 32, 38, 40, 43, 48, 49, 56, 58, 62, 64, vii, 77, 80.

Depth, 40-51 fath. or over.

Colonies occurred growing on shells and stones at Positions 7 and 62, several being so attached at the latter point. Specimens bore gonophores at 62 and at the doubtful position in Cruise VII. A fine colony was obtained at Position 64, but the growth was not otherwise remarkably luxuriant in specimens anywhere, and the quantity obtained was in most cases small.

Antennularia ramosa (Lamouroux).

At Positions 1, 3, 7, 13, 14, 32 (dead), 43, 60.

Depth, 40-50 fath.

A colony at Position 1 carried several *Scalpellum*. The species was not numerous at any point.

Aglaophenia myriophyllum (Linnaeus).

At Positions 11 (four), 14 (one), 32 (one), 33 (two), 37 (one), 40 (one), 43 (two small), 46 (one), 56 (one), 60 (two), 62 (four), 67 (one).

Depth, 40-50 fath.

Gonangia were borne on one colony at Position 60.

Aglaophenia tubulifera (Hincks).

At Position 60; several colonies on *Diphasia pinnata*, one with gonangia.

Depth, 49 fath.

Plumularia catharina, Johnston.

At Positions 1, 3, 4, 31, 33, 37, 38, 43, 52, 56, 59, 60, 62, vii, 80.

Depth, 40-51 fath. or over.

Generally of small or very small size; on tubes of *Chaopterus* and *Pallasia*, and on *Scalpellum*, *Macropodia*, *Hyas*, *Pecten*, *Cellaria*, etc.; often numerous, several colonies occurring at the same position; plentiful at Position 80. The creeping form described by Hincks (54) occurred exclusively at Positions 4, 37, 38, 52, 56, 59, 60; bearing gonangia at 37, 38, 52; and predominated over the branching form at 62 and 80. The branching form bore gonangia at Position 3.

Plumularia echinulata, Lamarck.

Small colonies at Positions 10, 31, 34.

Depth, 40-42 fath.

On a tube of *Pallasia*, on *Pecten opercularis*, and on *Porella*, respectively. I have been unable to distinguish these specimens from Hincks' description of *echinulata*, despite the fact that he only records it from shallow water, and that it has only hitherto been recorded at Plymouth inside the breakwater, and in the Yealm Estuary.

Plumularia frutescens (Ellis and Solander).

A fragment at Position 52, on *Macropodia*.

Depth, 43 fath.

Plumularia similis, Hincks.

A small colony at Position 56; several on *Sertularia abietina* at 60; and on *Macropodia* at 64.

Depth, 49-50 fath.

Plumularia pinnata.

At Positions 1, 3, 4, 7, 35, 43, 44, 45, 49, 51, 64, vii.

Depth, 40-53 fath.

On *Diphasia*, *Macropodia*, *Pisa*, *Cellaria*, etc. Gonangia were borne on colonies from Positions 3 and 4.

Plumularia setacea (Ellis).

At Positions 3, 36, 62, vii.

Depth, 40-50 fath. or over.

Colonies from all four positions bore gonophores.

At Position 62, and the doubtful position in Cruise VII, several colonies were obtained, growing on the creeping form of *Plumularia catharina*, and all of very slender growth and small size. In the largest group, at vii, not exceeding 15 mm. in height, two of the colonies bore numerous gonangia, and the greater number of the pinnae were monothecate. At 62 another group of four colonies occurred, of very minute size, not exceeding 3 mm. in height, and with all the pinnae monothecate. One of these bore a single gonangium. Nutting (59) refers to a minute form obtained by the *Albatross* from floating drift weed, which may be comparable with this. He treats it as an aberrant form of *setacea*, but suspects that the gonosome if present would prove it to be a distinct species. In regard to the specimens here considered, there can be no doubt that they all belong to *setacea*, while the entirely monothecate form at 62 is connected with the ordinary type by the intermediate, partly monothecate, form at vii.

Polyplumaria flabellata, Sars.

One small colony of 20 mm. in height was obtained at Position 56, and one large well-grown colony at Position 80.

Depth, 49-51 fath.

The species has not previously been recorded from British waters.

Distribution: Stavanger, Norway, 50-100 fath. (Sars, 62); Bay of Biscay, 134-300 m., and Azores, 130-318 m. (*Hirondelle*, Pictet et Bedot, 61); Bay of Biscay, 411 m., and Azores, 128 m. (*Travailleur et Talisman*, Billard, 48). Pictet and Bedot (48) regard the *Diplopteron insigne* of Allman (45), obtained off the south-west coast of Spain in 364 fath.,

and the *Polyplumaria pumila* of the same author (46), obtained by the *Challenger* at the Azores in 450 fath., as synonymous with *P. flabellata*.

Several fine colonies of this species were obtained during a cruise of the *Oithona* in 1910, from the deeper water between the 50-fathom and 60-fathom lines, in company with the colonies of *Diphasia alata* already alluded to under that species.

ALCYONARIA.

ALCYONIDAE.

Alcyonium digitatum, Linnaeus.

Recorded from three-fourths of the positions, including bottom samples; generally plentiful, and at 3, 53, and 68 abundant. The outermost point at which it was recorded was Position 66, distant 41 m., depth 52 fath., where it was plentiful. Of the seven hauls made outside this, three were bottom samples.

A single specimen of the yellow variety was obtained in 40 fath. at Position 4 (cp. Hickson, 53, p. 349).

ZOANTHARIA.

CORALLIMORPHIDAE.

Corynactis viridis, Allman.

Several specimens of this species were obtained on stones and on shells of *Pinna* at Position 80, but it occurred at no other position. Depth, 51 fath.

SAGARTIDAE.

Sagartia miniata (Gosse).

Chitonactis coronata (Gosse).

Paraphellia expansa (Haddon).

The records of these three species are incomplete. I am indebted to Mr. C. L. Walton for having pointed out to me the identity of some of the specimens which he examined in life, admitting of the general statement that *Sagartia miniata* occurred at about fifteen positions, extending over the whole area investigated, while the occurrence of *Chitonactis coronata* and *Paraphellia expansa* was limited to comparatively few positions, though hardly less limited in extent.

Adamsia palliata (Bohadsch).

At Positions 6, 8, 11, 13, 35, 43, 46, 49, 59.
Depth, 42-49 fath.

In most cases as single specimens, and always with the species *Eupagurus prideauxi* when a Pagurid was present (see p. 355).

It is remarkable that though *Eupagurus bernhardus* was frequently recorded, its common associate *Adamsia polypus* never occurred (see p. 299).

ZOANTHIDAE.

Epizoanthus incrustatus, Düben and Koren.

Two specimens were obtained at Position 43, of the carcinoecious form, with six and seven polyps respectively.

Depth, 45 fath.

Epizoanthus couchi, Johnston?

At Position 15, in 44 fath., two colonies apparently of this species occurred, each growing on a stone. In each case the polyps, which number seven and about fifteen respectively, are partly connected by a ribbon-shaped band, and partly isolated. All are strongly contracted, with the height not exceeding the diameter, which ranges from 5 mm. in the largest to 2 mm. in some of the young polyps. They are thickly incrustated with sand.

Epizoanthus sp.

At Positions 7 (one) and 42 (one), in 42-44 fath., a free form of *Epizoanthus* was obtained which rather closely resembles Holdsworth's description of *Zoanthus rubricornis* (57), and may belong to that species, but the colour of the tentacles was not observed in life. The first specimen consists of two polyps arising at an acute angle from a common base, the largest being 15 mm. in height by 4 mm. in diameter at apex. In the second specimen two polyps arise from a common base at an obtuse angle, their height and greatest diameter being 20 mm. by 5 mm., and 9 mm. by 4 mm. respectively.

TURBINOLIDAE.

Caryophyllia smithi, Stokes.

Recorded at Positions 7, 8, 9-13, 15, 18, 19, 33, 35, 37, 43-45, 47, 53, 56, 58, 59, 62, 64, 80.

Depth, 42-53 fath.

More than one and often several specimens occurred at each position, on shells and stones; many specimens at Position 80. The barnacle *Pyrgoma anglicum* was associated with individuals at 7 (one), 11 (one), 45 (two), and 59 (one).

ECHINODERMATA.**ASTEROIDEA.****ASTROPECTINIDAE.*****Astropecten irregularis* (Pennant).**

A few specimens at Position 4, and single specimens at Positions 37, 49, 59, and 68.

Depth, 40-52 fath.

***Luidia sarsi*, Düben and Koren.**

Single specimens at Positions 34 and 68.

Depth, 42-52 fath.

***Luidia ciliaris* (Philippi).**

At Positions 7 (a few), 10, 18, 26, 28, 34, 35, 40, 43, 46 (juv.), 52, 62 and 64 (one each), 68 (five), 72 (one), 78 (two).

Depth, 42-53 fath.

In his Report on the fauna between the Eddystone Grounds and Start Point, Dr. Allen (1) records three specimens of the preceding species but no occurrence of *L. ciliaris*, and refers to the statement of Ludwig that *L. ciliaris* is generally taken on hard ground, while *sarsi* prefers a muddy or sandy ground. The comparative frequency of *ciliaris* and scarcity of *sarsi* in the area at present under consideration may perhaps be chiefly attributed to the frequently rough character of the ground in this region being more favourable to the former species than to the latter. Ludwig's expression (73, p. 81) . . . "sandigen Boden, namentlich solchen, der mit kleinen Steinen, Conchylien, Corallineen und allerlei Detritus untermischt ist" nearly describes the general character of this area, or at least the smoother parts of it.

Distribution: Sicily, Gulf of Naples, Nice, Gulf of Marseilles, Gulf of La Ciotat, Banyuls, Minorca, Cape Verde Is., Arcachon, Concarneau, Roscoff, Plymouth, Polperro, Falmouth, Stackpole Head, Isle of Man and Irish Sea, S.W. Coast of Ireland, in 55 fath., Kenmare R., Arran,* Berwick Bay, Shetland Is., Scarborough, Faeroe Is., Jutland (?),† Skager Rak (cp. Ludwig, 73; Bell, 65; Forbes, 66).

Vertical Distribution, 4-159 m. (cp. Ludwig, 73).

* In quoting this record, which is apparently the same as that of Forbes, Bell does not refer to the fact that Forbes does not in this case make it clear to which "variety," as he terms it, the record applies, i.e. whether to *ciliaris* or *sarsi*, but it may be that Bell had definite data to refer to.

† Ludwig questions the certainty of this record (73, p. 81).

GYMNASTERIIDAE.

Porania pulvillus (O. F. Müller).

At Positions 7 (one ?), 8 (two), 20 (one), 34 (three), 36, 37, 59 (one); 64 (one).

Depth, 42-53 fath.

ASTERINIDAE.

Palmipes placenta (Pennant).

At Positions 1 (one), 3 (one), 34 (one small), 37 (one small), 70 (a few).

Depth, 40-43 fath.

SOLASTERIDAE.

Solaster papposus (Fabricius).

At Positions 7 (a few), 8 (a few), 15 (one small), 20 (one), 31 (a few), 34 (one small), 43 (one young), 49, 62, 66 (one), 67 (one), 68 (two).

Depth, 42-52 fath.

ECHINASTERIDAE.

Henricia sanguinolenta (O. F. Müller).

At Positions 8 (four), 25, 44 (one), 45 (one), 59 (two), 77 (one).

Depth, 43-49 fath.

ASTERIIDAE.

Asterias glacialis, Linnaeus.

At Positions 3 (several), 7, 8 (a few), 11 (one), 12 (one), 28 (a few), 34 (one), 35 (two very large), 37 (one), 49 (one), 56, 64 (one), 68, 70 (one).

Most of the records, excepting that at 35, are entered as "large" specimens.

Depth, 40-53 fath.

Asterias rubens, Linnaeus.

At Positions 3 (several), 7, 8 (about a dozen), 22 (one), 31, 32 (two), 34 (two), 35 (three), 36 (one), 37 (four), 49 (one), 51 (one), 53 (one young, diam. 35 mm), 59 (one small), 64 (one), 66 (one), 68 (two), 70 (three), 72 (three), 78 (two).

Mostly entered as "large" specimens.

Depth, 40-53 fath.

OPHIUROIDEA.

OPHIOLEPIDAE.

Ophiura ciliaris (Linnaeus).

At Positions 1, 3, 7, 10, 11, 14, 31, 34, 37, 56, 58, 68, 72.

Single or few specimens at each position. Perhaps 35 specimens in all.

Depth, 40-52 fath.

Ophiura albida, Forbes.

At Positions 1, 2, 11, 12, 15, 31, 32, 37, 43, 44, 47, 53, 55, 56, 63.

A few specimens, or more often single specimens, at each position, excepting several—about ten—at 43.

Depth, 40–50 fath.

Ophiura affinis, Lütken.*

At Positions 5 (four), 46 (one).

Depth, 42–47 fath.

A single specimen of this species obtained by Dr. Allen on the Bolt Head shell gravel ground in 1895 (1, p. 470) is the only previous record of its occurrence in the English Channel.

Distribution: Seaham (Hodge, 68), Firth of Clyde, Shetland (very abundant near Balta), Northumberland coast (Norman, 78, 79; Hodge, 69), Peterhead, Bass Rock, Dogger Bank, Skager Rak (Möbius and Bütschli, 77), Christiania Fjord, The Sound (Lütken, 74), S.W. of Ireland (Haddon, 7), Lesina, Ragusa (Heller, 67), S.E. of Long Island (?) (Leyman, 76).

Vertical Distribution, 6–294 fath.

AMPHIURIDAE.

Ophiactis balli (Thompson).

Recorded from 33 positions in the following proportions:—

From one to five specimens at Positions 1, 5, 7, 40, 47, 53.

A few or several specimens at Positions 6, 8, 10, 11, 12, 16, 18, 32, 33, 34, 43, 44, 45, 56, 59, 62, 80.

Many, or common at Positions 3, 14, 38, 49, 55.

Very common or abundant at Positions 9, 13, 15, 70.

Depth, 40–51 fath.

While these terms serve as a rough approximation to the proportionate distribution of the species, it must be added that they probably in many cases tend to show an under-estimate of actual numbers, and with the exception of the fine sandy ground covered by the hauls 1–4, it might be nearly correct to describe the species as usually very common and often abundant throughout the whole area.

OPHIOCOMIDAE.

Ophiocoma nigra (O. F. Müller).

Recorded from 41 positions, including the first and the last.

Depth, 40–52 fath.

The species was nowhere obtained in large numbers. Many speci-

* Mr. W. De Morgan kindly determined this species.

mens, perhaps twenty or twenty-five, occurred at 31 and 53; about a dozen at 21, 22, 30, 34-36, 44-46, 52, 56; few specimens or single specimens at all other positions, including 1 and 80.

OPHIOTHRICIDAE.

Ophiothrix fragilis (O. F. Müller).

Recorded from 23 positions, including the first and 63 and 64, but not 80.

Depth, 40-53 fath.

Nowhere obtained in large numbers. The greatest number, not exceeding about a dozen, occurred at Positions 5, 59, and 70. At the other points only a few or single specimens occurred. Small or young specimens were recorded at ten positions, viz. 1, 4, 5, 9, 10, 33, 40, 46, 53, 63.

The frequent occurrence of these small specimens is remarkable, while no such entry occurs in the records of the preceding species. In point of numbers and frequency of occurrence it seems evident, from whatever cause, that *Ophiocoma nigra* is by far the predominating species on these outer grounds. Reducing the comparative terms of entry used for the several records to rough numerical estimates where figures are not shown, I calculate that the total numbers recorded of the two species, *O. fragilis* and *O. nigra* respectively stand in the proportion of about 1 : 2.75.

ECHINOIDEA.

ECHINIDAE.

Echinus acutus, Lamarck.

At Positions 7, 31, 35, 36, 43, 49, 52, 72.

Depth, 40-47 fath.

These positions all lie between fifteen and thirty-one miles from the Eddystone, at a depth of 40-43 fath. Very few specimens of the species occurred, not more than three being recorded from any position.

Echinus esculentus, Linnaeus.

In marked contrast with the preceding, the extent of occurrence of this species will best be shown by giving the records, as far as they were made, in actual figures. Where numbers are omitted after a position the number of specimens was not recorded, but may be regarded as one or few.

At Position 1 (one), 3 (few), 7, 8, 12 (one), 20 (few), 22 (one), 32 (one), 34 (seven), 36 (one), 43 (two), 45 (four), 46 (nine), 49

(twenty, and two young), 51 (one), 52 (five), 53 (three), 56 (one), 58 (one young), 59 (one young), 66 (thirteen), 67 (two), 68 (eight), 70 (few), 72 (few), 78 (eleven), 80.

Depth, 40-52 fath.

The total number recorded is about 120, as opposed to about 15 of the preceding species. In his Report on the fauna between the Eddystone Grounds and Start Point, Dr. Allen (1) discusses in detail the conditions influencing the distribution of these two species. In regard to the great numerical difference between them in the area now dealt with, it is probable that Dr. Allen's remarks on the bare survival of *acutus* in the Plymouth area as being on the outskirts of the deep-water area, where it abounds, are directly applicable to the present case, since the deepest positions now under consideration extend very little beyond the 50-fathom sounding. It is this line that apparently marks the inner limits of the conditions especially favourable to the species, and its non-occurrence in the few hauls that were made near that depth may be due to local conditions.

In a recently published number of this Journal, Shearer, De Morgan, and Fuchs* express a difficulty in distinguishing many specimens of *acutus* and *esculentus* from one another, and even a doubt as to their true specific distinction. As regards specimens here recorded, no such confusion between the two forms as separated was noticeable, though in most cases where *acutus* was found the two species occurred together.

Echinus miliaris, Linnaeus.

A single specimen was obtained at each of the positions 1 and 80.

Depth, 40-51 fath.

CLYPEASTRIDAE.

Echinocyamus pusillus (O. F. Müller).

At Positions 1 (several), 45 (a few), 56 (one).

Depth, 40-49 fath.

Spatangus purpureus, O. F. Müller.

Large specimens at Positions 5, 9, 10, 11, 74 (one each), and 67 (two).

Medium-sized specimens at Position 46 (a few).

Small or young specimens at Positions 5 (a few), 17 (one), 20 (one),

31 (a few), 36 (one), 46 (several), 51 (a few), 56 (one), 58 (several).

Depth, 40-49 fath.

* "Preliminary Notice on the Experimental Hybridization of Echinoids," *Journ. Mar. Biol. Assoc.*, N.S., Vol. IX, 1911.

The large proportion of small specimens is remarkable.

The mollusc *Montacuta substriata* was attached to some of the specimens at Position 46, but it was not recorded in other cases.

SPATANGIDAE.

Echinocardium pennatifidum, Norman.

Five specimens on rough ground at Position 58.

Depth, 49 fath.

Length, 29, 34, 38, 39, 41 mm. respectively.

HOLOTHUROIDEA.

CUCUMARIIDAE.

Cucumaria brunnea, Thompson.

At Positions 3 (one), 4 (one), 43 (two).

Depth, 40-45 fath.

Cucumaria hyndmani, Thompson.

One specimen at Position 35.

Depth, 43 fath.

Thyone fusus (O. F. Müller).

One specimen at each of the Positions 11 and 33.

Depth, 42 fath.

Thyone raphanus, Düben and Koren.

One specimen at Position 14.

Depth, 44 fath.

Two examples of this species, which has not previously been recorded in the Plymouth fauna, were recently identified by Mr. J. H. Orton from three miles south of Rame Head, where they were obtained in July, 1911. Bell (65) gives as its distribution: British and Norwegian seas and Mediterranean; with the British localities: Faeroe Channel, 570 fath.; Shetland; The Minch; Dingle Bay, 40 fath., off the S.W. coast of Ireland. Also Irish Sea (Herdman, 9).

ANNELLIDA.

POLYCHAETA.

SYLLIDAE.

Typosyllis alternosetosa, de St. Joseph.

At Positions 14 (one), 33 (one), 38 (two), 43 (one), 45 (one), 52 (one), 56 (one), 58 (one), 59 (one).

Depth, 42-49 fath.

Typosyllis variegata, Grube.

At Positions 38 (two), 43 (one), 53 (one), 58 (one).

Depth, 44-49 fath.

The specimens appear only to differ from the account of Langerhans in the smaller number of articulations in the dorsal cirri of the body. Langerhans gives these as 34 and 24 in alternate segments. In these specimens they number about 24 and 16 respectively. Grube (83) first described the chaetae as with simply hooked end-pieces. Subsequent authors have described them as bifid. In all the specimens here considered they are very faintly bifid in some of the anterior segments, but distinctly so in the median and posterior segments. The transversely-placed 8-shaped dark marking, as described by Langerhans, in the dorsal surface of the segments, is distinct in the anterior segments of some specimens but absent in others (as preserved in spirit).

HESIONIDAE.

Castalia punctata (O. F. Müller).

One specimen at Position 33. Length in spirit, 10 mm.

Depth, 42 fath.

APHRODITIDAE.

Aphrodita aculeata, Linnaeus.

At Positions 6 (one), 11 (one), 31 (a few).

Depth, 40-42 fath.

Hermione hystrix (Savigny).

At Positions 8, 11, 16, 17 (one each), 18 (two), 19 (one), 20, 22, 25 (two), 31, 35 (one), 37 (one), 38, 43 (one), 44 (two), 58 (one), 59 (three), 62.

Depth, 43-50 fath.

The greater frequency of this species in comparison with the preceding is probably due to the generally rough character of the ground being more favourable to it (cp. Allen, 1).

Lepidonotus squamatus (Linnaeus).

At Positions 13 (one), 34 (one), 70 (two).

Depth, 40-42 fath.

Lagisca floccosa (Savigny).

At Positions 10, 12, 13, 14, 32, 33, 34, 35 (one each); 45 (three young), 49, 51 (two each), 58 (three), 59 (four), 60, 62 (two each), 70 (four), 72 (one), vii (two), 80 (seven).

Depth, 42-51 fath. or over.

Harmothoe setosissima (Savigny).

At Positions 46 (two), 52 (one), 53 (one), 56 (one).

Depth, 43-49 fath.

Harmothoe fraser-thomsoni, McIntosh.

One specimen at each of the Positions 56 and 80.

Depth, 49-51 fath.

Harmothoe lunulata (Della Chiaje).

One specimen at the doubtful position in Cruise VII.

Depth, 49 fath. or over.

Evarne impar (Johnston)?

One specimen at each of the Positions 10 and 32.

Depth, 40-42 fath.

The specimens only differ from the description and figures of McIntosh (91) for the species in the character of the ventral chaetae, in which the secondary process is very largely lacking. In one specimen this is absent from about the inferior third of the series. In the other it is only visible as a very fine process in about ten of the extreme superior chaetae. With the absence of this process is associated a corresponding diminution and even entire absence of the spinulation on the chaetae concerned. In the second specimen referred to, especially, many of the inferior chaetae are entirely bare in this respect. These remarks refer to about the tenth foot in each case. Both are young specimens, the largest not exceeding 10 mm. in length, and the nearer approximation of this latter to the type suggests that the difference may be due to immaturity.

Halosydna gelatinosa (M. Sars).

One specimen at Position 59.

Depth, 49 fath.

The specimen was broken into three pieces, but measured about 7 cm.

AMPHINOMIDAE.

Euphrosyne foliosa, Audouin and Edwards.

One specimen at Position 60.

Depth, 49 fath.

PHYLLODOCIDAE.

Phyllodoce rubiginosa, de St. Joseph.

One specimen at each of the Positions 45, 46, 58, and two at 59.

Depth, 46-49 fath.

NEREIDAE.

Nereis fucata, Savigny.

One specimen at each of the Positions 6 and 46, associated in each case with *Anapagurus laevis*.

Depth, 42-47 fath.

Nereis pelagica, Linnaeus.

One specimen at each of the Positions 7, 38, 46, 49, 58.

Length as measured in spirit, 35, 40, 40, 25, 20 mm., severally.

The specimen at 46 occurred in a *Pallasia* tube; the others were free.

Depth, 42-49 fath.

EUNICIDAE.

Eunice fasciata (Risso) = *E. harassii*, Audouin and Edwards.

One specimen at each of the Positions 4, 7, and 31.

Depth, 40-42 fath.

Eunice vittata (Della Chiaje).

One specimen at Position 32.

Length in spirit, 53 mm.

Depth, 42 fath.

Not apparently recorded from Plymouth since the time of Bate.

Distribution: Guernsey; *Porcupine* Expedition, Sta. xxvii, xxviii, xxviii; Galway; Polperro; Plymouth; shores of France; Madeira; Mediterranean; Japan; Adventure Bank, *Porcupine*, 92 fath.; Cape Verde Is. (cp. McIntosh, 93).

Onuphis conchilega, M. Sars.

At Positions 6 (two), 13 (one), 16 (one), 32 (nine), 37 (one), 42.

Depth, 42-44 fath.

Hyalinoecia tubicola (Müller).

Recorded at 23 positions: 1, 5, 10-15, 17, 19, 22, 31, 35-37, 41, 42, 49, 51, 52, 56, 58, 67.

From one to about fifteen specimens at each point, the number averaging about four.

Depth, 40-52 fath.

Lumbriconereis fragilis, O. F. Müller?

A single specimen at each of the Positions 46 and 58.

Depth, 47-49 fath.

A considerable portion at each extremity is lost in both examples.

The feet and bristles agree with those described and figured by McIntosh for this species.

Distribution: At various stations off the British shores, in 15–1380 fath. (*Porcupine*); W. and S.W. coast of Ireland, in 30–50 fath.; Connemara; Nova Zembla; Siberia and Behring Strait; Canada; (cp. McIntosh, 93).

SPHAERODORIDAE.

Ephesia gracilis, Rathke.

Single specimens at Positions 11, 15, 32, 33, 38, 49; and apparently occurring at other points not definitely recorded.

Depth for recorded specimens, 42–47 fath.

CHAETOPTERIDAE.

Chaetopterus variopedatus, Renier.

Living specimens were obtained at Positions 3, 4, 7, 9, 10, 12, 13, 43, 58, 59, 68, 70, 80; single specimens or a few only, in each case; in tubes of *Pallasia*, in a shell of *Buccinum*, winding through the whorls of *Fusus islandicus*, etc. Empty tubes only were recorded at Positions 1, 2, and 55.

Depth, 40–51 fath.

TEREBELLIDAE.

Polymnia nebulosa (Montagu).

At Positions 11, 31, 40, 45 (one each), 58 (two), 59 (three), 64 (one), vii (five).

Depth, 40–50 fath. or over.

Large specimens occurred at 59, and vii, attaining to 12 or 13 cm. in length.

Polymnia nesidensis (Della Chiaje).

One specimen at Position 60.

Depth, 49 fath.

Lanice conchilega (Pallas).

Empty tubes only of this species were obtained at Positions 10, 11, 32, 35, 60.

Nicolea venustula (Montagu)?, de St. Joseph.

At Positions 11 (one), 12 (two), 43 (two), 59 (three), 60 (two), 62 (one), 72 (one).

Depth, 42–50 fath.

The specimens range from 2 to 5 cm. in length. All have two pairs

of gills, and so far as can be ascertained 17 setigerous segments. The only doubt as to the latter point concerns a few specimens that were partly broken, and in which the number of segments is not quite clear. The species is undoubtedly the *Nicolea venustula* of Marenzeller (96) and de St. Joseph (101). But whatever may be said of the justification for Marenzeller's reference of this type to the *Terebella venustula* of Montagu, with 3 pairs of gills, the evidence he quotes in favour of his conclusion that the *Nicolea zostericola* of Oersted, sec. Grube et Malmgren, is synonymous with *venustula* seems far from convincing, and his view is not shared by de St. Joseph. Neither Marenzeller nor de St. Joseph finds any departure in the examples of *venustula* personally recorded by them respectively, from the typical condition of 2 pairs of gills and 17 setigerous segments. Such also is the condition, probably without exception, of the specimens recorded here. It is significant that in Plymouth both types occur distinctly. Dr. Allen has found *zostericola* common within tide-marks in Plymouth Sound. Among 14 examples of his material recently examined, I have found the number of setigerous segments invariably 15, excepting in one specimen which was slightly damaged and in which, probably in consequence, only 14 were distinct. All of these are of small size, not exceeding (in spirit) 2 cm. in length. On the other hand, seven specimens of *venustula* obtained by him from a position 32 miles S. of Start Point, in about 40 fathoms, have, without exception, 17 setigerous segments. Some of these range as low as 2 cm. in length, so that the difference in the number of such segments between the two types would seem to be independent of size or age.

These facts, and the occurrence of the two types near Plymouth under different respective conditions, and apparently without variation in the characters mentioned, favour the view that they are specifically distinct. In Plymouth at least, *zostericola* appears to be essentially a littoral form of comparatively slender habit and small size, while *venustula* frequents the deeper water and assumes a stouter form and larger size. The number of setigerous segments moreover, 15 in *zostericola* and 17 in *venustula*, may apparently be regarded as a sufficiently stable character on which to separate the two species from one another.

Thelepus cincinnatus, Fabricius.

- At Positions 1, 3 (a few), 14 (one), 32 (one), 33 (two), 34, 35, 43 (one each), 45 (three), 49 (one), 51 (two), 56, 60 (three each), 64 (one), 70 (two).
- Depth, 40-50 fath.

In referring the examples recorded to the species *cincinnatus* more importance has been attached to the character of the gills, which are present without exception on two segments only, than to the uncini, which are very variable in form. The specimens range from young examples of about 12 mm. in length to large ones of 10 cm. Between such extremes the only noticeable difference in the uncini is one of size. The irregularity of form occurs in both, though the range of variation seems greater in the larger specimens. The uncini conform on the broad lines with the description and figure of de St. Joseph (103), but often differ much in detail.

Regarding the uncinus from the face and tracing it from below upwards, there is first (a) the large central tooth, or "great fang," so termed by McIntosh. Above this (b) are usually two, but very often three, strong teeth, of which the central one, when present, has a slightly higher origin than the laterals. Next follows (c) a range with two small lateral teeth and one larger central one. This central tooth is the homologue of the large central tooth in the (b) range, and when present in the latter it is therefore absent from the range above in the reckoning adopted, and the (c) range then has the two small laterals only. Finally (d) occurs a range of very small teeth, about three to five in number, which fill in the apical space. These occasionally extend around the apical margin of the uncinus, so that their two extreme laterals lie one on either side of the (c) range, and the latter then appears to possess altogether five teeth, or four as the case may be. In a preparation of a young specimen of 18 mm. in length, the condition with three teeth in the (c) range is the most frequent, while apically the arrangement is much confused, and the remaining teeth are crowded together with little appearance of order. It must be added that the use of the term "range" is quite artificial, all of the teeth lying closely apposed, so that any irregularity occurring is liable to confuse the scheme of arrangement considerably.

In the profile view a difference occurs from the figure by Malmgren (94), which shows the uncinus rather narrower in antero-posterior measurement, and with the apex simply rounded and without the slight projection where the extreme apical teeth are borne. Malmgren's figures are as a rule so true to life that this difference presents some difficulty. The second point, however, is involved in Marenzeller's figure of the species (96), where the apical projection is distinctly shown. From the description of the species by Marenzeller and de St. Joseph the only important discrepancy is the frequent enlargement of the central tooth in the (c) range and its extension as a third tooth into the range immediately below. This character, which is not men-

tioned by either of these authors, occurs, I believe, in every preparation of the species I have seen, including some specimens collected by the *Huxley* in the North Sea.

AMPHICTENIDAE.

Pectinaria (Petta) pusilla, Malmgren.

One specimen at each of the Positions 33 and 34. Length (in spirit), 13 and 15 mm. respectively. The second example was associated with an Ascidian inside a valve of *Pecten opercularis*.

Depth, 42 fath.

The specimens only differ from Malmgren's description (94) in the point of the membranous fold under the paleolae. This is triangular, as in *P. assimilis*, McIntosh (90). The shape of this, however, is not clearly defined by Malmgren, who figures it slightly emarginate in the dorsal view, and overhanging in the ventro-lateral view of the whole animal. It is conceivable that in the single specimen he had before him the natural outline of the process was indistinct. In all other respects the examples are in close conformity with Malmgren's account of the species. Since the occurrence of Malmgren's specimen, which was obtained by Loven off the coast of Bohus in the Skager Rak, the species seems only to have been recorded from the Firth of Clyde (cp. Gemmill, 82).

SABELLIDAE.

Sabella pavonina (Savigny).

Usually small specimens at Positions 1, 7, 8, 31, 34, 35, 37, 40, 53, 59, 80.

Depth, 40-51 fath.

Dasychone bombyx (Dalyell).

At Positions 1 (several), 3 (one), 55 (a few), 59 (one), 60 (one), 70 (three), 72 (one), vii (one).

Depth, 40-49 fath. or over.

SERPULIDAE.

Serpula vermicularis, Linnaeus.

At Positions 7 (a few), 8 (several), 9 (very common), 13 (two), 14 (a few), 32, 43 (one), 49 (several large), 59 (one), 60 (two), 72 (one).
Depth, 42-49 fath.

Commonly attached to stones and shells of *Pecten*. The records are probably incomplete.

Pomatoceros triqueter (Linnaeus).

At Positions 6, 7, 80, and probably in several other hauls.
Depth, 42-51 fath.

Hydroides norvegica (Gunn).

Recorded at Positions 4, 6, 11, 13, 32, 58. About 50 examples on a valve of *Pecten opercularis*, at Position 13.
Depth, 40-49 fath.

Ditrupa arietina (O. F. Müller).

One specimen at Position 36.
Depth, 43 fath.

The species does not appear to have been previously recorded from the English Channel.

Distribution: Gulf of Naples, Teneriffe, Madeira, Azores, Bay of Biscay, S.W. of Belle Isle, N.W. coast of Ireland, W. coast of Scotland, Shetland, Norway, Philippine Is.—cp. Lo Bianco (88), Langerhans (87), McIntosh (89, 90), Roule (98), de St. Joseph (103), Johnston (85), Sars (105), Grube (84).

Filograna implexa (Berkeley)?

At Positions 7, 8, 37.
Depth, 42-43 fath.

De St. Joseph (101) distinguishes *Filograna implexa*, as with opercula, from *Salmacina dysteri* as without them. Cunningham and Ramage* treat the two as synonymous, a view which is shared by Prof. McIntosh. The specimens which were recorded in the preliminary list as *Filograna implexa* were unfortunately not retained for examination of this character, and the species is therefore left in doubt.

Protula tubularia (Montagu).

Single specimens at each of the Positions 9, 33, 59, vii.
Depth, 42-49 fath. or over.

Spirorbis spirillum (Linnaeus)?

A small *Spirorbis*, apparently of this species, occurred commonly on Hydroids, especially on *Sertularia abietina*, at many points, and was definitely recorded at Positions 11, 14, 35, 42, 43, 53, 60, 62, 67, 80.

Depth, 42-51 fath.

* "The Polychaeta Sedentaria of the Firth of Forth," *Trans. Roy. Soc. Edinburgh*, Vol. XXXII, p. 635.

HERMELLIDAE.

Sabellaria spinulosa, Leuckart.

Recorded in small numbers at Positions 4-7, 13, 31-33, 35, 44, 45, 47, 49, 51, 53, 56, 59, 60, 72, vii, 80.

Most commonly on shells of *Pecten*, also on tubes of *Pallasia* and on stones.

Depth, 40-51 fath. or over.

Pallasia murata, Allen.

Tubes or portions of tubes of this species were obtained at Positions 5, 6, 7, 10, 11, 12, 14, 17, 19, 31, 32, 37, 46, 53, 56, 63, 72.

Depth, 40-50 fath.

Living specimens or fragments of such were obtained at Positions 17, 63, and 72. A large colony was passed through at Position 17, where portions of about six specimens of the living animal were brought up in the dredge. This was by far the largest settlement touched in the course of the work (cp. Crawshay, 4, p. 103), though the absence of living specimens in the great majority of the hauls is largely to be explained by the difficulty of working the dredge deep enough to secure them.

HIRUDINEA.

Pontobdella muricata, Linnaeus.

One specimen at each of the Positions 44 and 52.

Depth, 43-46 fath.

At Position 44, in addition to the specimen, four lots of ova were obtained in dead valves of *Pecten opercularis*.

SIPUNCULOIDEA.

Phascolosoma vulgare (de Blainville).

One specimen at each of the Positions 15 and 38. Length 30 and 20 mm. respectively.

Depth, 44 fath.

Mr. G. Southern kindly identified this species.

ARTHROPODA.

CRUSTACEA.

CIRRIPEDIA.

BALANIDAE.

Balanus crenatus, Bruguière.

Recorded only at Position 4, but probably present in other hauls.

Pyrgoma anglicum, Leach.

On *Caryophyllia smithi*, at Positions 7, 11, 44, 45, 59.

Depth, 42-49 fath.

VERRUCIDAE.

Verruca stroemia (O. F. Müller).

Recorded at Positions 4, 35, and 72, on shells of *Pecten opercularis* and *Fusus islandicus*. Probably present in other hauls.

Depth, 40-43 fath.

LEPADIDAE.

Scalpellum vulgare, Leach.

Generally in small numbers, at Positions 1, 3, 5, 9, 11-14, 17, 19, 31, 32, 33, 35, 37, 38, 40, 42, 43, 46, 49, 59, 60, 62, 64, 67, 70, 77, 80.

On *Antennularia antennina*, *A. ramosa*, *Aglaophenia myriophyllum*, *Halecium halecinum*, and other Hydroids; and at Position 64, about 50 specimens on tube of *Lanice conchilega*.

Depth, 40-51 fath.

PELTOGASTRIDAE.

Sacculina carcini, Thompson.

One specimen at each of the Positions 14 (on *Pisa biaculeata*), and 60 (on *Macropodia longirostris*).

Depth, 44-49 fath.

Peltogaster sulcatus, Lilljeborg.

Eight individuals of this rare species were obtained at Position 59, parasitic on a specimen of *Eupagurus cuanensis*.

Depth, 49 fath.

Geoffrey Smith (135, p. 108) recognizes, among the various names given to the genus, only two certain species, *P. paguri* and *P. sulcatus*. Under the synonyms of the latter he records, as the hosts and distribution of the species: *Pagurus cuanensis*, *chiracanthus* and *laevis*, from Danish and Norwegian Seas; *E. prideauxi* and *meticulosus*, from Naples; an unnamed host from French coasts; *Pagurus sp. ?* from Brazil; and *Ligella gracilis* and *affinis* from Valparaiso.

The species is recorded by Norman (130, p. 226) "on examples of *Pagurus cuanensis* dredged in Teignmouth Bay." It was earlier recorded by him (127, p. 185), as "gregariously parasitic on *Pagurus laevis*, off Sunderland. New to Britain."

AMPHIPODA.

AMPELISCIDAE.

Ampelisca spinipes, Boeck.

One specimen at Position 1.

Depth, 40 fath.

LEUCOTHÖIDAE.

Leucothöe spinicarpa (Abildgaard).

At Positions 3 (four), 4 (two), 8 (two), 40 (one), 43 (one), 51 (one young).

Depth, 40-45 fath.

PARAMPHITHÖIDAE.

Epimeria cornigera (Fabricius).

At Positions 45 (four), 46 (one), 52 (one).

Depth, 43-47 fath.

Distribution: W. coast of Norway, Shetland and many localities off the British Isles, Bay of Biscay, Naples (cp. Chevreux, 112). Many examples obtained by the *Huxley* in the Bay of Biscay in 1906 have recently been recorded by Mrs. Sexton (134). Though recorded from Falmouth and South Devon by Leach and Montagu, the species has not been observed in the Plymouth fauna of late years.

IPHIMEDIIDAE.

Iphimedia obesa, Rathke.

One specimen at Position 1.

Depth, 40 fath.

PHOTIDAE.

Gammaropsis erythrophthalma (Lilljeborg).

Three specimens at Position 45.

Depth, 47 fath.

JASSIDAE.

Jassa pusilla, G. O. Sars.

At Positions 4 (two ovigerous females), and 5 (eleven examples).

On a sponge coating *Inachus dorsettensis*.

Depth, 40-42 fath.

Mrs. Sexton kindly examined these specimens, and separated those from the latter position as follows:—

Full-grown, 3 males; 1 ovigerous female.

Young 2 „ ; 5 „ females.

For details concerning these specimens, see her account of the species (134, p. 216).

Distribution: South and west coasts of Norway, Hammerfest, Cumbræ(?), Firth of Forth, Port Erin, Eddystone, south-west of Belle Isle, Bay of Biscay (cp. Sexton, 134).

COROPHIIDAE.

Erichthonius abditus (Templeton).

Three specimens at Position 45.

Depth, 47 fath.

CAPRELLIDAE.

Phytisca marina, Slabber.

One male at Position 3.

Depth, 40 fath.

Protella phasma (Montagu).

At Position 3, two females, one with young in pouch.

„ 6, three males; five females, some with young.

„ 56, twelve immature specimens. Length, 3-5½ mm.

Depth, 40-49 fath.

ISOPODA.

ANTHURIDAE.

Anthura gracilis (Montagu).

One specimen at Position 7.

Depth, 42 fath.

A particular point of interest attached to this specimen is the fact that it was found deeply intruded, head downwards, in a tube of the Polychaet worm *Sabellaria spinulosa*, the only part visible being the ends of the uropoda lying nearly flush with the opening of the tube. With these peculiarly shaped organs lying in this position, their appearance was so deceptive to the eye that they might easily be mistaken at a rough glance for the anterior region of the original occupant of the tube. Whatever significance may be attached to this resemblance, the main fact goes to suggest that the animal was preying on the *Sabellaria*. This inference is supported by the view that the oral parts of the Anthuridae point to a parasitic habit, though the mode of parasitism has not hitherto been stated (cp. G. O. Sars, 132, p. 44). The peculiar shape of the animal and the unusual form of the uropoda would seem well adapted to association with any such host.

AEGIDAE.

Rocinela damnoniensis, Leach.

At Positions 1, 5, 10 (one each), 11 (two), vii (one).

Depth, 40-49 fath. or over.

CIROLANIDAE.

Conilera cylindracea (Montagu).

One specimen at Position 10.

Depth, 42 fath.

ARCTURIDAE.

Astacilla longicornis (Sowerby).

Two specimens at Position 1.

Depth, 40 fath.

DECAPODA.

MACRURA.

PANDALIDAE.

Pandalus brevirostris, Rathke.

At Positions 1 (four), 33 (one), 45 (six), 52 (three young).

Depth, 40-47 fath.

HIPPOLYTIDAE.

Hippolyte varians, Leach.

Four specimens at Position 45.

Depth, 47 fath.

ALPHEIDAE.

Alpheus macrocheles (Hailstone).

One at each of the Positions 58, 59, 62, 68.

Length of specimens, 21, 17, 23, 40 mm., the last being an ovigerous female.

Depth, 49-50 fath.

CRANGONIDAE.

Crangon allmanni, Kinahan.

One specimen at Position 60. Length, 38 mm.

Depth, 49 fath.

ANOMURA.

GALATHEIDAE.

Galathea dispersa, Spence Bate.

Recorded from positions as follows:—1 (two), 5 (one), 13 (one), 40 (two), 43 (three), 49 (two), 51 (one), 52 (three), 56 (two), 58 (one), 59 (two), 62 (three), vii (one).

Depth, 40-50 fath. or over.

The records of this species are probably incomplete.

Galathea nexa, Embleton.

At Positions 58 (six), and 59 (one).

Depth, 49 fath.

The tendency in recent years has been to combine this species with the preceding, but I have followed Bonnier (110) in retaining it as distinct. The peculiar *facies* of *G. nexa* is remarkable to the naked eye owing to the much stronger spination and hispidation of the first peraeopods especially, and also in the generally shorter form of these appendages than in *G. dispersa*. These distinctions cannot be sexual in character, for though in a different degree they occur in both sexes, and the chelae are more strongly spined in the females of *nexa* than in the males of *dispersa*, the difference being especially marked in the large spine on the carpopodite.

The chief character of distinction used by Bonnier, namely, the relative length of the ischiopodite and meropodite of the third maxillipede, seems to me of little value as compared with the character of the large spine in the ventral region of the meropodite of that appendage. This is centrally situated and isolated in *nexa* as figured by Bonnier (Pl. XII, Fig. 7), but more distally situated and as a rule accompanied by a second smaller though prominent spine nearly adjacent and distal to it in *dispersa*. Bonnier's figure of this joint in *dispersa* is very misleading, owing conceivably to its having been drawn in such a position as to throw out the perspective, creating the impression that the large spine has a distal position. Milne Edwards and Bouvier (124, p. 72) correct this, describing the position as "vers le milieu du bord inféro-interne," which accurately represents the position of the spine in the specimens now under consideration. It is chiefly owing to the same difficulty of Bonnier's figure that Hansen (114, p. 31) unites the species with *nexa*, and records his material under this as the prior name.

Another character of distinction which may prove of considerable value, is the nature of certain setae closely adjacent to the large spine in question. Bonnier makes no allusion to these setae, but figures them distinctly as faint pencil marks in his drawing of the third maxillipede of *G. nexa* (Pl. XII, Fig. 7). They are from two to four in number, and arise close to the origin of the large spine. In all the specimens of *nexa* I have examined, these setae are quite simple, while in those of *dispersa* they are clearly pinnate. The only exception occurs in a specimen of *dispersa* in which the largest of them is simple or nearly so, the others being pinnate. This character needs confirmation in a large number of examples, but the evidence points to its being a reliable mark of distinction. The point is remarkable in view

of the fact that the condition is the reverse of that in the chelae. In the latter case it is the strongly pinnate setae—the “longs poils serrés” of Bonnier—covering the carpopodite and propodite, and forming the pronounced hispidation in *neva*, that are contrasted with the comparatively scarce setae, only partially pinnate or quite simple, in *dispersa*.

Distribution: Lofoten Islands, and southern coasts of Norway; British Islands, from Shetland to Cornwall; Galoper, Luc-sur-mer, and Channel Islands (cp. Bonnier, 110). Kemp (117), in recording the species collected by the *Huxley* in the Bay of Biscay in 1906, follows Hansen and others in treating *dispersa* and *neva* as synonymous, and on grounds of priority uses the latter name. He finds a closer resemblance, however, in the maxillipedes to the *dispersa* of Bonnier, and as a specimen of his material I have since examined is certainly of that species as here regarded, it is probable that the same applies to all of them.

Galathea intermedia, Lilljeborg.

One specimen at each of the Positions 1 and 43.

Depth, 40–45 fath.

Galathea squamifera, Leach.

Single specimens at Positions 10 and 33.

Depth, 42–43 fath.

PAGURIDAE.

Eupagurus bernhardus (Linnaeus).

Single or few specimens at Positions 1, 6, 7, 14, 20, 31, 32, 34, 36, 37, 42, 43, 52, 56, 59, 70.

In shells of *Buccinum undatum*, etc., and in the sponge *Ficulina ficus*. The records are unfortunately incomplete in detail, but few large specimens were obtained and there was no occurrence of the associated anemone *Adamsia polypus* (see p. 299).

Depth, 40–49 fath.

Eupagurus cuanensis (Thompson).

One or two specimens only at Positions 11, 12, 14, 16, 37, 52, 59, 60, 72.

In shells of *Fusus islandicus*, and once in *Murex erinaceus*, as far as recorded. A specimen occurred at Position 59, infected with the rare parasite *Peltogaster sulcatus* (see record of the latter species, p. 349).

Depth, 42–49 fath.

Eupagurus prideauxi (Leach).

Single or few specimens at Positions 1, 5, 6, 7, 9, 11, 13, 17, 20, 37, 43, 46, 49, 52, 53, 56, 59; and several at Position 60.

Depth, 40–49 fath.

The associated anemone, *Adamsia palliata*, was only definitely recorded in a few instances. It is most probable that this was an omission, due to the constancy of its occurrence with the species.

Eupagurus sculptimanus (Lucas).

From one to three specimens at Positions 10, 11, 12, 16, 19, 34, 36, 37, 40, 52, 80.

In shells of *Turritella*, *Dentalium*, etc.

Depth, 42-51 fath.

Anapagurus laevis (Thompson).

Single or few specimens at Positions 5, 6, 11, 46, 60, and probably present in other hauls.

Depth, 42-49 fath.

A single specimen was recorded with the commensal Polychaet, *Nereis fucata*, at Position 6.

Anapagurus hyndmanni (Thompson)?

Two specimens apparently belonging to this species were obtained at Position 59.

Depth, 49 fath.

The species has been recorded from Shetland, the Frith of Forth, the Firth of Clyde, Portaferry and Belfast Bay, Liverpool Bay, coasts of Devon and Cornwall, and Channel Islands, cp. Bell (109), Norman (11, 127, 128), Scott (133), Walker (136).

BRACHYURA.

PORCELLANIDAE.

Porcellana longicornis (Linnaeus).

Recorded at Positions 1, 3, 4, 9, 10, 11, 32, 53, 56, 58, 59, 63.

Depth, 40-50 fath.

LEUCOSIIDAE.

Ebalia cranchi, Leach.

At Positions 19 and 31. Apparently one specimen in each case.

Depth, 40-45 fath.

Ebalia tumefacta (Montagu).

One specimen at each of the Positions 19 and 63.

Depth, 45-50 fath.

The position of this species is far from satisfactory. The difficulty of its identification appears to me to consist in the separation of it,

not from *E. tuberosa*, as found by Walker (136, p. 98), but from *E. cranchi*. *E. tuberosa* is readily distinguished from it, as from the latter, by the more elongate "hand" in the first peraeopods, and also especially by the much longer claws, both sexes showing these characters alike. These points are mentioned by Montagu (126, p. 86) in his original description of *Cancer tumefactus*, and figured by Leach and by Bell, while the last author even expresses his inability to account for the two species being confused with one another. Bell (109), as he interprets the species, describes the meropodite or "arm" of *E. tumefacta* (= *E. bryeri*) as not more than twice as long as broad, and that of *E. cranchi* as three times as long as broad, using this, moreover, as one of the distinctive characters between them in his description of the latter species (109, p. 149). On this interpretation, while *E. tumefacta* is distinct in this appendage from *E. tuberosa* by the shorter meropodite and propodite, it is separated from *E. cranchi* by the shorter meropodite only. The number of specimens of *E. tumefacta* I have seen, satisfactorily to be regarded as such, and bearing out this character, is very few, and unless the species is extremely local in its habitat, it is difficult to consider it as more than a variety of *E. cranchi*. Dr. Allen's record of it as abundant to the westward of the Eddystone (1) would support the former alternative, but in this case some difficulty arises in the fact that the specimens concerned showed a close similarity to *E. tuberosa*. In the absence of any clear evidence to the contrary, it seems best to retain the species as distinct, though probably it has often been confused with others in records of the genus.

***Ebalia tuberosa* (Pennant).**

At Positions 1, 3 (one), 11 (one), 13 (two), 15 (one), 16 (three), 19 (one), 22 (a few), 28 (one), 31 (a few), 32 (one), 36 (one), 37 (one), 42 (one), 43 (a few), 44 (two), 46 (two), 53 (two), 62 (six), 63 (six).

Depth, 40-50 fath.

INACHIDAE.

***Macropodia aegyptia*, A. Milne-Edwards.**

Single specimens at Positions 43 and 52.

Depth, 43-45 fath.

***Macropodia longirostris* (Fabricius).**

At Positions 4, 7, 10, 20, 43, 45, 49, 52, 59, 60, 64, 66, 67, 77, 78.

Depth, 40-53 fath.

Single or a few specimens occurred in every case, except at 52, where

several were obtained. At Position 60 a female was infected with *Sacculina*.

Macropodia rostrata (Linnaeus).

From one to five specimens at Positions 1, 5, 6, 7, 37, 44, 45, 52.

Depth, 40–47 fath.

Only small specimens were recorded at Positions 1, 6, 37, and 44, that at 44 being an ovigerous female.

Inachus dorsettensis (Pennant).

At Positions 1 (several), 3, 4, 5 (two), 7 (one), 9 (one), 13 (three), 14 (one), 18 (two), 20 (one), 31 (a few), 34, 35, 37, 41 (one), 43, 45 (two), 49 (two), 52 (ten), 53, 56 (a few), 59 (a few), 60, 78 (a few).

Depth, 40–49 fath.

At Position 1, four specimens were dressed, severally, with *Laföea fruticosa*, *Plumularia catharina*, *Halecium* sp., and *Halichondria* sp. No other record was preserved of examples illustrating this habit.

Inachus leptochirus, Leach.

At Positions 45 (two), 49 (one), 52 (two), 56 (one), 67 (one).

Depth, 47–49 fath.

Distribution: Shetland (Norman, 11); Moray Firth (Gordon, 113); Firth of Clyde (Elliot, Laurie, and Murdoch, 6); western coasts of Devon or Cornwall and Bigbury Bay (Leach, 120); Falmouth (Norman, 130); Channel Islands (Norman, 128); north side of Bay of Biscay (Kemp, 117); N.W. coast of Spain, N.E. of Cape Verde Islands, Azores (Milne-Edwards et Bouvier, 125); Azores (Miers, 122), (Milne-Edwards et Bouvier, 123); Spalato in Adriatic (Heller, 115).

MAIIDAE.

Pisa biaculeata (Montagu).

At Positions 14 (one female with *Sacculina*), and vii (one ovigerous female).

Depth, 42–49 fath. or over.

Hyas coarctatus, Leach.

Single specimens at Positions 1, 14, 32 (ovigerous female), 43, 67.

Depth, 40–52 fath.

PARTHENOPIIDAE.

Eurynome aspera (Pennant).

At Positions 1 (three), 6 (one), 10 (one), 11 (one), 31, 32 (one), 34, 35 (two), 36 (three), 37 (two), 38, 43 (a few), 44, 46 (one ovigerous female), 47 (one), 53 (one), 56 (one), 58 (one), 59 (four).

Depth, 40–49 fath.

CANCRIDAE.

Cancer pagurus, Linnaeus.

One large specimen at Position 25, and two specimens at Position 64.
Depth, 46-50 fath.

At the former point the haul was one of eight minutes' duration, made with the triangular dredge, the bottom consisting of shell and gravel mixed with small stones. At the latter point the otter trawl was used for half an hour, and as no stones were touched by this, and few by the dredge haul immediately preceding it, it may be assumed that the ground was soft and comparatively free from them.

Xantho tuberculatus, Couch.

At Positions 9 (one ovigerous female), 28 (one ovigerous female), 33 (one), 36 (one ovigerous female), 44 (one), 58 (one male), 59 (two females), 63 (one), vii (one female), 80 (one).

Depth, 44-50 fath. or over.

Of the three ovigerous females recorded, two (at Positions 9 and 36) were secluded in empty shells of *Buccinum undatum*, and the zoea larvae hatched out off the last one on the following day.

The species was discovered by R. Q. Couch, who found it repeatedly in the crevices of *Lepralia foliosa* in the deep water in Mount's Bay, Cornwall, but states that it approaches the shore, being found under stones in summer, and breeds in June. Though it has been recorded from Liverpool Bay, and more recently from Cumbrae in Scotland, it is especially characteristic of the extreme south-western British fauna, and even its inclusion among the species of Plymouth Sound, properly speaking, is open to doubt. Garstang (6, p. 339) records its addition to the Plymouth type collection, but with no data as to its locality. An earlier record by Heape (8, p. 170), "Frequent, 4-45 fathoms," included in a list compiled by Bate, involves the same question of locality, since the material concerned is only referred to by the last author in his original report (2, p. 276), as collected "mostly between Bigbury Bay towards the east and the Dodman towards the west," and "within a distance of about twenty miles of the shore in water that has not exceeded fifty fathoms in depth," thus defining the area for the whole list recorded. The point is of some importance because *Xantho tuberculatus* is one of those species which appear to be rather definitely limited in distribution by certain physical conditions associated with the extreme western area of the Channel, outside the influence of which they exist only in diminishing numbers and soon disappear from the fauna.

Distribution: South-west coast of Ireland (Bourne, 3, p. 314); Cumbrae (Patience, 35); Liverpool Bay (Walker, 137, p. 97); between Bigbury Bay and the Dodman, frequent on stony ground in 4-45 fath. (Bate, 2, p. 276); Mount's Bay, Cornwall (Bell, 109); north side of Bay of Biscay (Walker, 139, p. 158); Bay of Biscay, coast of Portugal, Azores, 166-793 m. and between 748 and 1262 m. (Milne-Edwards et Bouvier, 123, p. 33, and 124, p. 32); Bay of Biscay (Koehler, 10); Bay of Biscay, north-west African coast to Cape Verde Islands (Milne-Edwards et Bouvier, 125, p. 93).

The records from Pirano and Lesina in the Adriatic by Heller, (115, p. 69), were found by Bouvier (111) to refer to *Xantho floridus*. The species is not recorded by Norman from the Channel Islands (128).

PORTUNIDAE.

Portunus depurator (Linnaeus).

One specimen at Position 37.

Depth, 43 fath.

Portunus marmoreus, Leach.

One rather small specimen at Position 46. Width of carapace 19 mm.

Depth, 46 fath.

Portunus pusillus, Leach.

At Positions 1 (two; one an ovigerous female), 3 (one ovigerous female), 13 (one), 31 (one), 35 (two), 48 (one), 62 (three; width of carapace, 18, 14, and 11 mm.), 67 (one; width of carapace 17mm.).

Depth, 40-52 fath.

Portunus tuberculatus, Roux.

Single specimens at Positions 35, 43, and 59.

Depth, 43-49 fath.

Distribution: Shetland, abundant in 80-120 fath. (Norman, 11, p. 268); Mediterranean (Costa); Gulf of Naples, rare (Heller, 115, p. 84); Bay of Biscay, 180 m. and between 300 and 400 m. (Caullery. See Koehler, 10); north coast of Spain and Azores, 560 m. (Milne-Edwards et Bouvier, 125, p. 63); Azores, 454 m.; Cape Finisterre and Bay of Biscay, 136-250 m. (Milne-Edwards et Bouvier, 123, p. 25); north side of Bay of Biscay, 75-109 fath. (Kemp, 117, p. 417).

Bathynectes longipes (Risso).

At Positions 46 (one male) and 80 (one immature female).

Depth, 47-51 fath.

Distribution: Cornwall, Swansea, cp. Bell (109, p. 361); Penzance, Mount's Bay, Falmouth, Polperro (cp. Norman, 130, p. 3); Plymouth, near Eddystone (Garstang); and of frequent occurrence in recent years on different Plymouth grounds; Channel Is. (Sinel. See Norman, 128); Genoa, Naples, Sicily; and in the Adriatic, at Quarnero, Lesina, and Lissa, in 30-40 fath.; Black Sea (cp. Heller, 115, p. 89).

Subsequent to the occurrence of the species referred to by Garstang in 1897, it does not seem to have been observed at Plymouth till 1905, when a specimen was found far inside the breakwater, in Millbay Pit. In 1907 it was recorded on the Rame-Eddystone ground and the Mewstone Ledge, and in every year subsequently occasional examples have occurred mostly on the Mewstone Ledge, but also again in Millbay Pit. On the Mewstone Ledge, Mr. Orton tells me he has repeatedly seen it in the crevices of *Lepralia foliosa*.

It is conspicuously absent from Bay of Biscay records.

CORYSTIDAE.

Ateocyclus septemdentatus (Montagu).

At Positions 4 (one), 10 (one), 13 (one), 14 (three), 20 (one), 22 (one), 31 (a few), 32 (one), 34 (a few), 35 (four), 36 (one), 37 (three), 43 (two), 49 (one), 51 (one).

Depth, 40-47 fath.

ARACHNIDA.

PYCNOGONIDA.

Mr. Hodgson kindly identified the species obtained in this group.

Nymphon brevirostre, Hodge.

One specimen at Position 62.

Depth, 50 fath.

Achelia echinata, Hodge.

At Positions 49 (three), 56 (three), 59 (one), 60 (one), 62 (two).

Depth, 47-50 fath.

Endeis spinosus (Montagu).

One specimen at Position 58.

Depth, 49 fath.

BRYOZOA.

As with the rest of the fauna, such of the Bryozoa as could be easily named at sight were recorded on board in the course of the work, and the rest were brought home for examination. The greater part of the

latter, and such as presented no difficulty, were then worked out and added to the list. Subsequently Miss Alice Heath kindly undertook to identify the more doubtful or difficult material that remained. In consequence of this, many of the species are absent from her list. Records by Miss Heath are distinguished by the letter H. The others, for which I am responsible, are followed by the letter C. Miss Heath writes the following note on the specimens submitted to her:—

“The greater part of the material sent to me for identification was in a dry state; the remainder was preserved in alcohol. There proved to be 30 genera and 54 species. Twenty-one species are recorded from one station only. The classification and names given are those used in the Plymouth Fauna List (*Journ. Mar. Biol. Assoc.*, N.S., Vol. VII, p. 155). *Lepralia foliosa* was represented by only one small piece worked up into a worm tube. In *Membranipora flustroides* the zoecia fitted rather more closely together, were less oval than in Hincks's illustration, and the spines were represented by three only. On one small zoecium these spines were flattened and glossy; the others were lost, their points of attachment only showing. One species of *Alcyonidium* I have not been able to identify. Zoarium, erect, delicate, transparent, flattened, about 2½ cm. in height by 1 cm. in breadth; attached to a piece of *Pecten* shell; not as firm and opaque as either *A. gelatinosum* or *A. mytili*. Surface smooth. The superficial boundaries of the zoecia could be distinguished, but very little of other details. Brown bodies apparently occupied the interior.”

AETEIDAE.

Aetea anguina (Linnaeus).

At Positions 9, 49 (H); 80 (C).

Depth, 42–51 fath.

Aetea recta, Hincks.

At Positions 49 (H); 32 (C).

Depth, 42–47 fath.

EUCRATEIDAE.

Eucratea chelata (Linnaeus).

At Positions 12 (H); 62 (C).

Depth, 42–50 fath.

CELLULARIIDAE.

Scrupocellaria scruposa (Linnaeus).

At Positions 35, 47, 49, 56, 64, 80 (H); 4, 36, 59 (C).

Depth, 40–51 fath.

BICELLARIIDAE.

Bicellaria ciliata (Linnaeus).

At Positions 49, 80 (H); 1, 3, 4, 10, 11, 12, 32, 45, 56 (C).
Depth, 40-51 fath.

Bugula avicularia (Linnaeus).

At Positions 4, 32, 45, 62 (C).
Depth, 40-50 fath.

Bugula flabellata, J. E. Gray.

At Positions 4, 43, 49, vii (C).
Depth, 40-49 fath. or over.

Bugula calathus, Norman.

At Position 36 (H).
Depth, 43 fath.

Bugula turbinata, Alder.

At Positions 43, 80 (H).
Depth, 45-51 fath.

Beania mirabilis, Johnston.

At Positions 49 (H); 11, 12, 32, 33, 35, 45, 47, 49, 59, 62, 80 (C).
Depth, 42-51 fath.
On other Bryozoa and on Hydroids: plentiful at 47 and 49.

MEMBRANIPORIDAE.

Membranipora catenularia (Jameson).

At Positions 43, 49, 59, 60 (H).
Depth, 45-49 fath.

Membranipora dumerili (Andouin).

At Position 36 (H).
Depth, 43 fath.

Membranipora flemingi, Busk.

At Positions 11, 36, 45, 59, 62 (H).
Depth, 42-50 fath.

Membranipora flustroides, Hincks.

At Positions 46, 58 (H).
Depth, 47-49 fath.

Membranipora lineata (Linnaeus.)

At Position 51 (H).

Depth, 43 fath.

MICROPORIDAE.

Micropora coriacea (Esper).

At Positions 8, 43, 56, 60, 80 (H).

Depth, 43-51 fath.

CELLARIIDAE.

Cellaria fistulosa (Linnaeus).At Positions 1, 3, 4, 8, 10, 11, 13, 14, 32, 33, 34, 35, 40, 49, 51, 56,
58, 59, 60, 62, 64, vii, 80 (C).

Depth, 40-51 fath.

This, the most common species of *Cellaria* obtained, seldom occurred in any considerable quantity except at the first three positions above named where, on the fine sandy ground, it was fairly plentiful.

Cellaria salicornioides, Lamouroux.

At Positions 3, 4, 8, 10, 11, 13, 14, 33, 47, 49, 56, 59, 60, 62, vii, 80 (C).

Depth, 40-51 fath. or over.

This species occurred far less frequently than the preceding, but the same general statement applies to it.

Cellaria sinuosa (Hassall).

At Positions 40, 45, 47, 56, 58, 60, 62, 80 (H); 13, vii (C).

Depth, 42-51 fath. or over.

The comparative scarcity of this species, which is common on the Eddystone Grounds, is remarkable. It is possible, however, that it was overlooked at some of the innermost positions.

CRIBRILINIDAE.

Cribrilina figularis (Johnston).

At Position 59 (H).

Depth, 49 fath.

Cribrilina radiata (Moll).

At Positions 8, 11, 12, 38, 44, 45, 49, 56, 59, 60, 80 (H).

Depth, 42-51 fath.

Membraniporella nitida (Johnston).

At Position 59 (H).

Depth, 49 fath.

ESCHARIDAE.

Lepralia foliacea (Ellis and Solander).

At Positions 51 (H); 46, 56, 58, 59, 63, 64, 68, vii, 78, 80 (C).

Depth, 43-51 fath. or over.

Plentiful at Positions 59 and 68.

Chorizopora brongniarti (Audouin).

At Positions 36, 45, 56, 59, 60 (H).

Depth, 43-49 fath.

Porella concinna (Busk).

At Positions 8, 13, 44, 53, 56, 60 (H).

Depth, 42-49 fath.

Porella compressa (Sowerby).

At Positions 36, vii (H); 9, 33, 34, 38, 46, 47, 53, 62 (C).

Depth, 42-50 fath. or over.

Smittia reticulata (Macgillivray).

At Position 36 (H).

Depth, 43 fath.

Smittia trispinosa (Johnston).

At Positions 8, 12, 40, 45, 56, 59 (H).

Depth, 42-49 fath.

Mucronella peachi (Johnston).

At Positions 43, 49 (H).

Depth, 45-47 fath.

Mucronella variolosa (Johnston).

At Positions 8, 51, 58, 72 (H).

Depth, 43-49 fath.

Mucronella ventricosa (Hassall).

At Positions 9, 12, 13, 36, 46, 59 (H).

Depth, 42-49 fath.

Palmicellaria skenei (Ellis and Solander).

At Positions 43, 62 (H).

Depth, 45-50 fath.

Hippothoa distans, Macgillivray.

At Positions 11, 12, 51, 56 (H).

Depth, 42-49 fath.

Hippothoa divaricata, Lamouroux.

At Positions 11, 43, 49, 53 (H).

Depth, 42-46 fath.

Schizoporella johnstoni, Quelch.

At Position 51 (H).

Depth, 43 fath.

Schizoporella linearis (Hassall).

At Positions 9, 38, 43, 44, 46, 47, 49, 56, 72 (H).

Depth, 42-49 fath.

Schizoporella unicornis (Johnston).

At Positions 8, 12, 45 (H).

Depth, 42-47 fath.

Schizoporella discoidea (Busk).

At Position 59 (H).

Depth, 49 fath.

CELLEPORIDAE.

Cellepora avicularis, Hincks.At Positions 8, 10, 11, 13, 34, 35, 38, 40, 43, 49, 51, 53, 56, 59, 60,
62, 64, 70, 80 (H); 1, 3, 4, 6 (C).

Depth, 40-51.

Cellepora dichotoma, Hincks.

At Positions 10, 36, 49 (H).

Depth, 42-47 fath.

Cellepora pumicosa, Linnaeus.

At Positions 10, 38, 44, 49 (H); 46 (C).

Depth, 42-47 fath.

Cellepora ramulosa, Linnaeus.At Positions 8, 11, 13, 33, 35, 38, 40, 43, 45, 47, 49, 52, 60, 62,
72 (H); 1, 32, 37, 46, 80 (C).

Depth, 40-51 fath.

Crisia ramosa, Harmer ?

At Positions 40, 49, 52, 56 (H).

Depth, 44-49 fath.

DIASTOPORIDAE.

Diastopora patina (Lamarck).

At Positions 9, 38, 46, 56, 72 (H); 80 (C).

Depth, 44-51 fath. or over.

TUBULIPORIDAE.

Tubulipora liliacea (Pallas).

At Positions 36, 56, 62, 64 (H); 1, 3, 4, 8, 9, 10, 11, 32, 35, 40, 49,

53, vii, 80 (C).

Depth, 40-51 fath. or over.

Entalophora clavata (Busk).

At Position 62 (H).

Depth, 50 fath.

Stomatopora granulata (Milne-Edwards).

At Position 50 (H).

Depth, 49 fath.

Stomatopora johnstoni (Heller).

At Position 13 (H).

Depth, 42 fath.

Stomatopora major (Johnston).

At Position 11 (H).

Depth, 42 fath.

Stomatopora dilatans (Johnston).

At Position 80 (H).

Depth, 51 fath.

Stomatopora deflexa (Couch).

At Positions 11, 13, 60, vii (H).

Depth, 42-49 fath. or over.

LICHENOPORIDAE.

Lichenopora hispida (Fleming).

At Positions 9, 11, 59, 60, 72 (H).

Depth, 42-49 fath.

ALCYONIDIIDAE.

Alcyonidium gelatinosum (Linnaeus).

At Positions 1, 3, 4, 7, 31, 35, 37, 43, 47, 51, 52, 56, 59 (C).

Depth, 40-49 fath.

As single or few colonies in all cases.

Alcyonidium mytili, Dalyell.

At Position 67 (H).

Depth, 52 fath.

Alcyonidium sp.

At Position 40.

Depth, 44 fath.

For description of this doubtful species, see Miss Heath's note at the commencement of this group.

VALKERIIDAE.

Valkeria uva (Linnaeus).

At Position 49 (H).

Depth, 47 fath.

Specimens apparently also belonging to this species were obtained on *Hydroids* and *Cellaria* at Positions 3, 4, 14, 47, 59, and 62, and probably occurred at several other points (C).

PEDICELLINIDAE.

Pedicellina cernua (Pallas).

At Positions 3, 10-14, 32-34, 37, 38, 49, 53, 56, 59, 62, 80 (C).

Depth, 40-51 fath.

Pedicellina gracilis, Sars.

At Positions 11-14, 32, 35, 37, 40, 45, 47, 49, 59, 62, 80 (C).

Depth, 42-51 fath.

MOLLUSCA.

Where not otherwise specified, records refer to living specimens.

AMPHINEURA.

NEOMENIIDAE.

Rhopalomenia aglaopheniae (Kowalevsky and Marion).

At Positions 37 (one), 38 (one), 43 (two), 56 (one); on *Aglaophenia myriophyllum*.

Depth, 43-49 fath.

Myzomenia banyulensis (Pruvot).

At Positions 32 (two), 38 (one), 45, 59 (one), 60 (one); on *Laföea dumosa*.

Depth, 42-49 fath.

ISCHNOCHITONIDAE.

Craspedochilus onyx (Spengler).

At Positions 1 (several), 3 (one), 4 (several), 11 (one), 13 (two), 15 (one), 32 (two), 35 (one), 36 (one).

Depth, 40-43 fath.

GASTROPODA.

PROSOBRANCHIATA.

FISSURELLIDAE.

Emarginula fissura (Linnaeus).

Single specimens at Positions 33 and 58.

Depth, 42-49 fath.

TROCHIDAE.

Gibbula tumida (Montagu).

One specimen at Position 33.

Depth, 42 fath.

Calliostoma exasperatum (Pennant)?

A *Trochus* apparently belonging to this species was obtained at Positions 45 (two) and 52 (one).

Depth, 43-47 fath.

Calliostoma montagui (W. Wood).

One dead shell at Position 52.

Depth, 43 fath.

Calliostoma granulatum (Born).

At Positions 32 (one), 52 (two), 60 (one).

Depth, 42-49 fath.

Calliostoma striatum (Linnaeus).

One dead shell at Position 43.

Depth, 45 fath.

Calliostoma zizyphinus (Linnaeus).

At Positions 1 (two), 17 (one), 52 (one), 59 (one), 60 (one).

Depth, 40-49 fath.

CAPULIDAE.

Capulus hungaricus (Linnaeus).

Single dead shells at Positions 1, 7, 41.

Depth, 40-44 fath.

CYPRAEIDAE.

Trivia europaea (Montagu).

Single specimens at Positions 45 and 51.

Depth, 43-47 fath.

The specimen at Position 51, measuring 9.5 mm., had a very smooth, shiny surface, with the ribs but faintly marked, and the spire quite distinct, showing three whorls, thus retaining the young characters to a remarkable degree.

Ovula patula (Pennant).

At Positions 1, 3 (one), 10 (one), 53 (one), 59 (three).

Depth, 40-49 fath.

Erato laevis (Donovan).

One dead shell at Position 1.

Depth, 40 fath.

NATICIDAE.

Natica alderi, Forbes.

At Positions 46 (two dead), 49 (one dead), 52 (two), 60 (one).

Depth, 43-49 fath.

LAMELLARIIDAE.

Lamellaria perspicua (Linnaeus).

At Positions 32 (one) and 59.

Depth, 42-49 fath.

SCALIDAE.

Scala clathrus (Linnaeus).

One specimen at Position 1.

Depth, 40 fath.

Scala turtoni (Turton).

One specimen at Position 36.

Depth, 43 fath.

EULIMIDAE.

Eulima polita (Linnaeus).

Single specimens at Positions 11 and 47.

Depth, 42-47 fath.

TURRITELLIDAE.

Turritella communis, Lamarck.

At Positions 1 (two) and 10 (one).

Depth, 40-42 fath.

APORRHAIIDAE.

Aporrhais pes-pellicani (Linnaeus).

One dead shell at Position 1.

Depth, 40 fath.

BUCCINIDAE.

Buccinum undatum (Linnaeus).

At Position 3 (spawn only), 5 (one), 7 (one), 8 (two and spawn), 9 (one), 10 (one), 17 (one), 59 (one).

Depth, 40-49 fath.

The spawn obtained at Position 3 hatched out on the following day.

Tritonofusus gracilis (Costa).

Specimens were obtained at Positions 10 (two), 11 (three), 12 (several), 14 (five), 25 (one), 32 (one), 34 (one), 35 (several), 43 (one), 46 (one), 52 (a few), 58 (one), 59 (one), 60 (one), 67 (one), 72 (five), 80 (one).

Depth, 42-51 fath.

The great majority of these specimens were empty shells, or those occupied by *Eupagurus cuanensis* or *E. prideauxi*, in most cases the former. Living specimens were only recorded at Positions 25 (one) 58 (one), 67 (one), 72 (two), and excepting perhaps those recorded without data at 10 and 34 these constitute the only ones obtained.

Tritonofusus propinquus (Alder).

One specimen at Position 58.

Depth, 49 fath.

This species has not previously been recorded from Plymouth, but three specimens were obtained by the *Huxley* at the north side of the Bay of Biscay in 1906 (Rennel, 148, p. 382). The localities of occurrence given by Jeffreys are: Coasts of Yorkshire, Durham, and Northumberland, Berwick Bay, Aberdeenshire, Hebrides, Shetland; New Brighton, Liverpool; Dublin Bay; Cork; Finmark; Kullaberg; Kattegat; cp. Jeffreys (147, iv, p. 339).

MURICIDAE.

Ocenebra erinacea (Linnaeus).

At Positions 59 (spawn only), and 60 (one shell occupied by *Eupagurus cuanensis*).

Depth, 49 fath.

Trophon muricatus (Montagu).

One shell at Position 6, occupied by *Eupagurus cuanensis*.
Depth, 42 fath.

NASSIDAE.

Nassa incrassata (Ström).

One specimen at Position 44.
Depth, 46 fath.

PLEUROTOMIDAE.

Mangilia gracilis, P. Fischer.

At Positions 13 (one living), and 31 (one dead).
Depth, 40-42 fath.

Clathurella linearis (Montagu).

At Positions 7 (one dead), and 11 (one living).
Depth, 42 fath.

OPISTHOBRANCHIATA.

TECTIBRANCHIATA.

SCAPHANDRIDAE.

Scaphander lignarius (Linnaeus).

At Positions 7 (six), 8 (two), 24, 43 (one), 52 (one); all living
except that at 52.
Depth, 42-45 fath.

PLEUROBRANCHIDAE.

Oscanius membranaceus (Montagu).

At Position 1 (one specimen, with spawn).
Depth, 40 fath.

NUDIBRANCHIATA.

AEOLIDIIDAE.

Galvina tricolor (Forbes).

At Positions 6 (one), 45 (five), 52 (several).
Depth, 42-47 fath.

Facelina drummondi (Thompson).

At Position 6 (one).
Depth, 42 fath.

DOTONIDAE.

Doto coronata (Gmelin).

At Position 13 (one).
Depth, 42 fath.

Doto fragilis (Forbes).

At Positions 8 (?) (spawn only), 19 (three), 34 (one).

Depth, 44-45 fath.

DENDRONOTIDAE.

Dendronotus frondosus (Ascanius).

At Position 52 (one).

Depth, 43 fath.

DORIDIDAE.

Goniodoris nodosa (Montagu).

At Position 47 (one).

Depth, 47 fath.

Archidoris tuberculata (Cuvier).

At Positions 4 (four), 7 (one), 78 (one).

Depth, 40-49 fath.

TRITONIIDAE.

Tritonia hombergi, Cuvier.

At Positions 4 (one), 52 (two), 60 (one), vii (one), 70 (one).

Depth, 40-49 fath. or over.

Tritonia (Candiella) plebeia, Johnston.

At Positions 4 (four), 7 (one), 11 (one), 45, 46 (one).

Depth, 40-47 fath.

SCAPHOPODA.

Dentalium entalis, Linnaeus.

At Positions 1 (fifteen), 5 (one dead), 6 (one dead), 10 (one living, two dead), 11 (three living, one dead), 13 (one), 36 (one), 37 (five living).

Depth, 40-43 fath.

PELECYPODA.

PROTOBRANCHIATA.

NUCULIDAE.

Nucula nucleus (Linnaeus).

At Position 1 (seven).

Depth, 40 fath.

FILIBRANCHIATA.

ANOMIIDAE.

Anomia ehippium, Linnaeus.

I have thought it best to include under this one species all the specimens of *Anomia* that were recorded. Though it is possible that *A. patelliformis* occurred among them, it was very difficult to distinguish among the extremely irregular forms assumed by the specimens any definite external characters, such as those assigned to the latter form by Jeffreys (147). The shape and moulding of the valves seemed in all cases to be merely dependent on that of the base of attachment.

Specimens were definitely recorded, sometimes in considerable numbers, at Positions 1, 3, 4, 7-15, 19, 31-36, 43, 44, 46, 49, 52, 53, 56, 59, 60, 64, vii, 72.

Depth, 40-50 fath. or over.

Attached to shells of other molluscs, more frequently *Pecten*, and to other bodies, especially stones on the rougher ground, it was one of the commonest and most generally distributed species that occurred.

ARCIDAE.

Pectunculus glycimeris (Linnaeus).

At Positions 6, 7, 10, 14, 16, 17, 19, 32, 33, 36, 37, 43, 44, 46, 51, 53, 58.

Depth, 40-49 fath.

At Position 7, only old valves occurred. Excepting at Positions 10, 14, 16, 17, 19, and 43, the specimens obtained were all of a remarkably small size.

Arca tetragona, Poli.

At Positions 34, 43 (two), 55, vii (one).

Depth, 42-49 fath. or over.

MYTILIDAE.

Volsella modiola (Linnaeus).

At Positions 1 (one dead), 11 (one living).

Depth, 40-42 fath.

Volsella barbata (Linnaeus).

At Position 4 (one).

Depth, 40 fath.

Volsella phaseolina (Philippi).

At Positions 4, 6, 8, 10, 11, 32, 33, 36, 37, 38, 40, 43, 45, 49, 51, 53, 58, 60, 64, vii.

Depth, 40-50 fath. or over.

From one to six specimens were recorded at the several positions, measuring from 3 to 9 mm. in length.

Modiolaria marmorata (Forbes).

At Positions 1 (one), 3 (two), 4 (three), 44 (one), 58 (one), 59 (one), 80 (one).

Depth, 40-51 fath.

Though this species was occasionally found buried in the tests of Ascidians, most of the specimens recorded occurred free. One was attached by the byssus to the base of a colony of *Cellaria*.

PSEUDOLAMELLIBRANCHIATA.

PTERIIDAE.

Pinna fragilis, Pennant.

Pairs of empty valves, or single valves or fragments of such, occurred at Positions 7, 8, 10, 13, 20, 28, 35, 49, 52, 66, 68, vii, 78, 80.

No living specimen was obtained.

Depth, 42-52 fath. or over.

PECTINIDAE.

Pecten maximus (Linnaeus).

At Positions 1 (empty shells), 7 (a few), 8 (one), 10 (one living, a few dead), 11 (one), 12 (three), 14 (one), 20 (a few), 30 (a few), 43 (one young), 45 (two), 47 (one), 52 (one), 59 (two), 60 (three), 62 (one), 68 (three), 80 (several dead).

Depth, 40-51 fath.

Pecten pusio (Linnaeus).

One dead valve at Position 46, and one small living specimen at the doubtful Position vii.

Depth, 47-49 fath. or over.

Pecten varius (Linnaeus).

One young specimen at Position 7.

Depth, 42 fath.

Pecten opercularis (Linnaeus).

The numerical proportion in which this species was obtained may be compared as follows:—

Few or very few specimens at Positions 1, 5 (small), 6, 9, 10, 11, 12, 18, 25, 37, 40, 41, 43, 44, 46 (small), 58 (small), 60 (small), 68 (small).

Fairly plentiful at Positions 3, 14, 20, 30, 31, 35, 52 (about fifty, many quite small), 63 (small), 72.

Abundant at Positions 7, 8, 49.

Dead specimens were obtained for the most part at Positions 10 and 37, and exclusively at Positions 13 (many), 47 (small), 51 and 80 (many).

The variety *lineata* was recorded at Positions 7 (few), 8 (several), 43 (one), 60 (one).

Specimens were recorded with both valves unicolorous at Positions 40 (purple), and 60 (chrome-yellow).

Depth, 40-51 fath.

Pecten tigerinus (Müller).

At Positions 1 (one), 6 (one valve), 7 (one), 13 (one), 31, 32 (several), 33 (one), 34, 43 (few), 44 (one).

Depth, 40-46 fath.

LIMIDAE.

Lima hians (Gmelin).

At Positions 44, 58 (four), vii (one).

Depth, 46-49 fath. or over.

Lima loscombi, G. B. Sowerby.

At Positions 6 (one dead valve, bored), 32 (one), 44 (one), 62 (one), 80 (one).

Depth, 42-51 fath.

EULAMELLIBRANCHIATA.

ASTARTIDAE.

Astarte sulcata (da Costa).

At Positions 9 (one), 11 (one), 15 (one), 16 (three), 19 (one), 32 (a few), 34, 35 (one), 36 (one), 37 (one), 40 (one), 44 (one small), 53 (one), 56 (one).

Depth, 42-49 fath.

CYPRINIDAE.

Cyprina islandica (Linnaeus).

A single living specimen was obtained at Position 39.

Dead specimens occurred at Positions 10 (a few), 12 (several), 13 (one), 20 (several), 44 (one).

Depth, 42-46 fath.

LUCINIDAE.

Lucina borealis (Linnaeus).

One young specimen at Position 1.
Depth, 40 fath.

Montacuta substriata.

At Position 46, attached to *Spatangus purpureus*.
Depth, 46 fath.

LEPTONIDAE.

Kellia suborbicularis (Montagu).

At Positions 1, 11 (two), 32 (two), 38 (two).
Depth, 40-44 fath.

SCROBICULARIIDAE.

Syndosmya prismatica (Montagu).

Three specimens at Position 1.
Depth, 40 fath.

TELLINIDAE.

Tellina crassa (Gmelin).

At Positions 17 (one living), 53 (one overgrown valve).
Depth, 45-46 fath.

MACTRIDAE.

Spisula elliptica (Brown).

At Positions 5 (two), 6 (three dead valves, one bored), 58 (one).
Depth, 42-49 fath.

Lutraria elliptica, Lamarck.

One dead valve bored by *Cliona*, at Position 11.
Depth, 42 fath.

VENERIDAE.

Dosinia exoleta (Linnaeus).

One young specimen at Position 5.
Depth, 42 fath.

Dosinia lincta (Pulteney).

At Positions 1 (one dead), 9 (three single valves), 10 (three living,
one dead), 11 (one dead), 13 (one dead).
Depth, 40-42 fath.

Venus fasciata (da Costa).

At Positions 40 (one), 44 (one), 46 (two), 53 (one dead).
Depth, 44-46 fath.

Venus casina, Linnaeus.

At Positions 6 (one dead valve), 9 (four living, one dead valve),
10 (one living, several dead), 11 (one), 12 (one), 13 (one), 16 (two),
17 (three), 19 (one), 34 (a few), 44, 46 (two young), 53.
Depth, 42-46 fath.

Venus ovata, Pennant.

At Positions 1 (one young), 6 (one dead valve), 10 (one), 40 (one),
43 (two), 44 (one).
Depth, 40-46 fath.

Tapes virgineus (Linnaeus).

At Positions 1 (three young living, one dead), 6 (one bored valve),
12 (one dead), 20 (one living), 43 (two dead), 53 (two dead), 56
(one dead).
Depth, 40-49 fath.

Gouldia minima (Montagu).

At Positions 6 (one dead valve), 43 (three), 44 (several).
Depth, 42-46 fath.

CARDIIDAE.

Cardium echinatum, Linnaeus.

At Positions 1 (old valves), 70 (one living).
Depth, 40 fath.

Cardium norvegicum (Spengler).

At Positions 5 (one young), 10 (one), 19 (one), 20 (dead valves),
51 (two large, living).
Depth, 42-45 fath.

Cardium tuberculatum, Linnaeus.

One young specimen, 9 mm. in length, apparently belonging to
this species, was obtained at Position 53.
Depth, 46 fath.

GARIDAE.

Gari costulata (Turton).

Single specimens at Position 10, 31, 37.
Depth, 40-43 fath.

Gari ferroensis (Chemnitz).

One dead valve at Position 1.
Depth, 40 fath.

Gari tellinella (Lamarck).

One dead, at the doubtful Position vii.

Depth, between 49 and 53 fath.

SOLENIIDAE.

Cultellus pellucidus (Pennant).

Two specimens at Position 1.

Depth, 40 fath.

SAXICAVIDAE.

Saxicava arctica (Linnaeus).

From one to about a dozen specimens were recorded at Positions 3, 4, 7, 11, 14, 32, 33, 37, 40, 43, 47, 53, 59, 62, 64, 72.

Depth, 40-50 fath.

PHOLADIDAE.

Pholas sp.

Old borings of a doubtful *Pholas* occurred in limestone at Position 46.

Depth, 47 fath.

Pholadidea sp.

An unidentified species of *Pholadidea* occurred, boring in sandstone, at Position 34.

Depth, 42 fath.

LYONSIIDAE.

Lyonsia norvegica (Chemnitz).

One pair of dead valves at Position 36.

Depth, 43 fath.

CEPHALOPODA.

LOLIGINIDAE.

Loligo media (Linnaeus).

One specimen at Position 7.

Depth, 42 fath.

SEPIIDAE.

Sepia elegans, d'Orbigny.

At Positions 3 and 60 (one).

Depth, 42-49 fath.

Sepia officinalis, Linnaeus.

At Positions 7 (one), 60 (one).

Depth, 42-49 fath.

Sepia sp.

Two records under the generic name only, of single specimens that were subsequently lost, occurred at Positions 1 and 68.
Depth 40-52 fath.

SEPIOLIDAE.

Sepiolo atlantica, d'Orbigny.

One specimen only was recorded at Position 6.
Depth, 42 fath.

POLYPODIDAE.

Moschites cirrosa (Lamarek).

One specimen at Position 8.
Depth, 43 fath.

TUNICATA.

By

Dr. R. Hartmeyer.

CAESIRIDAE [MOLGULIDAE].

Eugyra glutinans (Möller).

At Positions 1 (one), 6 (one), 10 (three), 37 (two).
Depth, 42-43 fath.

Caesira [Molgula] simplex (Alder and Hancock).

At Positions 1 (one), 3 (four), 7 (seven), 8 (one), 10 (two), 11 (two), 12 (three), 31 (one), 32 (two), 34 (one), 49 (six), 70 (one).
Depth, 40-47 fath.

Caesira [Molgula] oculata (Forbes).

At Positions 11 (one), 33 (one), 44 (one).
Depth, 42-46 fath.

PYURIDAE [HALOCYNTHIIDAE].

Pyura [Halocynthia] savignyi (Philippi).

At Positions 3 (one), 4 (one), 8 (one), 15 (one), 34 (four), 43 (three), vii (two).
Depth, 40-49 fath. or over.

TETHYIDAE [STYELIDAE].

Pandocia [Polycarpa] singularis (Gunnerus).

At Positions 1 (seven), 3 (seven), 4 (two very large, many smaller, including a number quite young), 7 (three), 8 (six), 9 (one), 12

(one), 49 (one), 59 (three), 60 (one), 70 (many examples associated with *Ascidrella aspersa*), 72 (two), vii (six, including one young).
Depth, 40–49 fath. or over.

Pandocia [Polycarpa] comata (Alder).

At Positions 1 (one), 4 (one young), 10 (two, including one young?), 31 (two), 53 (one), vii (one).
Depth, 40–49 fath. or over.

BOTRYLLIDAE.

Botrylloides rubrum, Milne-Edwards.

At Positions 3 (one), 4 (one), 8 (one), 38 (one).
Depth, 40–43 fath.

Polycyclus polycyclus (Savigny).

At Positions 3 (two), 4 (one), 7 (one), 8 (one), 49 (one), 60 (one), 64 (two).
Depth, 40–53 fath.

Certain colonies of a *Polycyclus* I refer to the *Botryllus polycyclus* of Savigny, and to the form from the Channel, not to that from the Mediterranean. Herdman has referred colonies from the Irish Sea likewise to this form of Savigny's, but has given them a new name, *P. savignyi*. This new naming seems scarcely justified, even if—as I agree with Herdman in doing—one separates specifically the North-west European form from the Mediterranean form. The latter bears the name *P. renieri*, Lam. *P. polycyclus* (Sav.) is partly a synonym of this species (Mediterranean form). For the North-west European specimens this name *P. polycyclus* (Sav.) still stands. *P. savignyi* (Herdman) is purely a synonym of it. The largest of the colonies (Fig. 1) forms a flattened extended mass, of which the anterior border is divided into a number of blunt lobes, while the posterior end is strongly narrowed with a stalk-like extension. This stalk-like process evidently serves for the attachment of the colony.

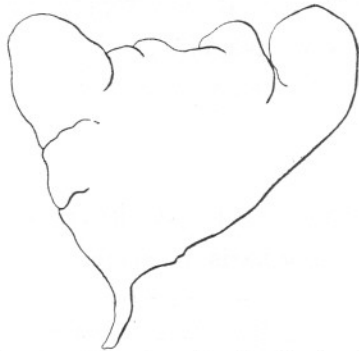


FIG. 1.—*Polycyclus polycyclus* (Sav.) $\times \frac{3}{4}$.

The colony is 67 cm. in maximum breadth, 51 cm. in length, and 1.3 cm. in thickness. To Herdman's description I further add that the meshes contain, counted from the endostyle, ca. 8, ca. 5, ca. 4, ca. 6 stigmata, and the stomach possesses a prominent caecum bent into a hook shape.

RHODOSOMATIDAE [CORELLIDAE].

Corella parallelogramma (Müller).

At Positions 3 (one), 10 (one), 60 (one).

Depth, 40-49 fath.

Corella larvaeformis, Hancock.

At Positions 32 (one), 38 (one).

Depth, 42-44 fath.

PHALLUSIIDAE [ASCIDIIDAE].

Asciidiella aspersa (Müller).

At Positions 1 (three, including a smooth example of the type *virginea*, of which, however, the course of the gut conforms with that of the type *aspersa*), 3 (seven), 4 (eight), 5 (one), 7 (one), 10 (one), 32 (three), 33 (three), 34 (two), 40 (one), 42 (one), 70 (in great abundance in and upon *Pecten* shells, or massed together), 72 (one young).

Depth, 40-44 fath.

Phallusia [Ascidia] virginea, Müller.

At Positions 1 (one), 3 (one), 8 (one), 12 (one), 15 (one), 34 (one), 38 (one), 40 (one), 43 (one), 59 (two), 60 (one), 67 (one), 70 (two), 72 (three), vii (one).

Depth, 40-52 fath. or over.

Phallusia [Ascidia] mentula (Müller).

At Positions 3 (two), 4 (three), 8 (two), 12 (one), 34 (one young), 40 (one), 59 (one).

Depth, 40-49 fath.

Phallusia [Ascidia] conchilega (Müller).

At Positions 1 (one), 4 (one), 8 (one), 10 (three), 32 (one), 34 (two), 36 (one), 37 (two young), 43 (four), 49 (one), 70 (one), vii (two).

Depth, 40-49 fath. or over.

I refer the species *depressa* to the older specific name *conchilega*. Among the material two examples occur which in some characters, especially in the course of the alimentary canal, differ from the typical specimens. That from Position vii (Fig. 2) measured on the body

(excluding the test) 3.6 cm. in length and 2.6 cm. in height. The anterior end is narrowed and bluntly rounded; the posterior end, on the contrary, is more than usually broadened. The whole animal has evidently undergone a shortening in the long axis. One consequence of this shortening at least is the almost horizontal position of both loops of the intestine and the situation of the anal opening as high as the upper curvature of the intestine, whereby the unusual course of the latter is occasioned. The test is beset with conspicuously large prominences, which in their form recall those of *Ascidiella aspersa* (Müller). The other specimen (Fig. 3), from Position 8, likewise shows certain peculiarities.

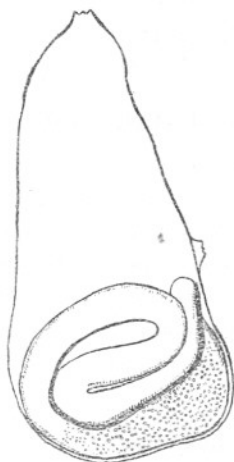


FIG. 2.—*Phallusia conchilega* (Müll.), Interior $\times 2$

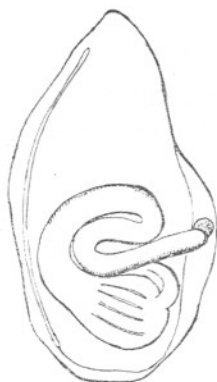


FIG. 3.—*Phallusia conchilega* (Müll.), Interior $\times 2$.

Such are the pronounced oval form, and the likewise very strongly bent loops of the intestine, although the anus retains its position below

the upper curve of the latter. The free surface (the animal is attached by the whole left side of the body) is finely cornulated.

CIONIDAE.

Ciona intestinalis (Linnaeus).

At Positions 3 (two), 4 (one), 10 (one), 12 (one), 34 (two), 40 (one), 44 (one), 49 (two), 59 (many massed together), 67 (one), 70 (many on the inner surface of *Pecten* shells or massed together).

Depth, 40-52 fath.

DIDEMNIDAE.

Didemnum [*Leptoclinum*] *perspicuum* (Giard).

At Position 3 (two).

Depth, 40 fath.

Leptoclinum [*Diplosoma*] *gelatinosum*, Milne-Edwards.

At Positions 1 (one), 3 (one), 4 (two), 59 (one).

Depth, 40-49 fath.

CEPHALOCHORDATA.

Amphioxus lanceolatus (Pallas).

At Positions 5 (one), 11 (one), 21 (one), 48 (five), 50 (one), 57 (eight), 58 (three).

Depth, 42-49 fath.

VERTEBRATA.

PISCES.

The infrequent use of the trawls must be borne in mind with reference to the comparatively few fishes recorded.

ELASMOBRANCHII.

SCYLLIIDAE.

Scyllium canicula (Linnaeus).

One specimen at Position 7.

Depth, 42 fath.

RAIIDAE.

Raia clavata, Linnaeus.

Single specimens at Positions 8 and 66.

Depth, 44-52 fath.

Raia circularis, Couch.

At Positions 49 (one), and 66 (three).

Depth, 47-52 fath.

Raia sp.

Examples of *Raia* not specifically recorded occurred at Positions 3 (one), 7 (three), 8 (one).

Depth, 40-43 fath.

TELEOSTEI.**MURAENIDAE.****Conger conger** (Linnaeus).

One specimen at Position 64.

Depth, 53 fath.

GADIDAE.**Gadus luscus**, Linnaeus.

At Positions 3, 7 (two), 68 (thirty-two), 78 (six).

Depth, 40-52 fath.

Gadus minutus, Linnaeus.

At Positions 3, and 49 (several).

Depth, 40-47 fath.

Gadus pollachius, Linnaeus.

One specimen at Position 59.

Depth, 49 fath.

Molva vulgaris, Fleming.

One specimen at Position 3.

Depth, 40 fath.

Motella tricirrata, Nilsson.

At Positions 58 (one), and vii (one).

Depth, 49 fath. and (?) over.

SERRANIDAE.**Serranus cabrilla**, Linnaeus.

At Positions 8 (one), 49 (three).

Depth, 43-47 fath.

Fishes obtained at Positions 64 (one), and 68 (four), which were not retained, probably also belonged to this species.

CAPROIDAE.**Capros aper** (Linnaeus).

At Positions 3 (three), 7 (a few), 8 (one), 49 (a few), 59 (one), 60 (two), 64 (two), 68 (eighty-five), 78 (two).

Depth, 40-52 fath.

The haul at Position 68, where the large number of this species

occurred, was one of fifty-five minutes with the otter trawl, taken in 52 fathoms. It was one of the few cases in which the otter trawl was used, with some risk, in the neighbourhood of decidedly rough ground.

PLEURONECTIDAE.

Zeugopterus norvegicus (Günther).

At Positions 52 (one), 59 (one), 60 (one). Length, 6·9, 10·3, and 5·7 cm. severally.

Depth, 43–49 fath.

A *Zeugopterus* which occurred at Position 58, probably also belonged to this species.

Arnoglossus laterna (Walbaum).

At Positions 3 (one), 7 (a few), 8, 49 (eight), 52 (one), 60 (three), 64 (three), 68 (six), 78 (four).

Depth, 40–53 fath.

Arnoglossus megastoma, Donovan.

At Positions 3 (a few), 7 (two).

Depth, 40–42 fath.

Pleuronectes microcephalus, Donovan.

At Positions 7 (one), 49 (one), 68 (three).

Depth, 42–52 fath.

Solea variegata (Donovan).

At Positions 35 (one), 51 (one), 52 (three), 68 (one).

Depth, 43–52 fath.

GOBIIDAE.

Gobius jeffreysi, Günther.

At Position 1 (one), 52 (one).

Depth, 40–43 fath.

Gobius scorpioides, Collett.

At Positions vii (one), 62 (one). Length, 33 mm. and 31 mm. respectively.

Depth, 50 fath. and (?) over.

Mr. Boulenger kindly identified this rare goby. With reference to its occurrence, Holt and Byrne (152, p. 21) state that excepting several specimens obtained from Ballynakill Harbour on the west coast of Ireland, there are only five records of its capture, viz. from the Norwegian coast, the Cattegat, Falmouth, and 30 miles W.N.W.

of Cleggan Head, the depth of occurrence ranging from about 2 to 74 fath.

The two specimens here recorded considerably exceed in length the measurement, "less than 1 inch," given by Holt and Byrne.

AGONIDAE.

Agonus cataphractus, Linnaeus.

At Positions 5 (one), 52 (one). Length of the latter specimen 40 mm.

Depth, 42-43 fath.

Callionymus lyra, Linnaeus.

At Positions 3 (a few), 7 (two), 8 (one), 59 (two), 60 (three), 66 (one), 68 (one).

Depth, 40-52 fath.

TRIGLIDAE.

Trigla pini, Bloch.

At Positions 3 (one), 7 (a few), 8 (one), 49 (four), 60 (three small), 64 (two), 68 (five).

The small specimens at Position 60 measured 6.4, 5.6, and 5.3 cm. severally, in length.

Depth, 40-53 fath.

Trigla lineata, Gmelin.

Two specimens at Position 49.

Depth, 47 fath.

TRACHINIDAE.

Trachinus draco, Linnaeus.

Only recorded at Position 7.

Depth, 42 fath.

GOBIESOCIDAE.

Lepadogaster bimaculatus, Fleming.

One specimen at Position 1.

Depth, 40 fath.

Lepadogaster microcephalus, Brook.*

One specimen at Position 72.

Depth, 43 fath.

LOPHIIDAE.

Lophius piscatorius, Linnaeus.

One specimen at Position 64.

Depth, 53 fath.

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