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Part 2. On the Crustacea, Tunicata, Polyzoa, Echinodermata, Actinozoa,
Hydrozoa, and Porifera

Author(s): Norman

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Summary.

	Shetland.	Northern.	Southern.	Total British.	Remarks.
MARINE.					
Brachiopoda	6	6	4	8	
Conchifera	126	110	107	167	
Solenococonchia	4	4	3	5	
Gastropoda	223	188	140	359	The last figure includes 111 Nudibranchs.
Pteropoda	3	2	3	3	The number of marine species in Lovén's 'Index' of Scandi- navian mollusca is 345, in- cluding 40 Nudibranchs.
Cephalopoda	6	5	3	12	
	368	315	260	554	
LAND AND FRESHWATER.					
Conchifera	2	2	2	15	
Gastropoda	22	22	20	109	
	392	339	282	678	

Obs. The Shetland Nudibranchs and Cephalopods have not been sufficiently investigated. Lovén's 'Index' and a further list of Swedish Nudibranchs which he lately sent me contain 60 species of that order, out of which 25 only have been identified as Zetlandic. He also gives 9 species of Cephalopods, of which 5 only are Zetlandic. The southern distribution of our Nudibranchs is very little known. For the preparation of the present list of Nudibranchs I am in a great measure indebted to the late Mr. Alder and to Mr. Norman. Forty-eight species of mollusca (marked †) have been discovered in the Shetland seas since the publication of Forbes & Hanley's 'History of British Mollusca and their Shells.'

*Shetland Final Dredging Report.—Part II. On the Crustacea, Tunica-
cata, Polyzoa, Echinodermata, Actinozoa, Hydrozoa, and Porifera.
By the Rev. ALFRED MERLE NORMAN, M.A.*

THE especial object with which the Shetland dredging was recently undertaken, under the auspices of the British Association, was the examination of the fauna of the deep water which surrounds that most northern group of our islands. The abyss of the sea there approaches near to land at a depth rapidly descending to eighty or one hundred, and subsequently reaching many hundred fathoms. The sea-bottom at such a depth would never have been laid bare during those two great upheavals of the earth's surface which appear to have been the last great geological oscillations over the area of the north-west of Europe. At a time when all the channels and sea which now separate our islands from each other, and from the rest of Europe, were raised high and dry above the level of the ocean, and the whole formed part of one great continent, the sea, if the calculations as to the extent of that elevation are anything like the truth, must still have broken on the rocky shores of the

imposingly bold promontory of Shetland, and the forefathers of at least a large proportion of its present inhabitants must have lived and died in the same spots which they now occupy.

Before the recent investigation was commenced, the dredgings of Mr. Jeffreys and the late Mr. Barlee had resulted in procuring many northern species of Mollusca in Shetland, which were not before supposed to range so far south. Moreover, the long lines of the Haaf fishermen had brought up some strangers from the deep, and had made known to Jameson, Fleming, and others the existence of a fauna of a widely different character from that of other portions of the British coast. Lastly, the cruise of Mr. M'Andrew's yacht enabled the late Professor E. Forbes to acquaint himself with many Echinodermata and other animals of peculiar interest. These combined circumstances made us anxious that the invertebrata of this portion of our islands should be thoroughly investigated, and led to the appointment by the British Association of a Committee to prosecute such researches. It is only right, however, that it should be known that the money which has from time to time been voted by the Association to this Committee has only consisted of grants in aid*. Dredging in the open waters of the Atlantic at considerable distances from land necessitates the employment of a vessel of some size, and consequently entails a not inconsiderable outlay. That outlay has been mainly borne by Mr. Jeffreys, who has been the leader in the whole undertaking. Mr. Leckenby, of Scarborough, has also contributed largely towards the expenses; and other members of the Committee, who have taken part in the expeditions, have similarly aided, if in much smaller sums, at least not less willingly in proportion to their means. But my object in referring to this matter is to let it be known that the light which is now thrown upon the fauna of this portion of our seas, together with any value which this present Report may possess, is chiefly due to the liberality in the cause of science of the two naturalists whose names have been mentioned.

The marine fauna of Shetland has now been proved to be extremely rich. The sea there would seem to be in an especial manner the meeting-place of northern and southern types. Many arctic forms not known further to the south are here found associated with numerous Mediterranean species which do not reach the Scandinavian coast, and some of which are remarkable as not having as yet been found at any intermediate habitat between the extreme south of Europe and Shetland.

The distribution of animal life around our coasts appears for the most part to have followed the direction south, west, north, east. It would seem that comparatively very few (if any) southern species have made their way far north through the straits of Dover, which may probably be accounted for by the fact that that channel has, geologically speaking, been only a short time open. As a rule southern species are to be seen at a higher latitude on the western than they are on the eastern coasts. There are, however, some apparent, but only apparent, exceptions. These consist of animals known on the north-east coast of Scotland, which we should not have expected to meet with there. On examining into the probable cause of their migration to this district, I am led to believe that they have made their way thither round the western and northern, and down the eastern coasts to their present habitats, and not up the eastern coast as might at first have been supposed. For example, *Cerithium perversum*, *Phasianella pulla*, *Fissurella Græca*, *Tellina ba-laustina*, *Callianassa subterranea*, *Palmipes placenta*, *Amphiura brachiata*, &c.

* The dredging of the first two years here reported on (1861 and 1862) was carried on without any aid from the British Association.

have been found in the Moray Firth, but are wholly unknown on the eastern coast of England. Moreover, many species have been recorded on the Norwegian coast, though never found on the eastern shores of England, and therefore may be presumed to have migrated thither up the western side of Great Britain and round the north of Scotland; as examples of such species may be cited *Pleurotoma striolata*, *attenuata*, and *septangularis*, *Cerithiopsis tubercularis*, *Cerithium reticulatum* and *perversum*, *Rissoa violacea*, *Pholas dactylus*, *Solen vagina*, *Psammobia costulata*, *Gastrana fragilis*, *Isocardia cor*, *Cardium aculeatum*, *Lepton squamosum*, *Xantho rivulosus*, *Portunus arcuatus*, *Gebia deltura*, &c. On the other hand, while northern forms do not extend southward on the east coast beyond Yorkshire and the Dogger Bank, on the western coasts they in many instances have a range southwards to the Nymph Bank, off Cork, and even to the Mediterranean sea. Inasmuch, therefore, as migration northwards has for the most part taken place by way of the Hebrides and Shetland, a southern form which may be found in the Gulf of Christiania or neighbouring part of Scandinavia, though at a point of latitude considerably further to the south than Shetland, may be regarded practically with respect to distribution to be further north, and a northern species at Shetland as further south in its course of migration. In the preparation, therefore, of the Tables IV. and VII. I have regarded the whole of the Scandinavian sea as though it was to the north of Shetland, notwithstanding that the latter is geographically situated in about the same latitude as Bergen.

As has been already stated, the chief aim of the Dredging Committee was to thoroughly examine the invertebrata of the deep sea. This purpose was never lost sight of, and the dredge was rarely let down in the Voes or other shallow water except when we were driven there by stress of weather; nor was it possible to find much leisure, amid the constant labour entailed by the examination and preparation of the animals procured by the dredge, to devote to the littoral zone. Notwithstanding, therefore, the great length of the present catalogue (which shows the fauna in almost every branch to be more rich than that of any other portion of the British coast which has been carefully examined by competent naturalists) there cannot be a question that numerous and interesting discoveries will reward the future investigations of zoologists near the shore as well as in the open sea. For with regard to the latter, our repeated dredgings in these northern waters have only sent us home each time more fully convinced how much remains to be done before we can attain anything like a complete knowledge of the animals which inhabit them. We never tried a new locality a few miles distant from that which we were before examining that we did not meet with species which had been previously unnoticed: in fact the Shetland seas appear to afford an inexhaustible treasury of rare animals in every department of zoology.

While some species are extremely widely diffused, though numerically scarce, throughout the province, others are common everywhere, and others again apparently excessively limited in their distribution as well as very rare when found. But one of the most remarkable features in the distribution of life in the Shetland Sea is the extraordinarily circumscribed habitat, but at the same time the local profusion, of many species. It will not be without interest to give a few examples of this. Many Crustacea, as *Nika edulis*, *Doryphorus Gordonii*, *Gastrosaccus sanctus*, &c., occurred on one occasion in one spot in considerable numbers, but were scarcely ever (if ever) seen again. Forty miles east of the Whalsey Skerries *Echinus Norvegicus* was in such extraordinary profusion that the dredge came up again and again literally almost filled with it; but though occurring in many other localities, it was,

save in this one instance, comparatively uncommon. Near the same spot *Antedon Sarsii* was brought up in thousands, yet, except in that one day's dredging, I never was fortunate enough to meet with the species. In this same neighbourhood *Ophiura Sarsii* was found very abundantly, but it was scarcely ever seen again during these dredgings. *Cidaris papillata* and *Spatangus meridionalis* appeared to be confined to one limited area to the north of Unst, yet there they were to be met with in considerable numbers. Similarly *Tealia digitata* was chiefly found in one particular spot; and the same is true of *Ascidia obliqua*, *A. sordida*, *Eschara lorea* and *lævis*, *Cellepora attenuata*, *Tessarodoma gracile*, *Palmicellaria elegans*, *Hornera borealis* and *violacea*, *Zoanthus papillosus*, *Sidisia Barleeii*, *Pennatula phosphorea*, *Tubularia attenuata*, *Quasillina brevis*, *Phakellia robusta*, *Isodictya fimbriata*, *Oceanapia Jeffreysii*, &c., all of which, though dredged occasionally elsewhere, were chiefly to be found in one circumscribed area, where they appeared to be very common, and in some instances to live in the most astounding quantities. When cases of remarkable local distribution occur in channels or bays the circumstance is not unexpected, but it is different when we are dredging in the wide expanse of the Atlantic with *apparently* no causes at work to make such differences in the nature of the sea-bottom, which around Shetland is in general of nearly uniform though gradually increasing depth, as would render different positions peculiarly fitted for the life of different species. Yet this would seem in a most marked degree to be the case. The nature of the sea-bed on the Haaf is continually changing, and the character of the inhabitants varies with it. At one moment the dredge is scraping over hard stony ground calculated to tear the nets to pieces, at the next it is sunk deep in fine sand or in an unctuous mud. When the dredge is hauled up it will be often found that while down it has at first travelled over a soft bottom and thence brought up in the sand some extremely interesting species, perhaps in profusion, while subsequently it has been dragged over hard ground and the stones which it has thence collected have crushed to pieces the delicate organisms which lay below them in the net. We at once tack and endeavour again to strike the spot where we had first let down the dredge—no easy matter certainly in the open sea, where no bearings can be taken from the land; the whole day is spent, perhaps many days are spent, in the search for that spot, but *Ulocyathus arcticus* or *Trochus amabilis* declines again to show us its pretty face.

It may be well to mention that the term "Haaf," which constantly occurs in this Report, means the *open sea*, and the Shetland fishermen, more especially those of the "Out" or "Whalsey Skerries," speak of the "inner," "middle," or "outer Haaf," according to the distance of the fishing-ground from land. The "outer Haaf" to the east of the Whalsey Skerries is about forty miles from those rocky islets, and fifty-five or sixty miles from the mainland.

In the catalogue of species which follows in this Report I have, in the case of those animals which have only occurred once, generally appended the date of the year in which they were discovered. The following account of the naturalists who accompanied the expeditions in the different years will enable the reader to assign the credit of each discovery to the right persons. Many invertebrata which were preserved during the years when I was not myself present with the Committee, and belong to the classes on which I report, were kindly placed in my hands by Mr. Jeffreys. In the notes which follow, the specimens having been actually examined by myself, I hold myself responsible for the correctness of the identification of the species in all cases, except where the locality or note is contained within inverted commas, where

the determination of the species rests upon the authority of the naturalist whose name follows the quotation.

1861. Mr. Jeffreys, Mr. Waller, and myself. The dredging this year was chiefly carried on from the Whalsey Skerries, where the Lighthouse was made our headquarters; but a short cruise was taken, just before the homeward voyage, to the ground to the north of Unst, which in later years proved so productive. Vessel, the yacht 'Osprey.'

1862. Mr. Jeffreys and Professor Allman. The expedition came to a premature and unfortunate termination. The vessel which had been chartered, having been caught in a heavy gale at sea, had her rudder-post carried away, and thus became disabled. Professor Allman, however, succeeded in procuring several Hydrozoa new to science.

1863. Mr. Jeffreys, Mr. Waller, Mr. R. Dawson, and myself. A steamer was this year engaged in the work, and the dredging was in the directions north, north-east, and east of Unst.

1864. Mr. Jeffreys, Mr. Waller, and Mr. Peach. The dredging was chiefly carried on to the north of Unst, Balta Sound being made the headquarters during the greater portion of the summer. Mr. Peach paid special attention to the sponges, and discovered several new species. Vessel, the 'Osprey.'

1867. Mr. Jeffreys, Mr. Waller, Mr. Dodd, and myself. The bed of the ocean, to the north and west of Shetland, was investigated, and at greater depths than had before been tried. A fortnight was also spent in examining the rich fauna of the deeper parts of St. Magnus Bay. Vessel, Mr. Jeffreys's yacht the 'Osprey.'

1868. Mr. Jeffreys, Mr. Waller, and Major Woodall. Dredging chiefly to the north of Unst and St. Magnus Bay, but the Out Skerries Haaf was also visited. Vessel, the 'Osprey.'

My sincere thanks are especially due to my kind and valued friends Mr. Jeffreys and Mr. Waller, for the assistance they rendered me in all kinds of ways during our dredging operations, and in the preservation of those invertebrata which it is my duty here to notice.

In 1867 Mr. D. Robertson went to Shetland, and, besides dredging and using the towing-net in Bressay Sound, he visited many of the inland lochs and streams, for the purpose of examining the Crustacea which they might contain. I have to thank him for having kindly allowed me to examine the gatherings which he made, and I am thus enabled to add many species to the list of Entomostraca.

In the preparation of the Tables which follow, it must be understood that I have not relied solely on published localities. A large number of the species have been identified by myself from habitats further to the north or to the south than those which have been recorded in print. This will account for the absence of many names from the Tables IV., V., and VII. which might have been expected there.

I.

Comparison of the Total Number of British and of Shetland Species.

The following Table is intended to show—

1. The number of species belonging to the several Classes and Orders, as given in the "List of the British Marine Invertebrate Fauna," published by the British Association in 1861, and which supplies us with a carefully corrected catalogue of the species known seven years ago.

2. The total number of species which have been recorded as British up to the time of publication of this Report. This estimate I have drawn up

with great care. In the second column many species are omitted which, though contained in the first, are not considered by me to be distinct from other described species; consequently the difference between the number of British species now known, and those which had been recognized previously to 1861, is even greater than appears from a comparison of the figures here inserted.

3. The number of species which have been found in the Shetland seas. The inland forms are entirely omitted from these columns. The small area of the Shetland Islands, their isolation, the stunted character of the vegetation, the almost total absence of trees, and the scarcity of ponds or pieces of water other than moorland tarns (which character of water has a restricted fauna peculiarly its own), all tend to limit the numbers of land and fresh-water invertebrata likely to be found in the islands. Our object was the investigation of the marine fauna, and but little attention was paid to that of the land. Those few species, however, which were observed will be found enumerated in the Catalogue, and consist of twenty-two Crustacea (out of one hundred and fifteen known as British) and one Hydrozoon.

		I.	II.	III.			
		British,	British,	Shetland.			
		in 1861.	in 1868.				
ARTHROPODA.	Crustacea	Brachyura	41	40	18	} 362	
		Anomura	14	15	11		
		Macrura	52	53	26		
		Stomapoda	23	40	23		
		Amphipoda	120	183	110		
		Isopoda	50	66	21		
		Phyllopoda	2	2	1		
		Cladocera	1	2	2		
		Ostracoda	21	124	87		
		Copepoda	50	87	51		
		Cirripedia	27	25	6		
		Pycnogonoidea	11	25(?)	6		
		Arachnida	Acarina	0	9		2
			Tunicata	73	104		39
MOLLUSCOIDA.	Polyzoa	Cheilostomata	110	153	102	} 137	
		Cyclostomata	24	25	21		
		Ctenostomata	24	28	10		
		Pedicellinea	3	3	3		
		Lophopea	0	1	1		
ECHINO- DERMATA.	Holothuroidea	24	20	14	} 62	
		Echinoidea	15	16	15		
		Asteroidea	16	18	17		
		Ophiuroidea	14	16	14		
		Crinoidea	3	4	2		
ACTINOZOA.	Actinozoa	Zoantharia	67	74	21	} 34	
		Acyonaria	11	15	7		
		Ctenophora	11	11	1		
		Lucernariada	13	14	5		
CELENTERATA.	Hydrozoa	Thecaphora	72	92	52	} 104	
		Athecata	36	72	26		
		"Naked-eyed Medusæ"	69	69	24		
		Calycophorida	1	1	1		
		Physophorida	3	4	1		
PROTOZOA.	Porifera	Calcarea	10	12	5	} 83	
		Silicea	101	177	73		
		Keratosa	10	12	5		
		1122	1612	823			

II.

Comparison of the Shetland Invertebrate Marine Fauna with that of other portions of the British Coast.

No really satisfactory comparison can be made between the number of animals here reported on as inhabiting the Shetland Sea with those found on other portions of our coast. Unfortunately very little attention has hitherto been paid to any, except the larger and more conspicuous forms belonging to these classes. In order, however, that this comparison may be carried out as far as at present practicable, I give the following summaries of the most fully worked up local lists that I am acquainted with.

CRUSTACEA.

	A. Shetland.	B. Northumber- land and Durham.	C. Hebrides.	D. Moray Firth.	E. Dublin.	F. Galway.	G. Clyde dis- trict, &c.
Brachyura	18	13	16	18	23	30	
Anomura	11	11	6	5	8	8	
Macrura	26	11	18	17	24	22	
Stomapoda	23	9	6	4	4		
Amphipoda	110	53	47	..	22		
Isopoda	21	8	11				
Phyllopoda	1	1	1				
Cladocera	2	2	0				
Ostracoda	87	19	65	30	..	53	67
Copepoda	51	12	22				
Cirripedia	6	9	3				
Pycnogonoidea	6	10	1				
	362	158	196	74	81	113	

B.—Norman, "Report of Deep-Sea Dredging on the Coast of Northumberland and Durham, 1862-64. Crustacea," Nat. Hist. Transac. Northumb. and Durham, vol. i. (1865) p. 12.

C.—Norman, "Report of Committee appointed for the purpose of Exploring the Coasts of the Hebrides by means of the Dredge.—Part II.," British Assoc. Report, 1866, p. 193.

D.—Rev. G. Gordon, "A List of the Crustaceans of the Moray Firth," Zoologist, 1852, p. 3678; and the Ostracoda from G. S. Brady, Trans. Linn. Soc. vol. xxvi. p. 478.

E.—Kinahan, "Report of the Committee appointed to dredge Dublin Bay," Brit. Assoc. Report, 1860, p. 27; and "Report on Crustacea of the Dublin District," Brit. Assoc. Report, 1859, p. 262.

F.—A. G. Melville, "List of Crustacea Podophthalmia of Galway Marine Districts," Nat. Hist. Review, vol. iv. (1857) p. 151; and the Ostracoda added from Mr. G. S. Brady's paper in Trans. Linn. Soc. vol. xxvi.

G.—G. S. Brady, "A Monograph of the Recent British Ostracoda," Trans. Linn. Soc. vol. xxvi. p. 478,—this being the fullest district list given by him.

TUNICATA.

The only catalogues for comparison with the thirty-nine Shetland Tunicata are Alder's list of those of the Northumberland and Durham coasts (Catalogue of the Mollusca of the Northumberland and Durham Coasts, p. 101), which includes thirty species, my own very short list of sixteen observed in the Clyde district ("The Mollusca of the Firth of Clyde," Zoologist, 1857, p. 5703), and a third of twenty-one Hebridean species by Mr. Alder (Brit. Assoc. Report, 1866, p. 206).

POLYZOA AND CŒLEENTERATA.

	H. Shetland.	I. Northumber- land and Durham.	K. Devon and Cornwall.	L. Hebrides.
<i>Polyzoa.</i>				
Cheilostomata	102	59	87	54
Cyclostomata	21	12	14	10
Ctenostomata	10	16	17	2
Pedicellinea	3	3	3	0
Lophopea	1	0	0	0
<i>Actinozoa.</i>				
Zoantharia	21	11	37	4
Alcyonaria	7	4	4	6
Ctenophora	1	0	0	0
Lucernariada	5	2	2	0
<i>Hydrozoa.</i>				
Thecaphora	52	56	58	28
Athecata	26	23	19	4
"Naked-eyed Medusæ"	24	0	0	0
Calycophorida	1	0	0	0
Physophorida	1	0	0	0
	275	186	241	108

I.—Alder, "Catalogue of the Zoophytes of Northumberland and Durham," 1857, and "Supplement" to the same, 1862.

K.—Rev. T. Hincks, "Catalogue of the Zoophytes of South Devon and South Cornwall," 1861-62.

L.—Norman, Brit. Assoc. Report, 1866, p. 199.

ECHINODERMATA.

	M. Shetland.	N. Northumber- land and Durham.	O. Hebrides.	P. Orkney.	Q. Moray Firth.	R. Dublin.
Holothuroidea	14	9	9	3	1	4
Echinoidea	15	10	6	7	6	5
Asteroidea	17	8	8	10	11	8
Ophiuroidea	14	10	9	7	7	7
Crinoidea	2	1	2	1	1	1
	62	38	34	28	26	25

- N.—G. Hodge, "Report of Deep-Sea Dredging on the Coasts of Northumberland and Durham, 1862-64.—Echinodermata," Nat. Hist. Trans. Northumb. and Durham, vol. i. p. 42.
- O.—Norman, Brit. Assoc. Report, 1866, p. 198.
- P.—Dr. W. B. Baikie, "Catalogue of the Echinodermata of Orkney," Zoologist, 1853, p. 3811. (Several species are included in Dr. Balfour Baikie's list for which no Orkney habitat is given; these are here omitted.)
- Q.—Rev. G. Gordon, "List of the Echinodermata hitherto met with in the Moray Firth," Zoologist, 1853, p. 3781.
- R.—Kinahan, Brit. Assoc. Report, 1860, p. 31.

PORIFERA.

The only local List of Sponges is one recently published by Mr. E. Parfitt, "On the Marine and Freshwater Sponges of Devonshire" (Trans. Devonshire Association for the Advancement of Science, Literature, and Art, 1868); it includes forty-nine marine species, while the Shetland species observed by us are eighty-three. Only eighteen of these species are as yet known to be common to these two extremities of our islands.

III.

Species added to the British Fauna during the recent Dredging.

The new species which have during the past six years been discovered in Shetland have from time to time been published through various channels, a large proportion of them having been placed in the hands of those naturalists who were engaged in bringing out works on the several branches of marine zoology. The following list of 156 species is therefore given here in order to show at a glance the additions to our fauna which have directly resulted from the investigations of the Dredging Committee.

- | | |
|--|---|
| Portunus tuberculatus, <i>Roux</i> . | Kroyera altamarina, <i>B. & W.</i> |
| Pagurus tricarinatus, <i>Norman</i> . | Syrrhoë hamatipes, <i>Norman</i> . |
| Crangon serratus, <i>Norman</i> . | Lilljeborgia Shetlandica, <i>B. & W.</i> |
| Sabinæa septemcarinata (<i>Sabine</i>). | Dexamine Vedlomensis, <i>B. & W.</i> |
| Lophogaster typicus, <i>M. Sars</i> . | Atylus macer, <i>Norman</i> . |
| Thysanopoda Norvegica, <i>M. Sars</i> . | Calliopius Fingalli, <i>B. & W.</i> |
| Mysis inermis, <i>Rathke</i> . | Megamphopus cornutus, <i>Norman</i> . |
| —— ornata, <i>G. O. Sars</i> . | Protomedeia pectinata, <i>Norman</i> . |
| Mysidopsis hispida, <i>Norman</i> . | Heiscladus longicaudatus, <i>B. & W.</i> |
| Gastrosaccus sanctus (<i>Van Beneden</i>). | Amphithoë albomaculata, <i>Kröyer</i> . |
| Nematopus serratus, <i>G. O. Sars</i> . | Siphonocetes typicus, <i>Kröyer</i> . |
| Nannasticus binoculoides, <i>Bate</i> . | Cyrtophium armatum, <i>Norman</i> . |
| Diastylis echinata, <i>Bate</i> . | Corophium tenuicorne, <i>Norman</i> . |
| —— bispinosa (<i>Stimpson</i>). | Hyperia oblivia, <i>Kröyer</i> (not <i>B. & W.</i>). |
| —— lævis, <i>Norman</i> . | Metoëcus medusarum, <i>Kröyer</i> . |
| —— spinosa, <i>Norman</i> . | Phryxus longibranchiatus, <i>B. & W.</i> |
| Cumella agilis, <i>Norman</i> . | Cirolana truncata, <i>Norman</i> . |
| Probolium serratipes, <i>Norman</i> . | Pontocypris hispida, <i>G. O. Sars</i> . |
| Anonyx nanus, <i>Kröyer</i> . | Cythere dubia, <i>G. S. Brady</i> . |
| —— nanoides, <i>Lilljeborg</i> . | —— costata, <i>Brady</i> . |
| —— ampulla (<i>Phipps</i>). | —— mucronata (<i>G. O. Sars</i>). |
| —— tumidus, <i>Kröyer</i> . | —— abyssicola (<i>G. O. Sars</i>). |
| Stegocephalus ampulla (<i>Phipps</i>). | —— crenulata (<i>G. O. Sars</i>). |
| Opis leptochela, <i>Bate & Westw.</i> | —— leioderma, <i>Norman</i> . |
| Pontoporeia affinis, <i>Lindström</i> . | Cytherura concentrica, <i>C. B. & R. (MS.)</i> . |
| Ampelisca lævigata, <i>Lilljeborg</i> . | —— flavescens, <i>Brady</i> . |
| Ædiceros parvimanus, <i>B. & W.</i> | —— quadrata, <i>Norman</i> . |
| —— æquicornis, <i>Norman</i> . | —— navicula, <i>Norman</i> . |

- Sarsiella capsula, *Norman*.
 Cytheropteron alatum, *G. O. Sars*.
 Bythocythere tenuissima, *Norman*.
 Cypridina Norvegica, *Baird*.
 Conchoëcia obtusata, *G. O. Sars*.
 Polycope dentata, *Brady*.
 Cyclops nigricauda, *Norman*.
 — pallidus, *Norman*.
 Amymone falcata, *Norman*.
 Cleta forcipata, *Claus*.
 Tigriopus Lilljeborgii, *Norman*.
 Thalestris Clausii, *Norman*.
 Porcellidium subrotundum, *Norman*.
 Aspidiscus fasciatus, *Norman*.
 Ascomyzon echinicola, *Norman*.
 Lichomolgus forficula, *Thorell*.
 Entorocola eruca, *Norman*.
 Notodelphys cærulea, *Thorell*.
 — prasina, *Thorell*.
 Doropygus auritus, *Thorell*.
 Botachus cylindratus, *Thorell*.
 Notopterophorus papilio, *Hesse*.
 Nogagus Lütkeni, *Norman*.
 Brachiella rostrata, *Kröyer*.
 Nymphon Strömii, *Kröyer*.
 Ascidia obliqua, *Alder*.
 — rudis, *Alder*.
 — plebeia, *Alder*.
 Polyclinum succineum, *Alder*.
 Menipea Jeffreysii, *Norman*.
 Hippothoa expansa, *Norman*.
 Membranipora sacculata, *Norman*.
 Lepralia cruenta, *Norman*.
 — laqueata, *Norman*.
 — abyssicola, *Norman*.
 — polita, *Norman*.
 — microstoma, *Norman*.
 — minuta, *Norman*.
 — tubulosa, *Norman*.
 Celleporella lepralioides, *Norman*.
 — pygmæa, *Norman*.
 Cellepora attenuata, *Alder*.
 Palmicellaria elegans, *Alder*.
 Hemeschara struma, *Norman*.
 Eschara lorea, *Alder*.
 Hornera borealis, *Busk*.
 — violacea, *M. Sars*.
 Alecto diastoporides, *Norman*.
 Rhabdopleura Normani, *Allman*.
 Thyone elegans, *Norman*.
 Spatangus meridionalis, *Risso*.
 Echinus pictus, *Norman*.
 Asterias Mülleri, *M. Sars*.
 Astropecten acicularis, *Norman*.
 Archaster Parelii (*Düb. & Kor.*).
 Ophiura Sarsii, *Lütken*.
 Ophiopeltis securigera, *Düb. & Kor.*
 Zoanthus anguicomma, *Norman*.
 Cuspidella humilis, *Hincks*.
 — grandis, *Hincks*.
 Obelia plicata, *Hincks*.
 Gonothyraea hyalina, *Hincks*.
 Clava diffusa, *Allman*.
 Tubiclava cornucopiæ, *Norman*.
 Coryne nutans, *Allman*.
 — vermicularis, *Hincks*.
 Eudendrium annulatum, *Norman*.
 — vaginatum, *Allman*.
 Perigonimus minutus, *Allman*.
 Tubularia bellis, *Allman*.
 — attenuata, *Allman*.
 Physophora (? borealis, *Sars*).
 Normania crassa, *Bowerbank*.
 Ecionemia compressa, *Bow*.
 Polymastia bulbosa, *Bow*.
 — radiosa, *Bow*.
 Tethea spinularia, *Bow*.
 Dictyocylindrus virgultosus, *Bow*.
 Phakellia robusta, *Bow*.
 Microciona ambigua, *Bow*.
 — simplicissima, *Bow*.
 Hymeraphia coronula, *Bow*.
 Hymedesmia radiata, *Bow*.
 — occulta, *Bow*.
 Hymeniacion reticulatus, *Bow*.
 — perarmatus, *Bow*.
 — membrana, *Bow*.
 — paupertas, *Bow*.
 Halichondria forcipis, *Bow*.
 — simplex, *Bow*.
 — scandens, *Bow*.
 — mutulus, *Bow*.
 — inornata, *Bow*.
 — falcula, *Bow*.
 Isodictya jugosa, *Bow*.
 — laciniosa, *Bow*.
 Raphiderma coacervata, *Bow*.
 Oceanapia Jeffreysii (*Bow*).
 Desmacidon Peachii, *Bow*.
 — constrictus, *Bow*.

IV.

Scandinavian and Arctic Species which have not been observed further south than Shetland, for the most part inhabitants of very deep water.

- Sabinæa septemcarinata (*Sabine*).
 Lophogaster typicus, *M. Sars*.
 Nematopus serratus, *G. O. Sars*.
 Anonyx nanoides, *Lilljeborg*.
 — ampulla (*Phipps*).
 Stegocephalus ampulla (*Phipps*).
 Pontoporeia affinis, *Lindström*.
 Amphithoë albomaculata, *Kröyer*.
 Siphonæcetes typicus, *Kröyer*.
 Metoëcus medusarum, *Kröyer*.

- Pontocypris hispida, *G. O. Sars.*
 Macrocypris minna (*Baird.*)
 Cythere costata, *Brady.*
 — mucronata (*G. O. Sars.*)
 — abyssicola (*G. O. Sars.*)
 — crenulata (*G. O. Sars.*)
 Cytheropteron alatum, *G. O. Sars.*
 Cypridina Norvegica, *Baird.*
 Conchoëcia obtusata, *G. O. Sars.*
 Bicellaria Alderi, *Busk.*
 Membranipora cornigera, *Busk.*
 — rhynchota, *Busk.*
 — vulnerata, *Busk.*
 Alysidota Alderi, *Busk.*
 Lepralia bella, *Busk.*
 — abyssicola, *Norman.*
 — microstoma, *Norman.*
- Lepralia ringens, *Busk.*
 — monodon, *Busk.*
 Celleporella lepralioides, *Norman.*
 Tessarodoma gracile (*M. Sars.*)
 Eschara lævis (*Fleming.*)
 Hornera violacea, *Sars.*
 Defrancia truncata (*Jameson.*)
 Echinus Norvegicus, *Düb. & Kor.*
 Cidaris papillata, *Leske.*
 Archaster Parelii (*Düb. & Kor.*)
 Ophiura Sarsii, *Lütken.*
 Ophiopeltis securigera, *Düb. & Kor.*
 Astrophyton Linckii, *Müll. & Trosch.*
 Antedon Sarsii (*Düb. & Kor.*)
 Ulocyathus arcticus, *M. Sars.*
 Lophohelia prolifera (*Linn.*)
 Primnoa lepadifera (*Linn.*)

V.

Species which have as yet only been found in the Shetland Seas.*

- Pagurus tricarinatus, *Norman.*
 Probolium serratipes, *Norman.*
 Œdiceros æquicornis, *Norman.*
 Syrrhoë hamatipes, *Norman.*
 Atylus macer, *Norman.*
 Megamphopus cornutus, *Norman.*
 Protomedeia pectinata, *Norman.*
 Cyrtophium armatum, *Norman.*
 Corophium tenuicorne, *Norman.*
 Cirolana truncata, *Norman.*
 Cythere dubia, *G. S. Brady.*
 — leioderma, *Norman.*
 Cytheridea Zetlandica, *Brady.*
 Cytherura navicula, *Norman.*
 Sarsiella capsula, *Norman.*
 Cytheropteron rectum, *Brady.*
 Bythocythere tenuissima, *Norman.*
 Polycope dentata, *Brady.*
 Amymone falcata, *Norman.*
 Porcellidium subrotundum, *Norman.*
 Aspidiscus fasciatus, *Norman.*
 Entorocola eruca, *Norman.*
 Ascomyzon echinicola, *Norman.*
 Nogagus Lütkeni, *Norman.*
 Polyclinum succineum, *Alder.*
 Hippothoa expansa, *Norman.*
 ? Lepralia umbonata, *Busk.*
 Celleporella pygmæa, *Norman.*
 Cellepora attenuata, *Alder.*
 Eschara lorea, *Alder.*
 Hemeschara struma, *Norman.*
 ? Pustulipora orchadensis, *Busk.*
 Rhabdopleura Normani, *Allman.*
 Thyone elegans, *Norman.*
 Cucumaria fucicola (*Forbes & Goodsir.*)
 Psolinus brevis (*Forbes & Goodsir.*)
- Actinia intestinalis, *Fleming.*
 — vermicularis, *Forbes.*
 Zoanthus anguicomma, *Norman.*
 Sidisia Barleeii, *Gray.*
 Paracyathus Thulensis, *Gosse.*
 Cuspidella humilis, *Hincks.*
 — grandis, *Hincks.*
 Obelia plicata, *Hincks.*
 Gonothyraea hyalina, *Hincks.*
 Clava diffusa, *Allman.*
 Coryne vermicularis, *Hincks.*
 — nutans, *Allman.*
 Eudendrium annulatum, *Norman.*
 — vaginatum, *Allman.*
 Perigonimus minutus, *Allman.*
 Tubularia bellis, *Allman.*
 — attenuata, *Allman.*
 Thaumantias maculata, *Forbes.*
 — globosa, *Forbes.*
 — melanops, *Forbes.*
 — lineata, *Forbes.*
 Trachynema rosea (*Forbes.*)
 Pandea globulosa (*Forbes.*)
 Tiara turrita (*Forbes.*)
 Lizzia blondina, *Forbes.*
 Margelis nigritella (*Forbes.*)
 Steenstrupia rubra, *Forbes.*
 Ectopleura pulchella (*Forbes.*)
 Geodia Zetlandica (*Johnston.*)
 Ecionemia compressa, *Bow.*
 Quasillina brevis (*Bow.*)
 Polymastia bulbosa, *Bow.*
 Tethea spinularia, *Bow.*
 Halicnemina patera, *Bow.*
 Dictyocylindrus virgultosus, *Bow.*
 Phakellia robusta, *Bow.*

* Of course it will be understood that all that is meant by this expression is that we as yet know nothing whatever of the distribution of the species contained in this list.

Microciona lævis, <i>Bow.</i>	? Halichondria Batei, <i>Bow.</i>
— ambigua, <i>Bow.</i>	— albula, <i>Bow.</i>
— simplicissima, <i>Bow.</i>	— inornata, <i>Bow.</i>
Hymenaphia vermiculata, <i>Bow.</i>	— mutulus, <i>Bow.</i>
— coronula, <i>Bow.</i>	— falcula, <i>Bow.</i>
Hymedesmia radiata, <i>Bow.</i>	Isodictya varians, <i>Bow.</i>
— Zetlandica, <i>Bow.</i>	— jugosa, <i>Bow.</i>
— occulta, <i>Bow.</i>	— Barleei, <i>Bow.</i>
Hymeniacion reticulatus, <i>Bow.</i>	— fimbriata, <i>Bow.</i>
— perarmatus, <i>Bow.</i>	Raphioderma coacervata, <i>Bow.</i>
— membrana, <i>Bow.</i>	Oceanapia Jeffreysii (<i>Bow.</i>).
— paupertas, <i>Bow.</i>	Desmacion Peachii, <i>Bow.</i>
Halichondria forcipis, <i>Bow.</i>	— constrictus, <i>Bow.</i>
— simplex, <i>Bow.</i>	Diplodemia vesicula, <i>Bow.</i>
— scandens, <i>Bow.</i>	Verongia Zetlandica, <i>Bow.</i>

VI.

Mediterranean Species which occur in Shetland, but have not been found at intermediate localities.

Two large and conspicuous animals, *Portunus tuberculatus*, Roux, and *Spatangus meridionalis*, Risso, have been found abundantly in these dredgings at a depth from eighty to one hundred and forty fathoms. They are well known in the south of Europe, but were supposed up to the time of their discovery in Shetland not to occur north of the Mediterranean. It is not unlikely that *Pagurus tricarinatus*, Norman, will also prove to be a deep-water Mediterranean form. All deep-water dredging seems to establish this fact more clearly, that deep-water species have a much more extended geographical range than shallow-water and littoral forms. These Mediterranean species must have made their way northwards in the abyss of the sea round the western coast of Ireland, in which locality they will doubtless at some future day be found. The classes on which it is my lot to report have been so much neglected, and our knowledge therefore of their distribution is at present so extremely limited, that it is at present impossible to draw any satisfactory conclusions as to their range; but I feel satisfied that when hereafter fuller and more accurate investigation shall have been carried on both in the Mediterranean and our own coasts, not only will the number of species common to the two extremities of Europe be found to be much greater than is now generally supposed, but also that a very large proportion of such species will prove to be forms which will be met with in the depths of the Mediterranean and of the seas to the west and north of our country, but which will be found to be absent from the channels which intersect and the shallower water which immediately surrounds our islands. Meanwhile the occurrence of *Portunus tuberculatus* and *Spatangus meridionalis* is of excessive interest, as such fine and handsome species could not have been well overlooked, or have failed to attract attention in any portion of the sea which has been at all efficiently dredged*.

The contents of the three Tables (IV., V., and VI.) added together give the

* The following northern Mollusca have been identified by Mr. Jeffreys from the Mediterranean, but are not known elsewhere south of the north of Scotland or Shetland Sea:—*Pecten aratus*, *P. vitreus*, *Lima Sarsii*, *Leda pygmæa*, *Scissurella crispata*, *Aclis Walleri*, *Cerithium metula*, &c.; the occurrence also of the following in the Mediterranean is very unexpected:—*Terebratula caput-serpentis*, *Crania anomala*, *Pecten septemradiatus*, *Axinus Croulinensis*, *Chiton Hanleyi*, *Propilidium ancyloides*, *Rissoa abyssicola*, *Scalaria Trevelyana*, *Odostomia Scilla*, *Bulla utriculus*, &c.

number of Shetland species which are as yet unknown off other parts of the British coast as one hundred and forty-eight.

VII.

Southern and other forms which are not as yet known to the North of Shetland.

- Stenorhynchus longirostris* (*Fab.*).
Inachus leptochirus, *Leach.*
Portunus holsatus (*Fab.*).
 — *tuberculatus*, *Roux.*
Porcellana platycheles (*Pennant.*).
Pagurus Hyndmanni, *Thompson.*
 — *ferrugineus*, *Norman.*
Galathea dispersa, *Bate.*
Crangon trispinosus, *Hailstone.*
Nika edulis, *Risso.*
Hippolyte cultellata, *Norman.*
Mysidopsis hispida, *Norman.*
Nannasticus binoculoides, *Bate.*
Diastylis lævis, *Norman.*
 — *lamellata*, *Norman.*
 — *spinosa*, *Norman.*
Cumella agilis, *Norman.*
Iphinoë serrata, *Norman.*
 — *gracilis*, *Bate.*
Cuma scorpioides (*Montagu.*).
Præbolium monoculoides (*Montagu.*).
 — *marinum* (*Bate.*).
 — *pollexianum* (*Bate.*).
Lysianassa Audouiniana, *Bate.*
 — *longicornis*, *Lucas.*
Anonyx longicornis, *Bate.*
 — *melanophthalmus*, *Norman.*
Callisoma crenata, *Bate.*
Cediceros parvimanus, *B. & W.*
Monoculodes Stimpsoni, *Bate.*
Kroyera altamarina, *B. & W.*
Urothoë, species.
Lilljeborgia Shetlandica, *B. & W.*
Helleria coalita, *Norman.*
Dexamine Vedlomensis, *B. & W.*
Atylus gibbosus, *Bate.*
 — *bispinosus*, *Bate.*
Pherusa fucicola, *Leach.*
Calliopius Ossiani (*Bate*)?.
Eusirus Helvetiæ, *Bate.*
Gossea microdeutopa, *Bate.*
Microdeuteropus versiculatus, *Bate.*
 — *Websteri*, *Bate.*
Protomedeia hirsutimana, *Bate.*
Bathyporeia Robertsoni, *Bate.*
Mæra brevicaudata (*Bate.*).
Heiscladus longicaudatus, *B. & W.*
Sunamphithoë hamulus, *Bate.*
- Sunamphithoë conformata*, *Bate.*
Podocerus variegatus, *Leach?*.
 — *falcatus* (*Montagu.*).
 — *pelagicus* (*Leach.*).
Cerapus abditus, *Templeton.*
 — *difformis* (*M.-Edwards.*).
Nænia rimapalmata, *Bate.*
 — *excavata*, *Bate.*
Unciola planipes, *Norman.*
Corophium longicorne (*Fabr.*).
Dulichia porrecta, *Bate.*
Phryxus Galatheæ (*Hesse.*).
Cirolana spinipes, *B. & W.*
Eurydice pulchra, *Leach.*
Arcturus gracilis, *Goodsir.*
Pontocypris acupunctata, *G. S. Brady.*
Bairdia inflata (*Norman.*).
 — *complanata*, *Brady.*
Cythere quadridentata, *Baird.*
 — *emaciata*, *Brady.*
 — *antiquata* (*Baird.*).
 — *acerosa*, *Brady.*
Paradoxostoma Normani, *Brady.*
 — *ensiforme*, *Brady.*
Cylindroleberis Mariæ (*Baird.*).
Copepoda, very many.
Ascidia rudis, *Alder.*
 — *sordida*, *A. & H.*
 — *depressa*, *A. & H.*
 — *plebeia*, *Alder.*
 — *elliptica*, *A. & H.*
Molgula citrina, *A. & H.*
Salicornaria Johnsoni, *Busk.*
Membranipora imbellis, *Hincks.*
 — *Rosselii* (*Audouin.*).
Lepralia Brongniartii (*Aud.*).
 — *Hyndmanni*, *Johnst.*
 — *Woodiana*, *Busk.*
 — *discoidea*, *Busk.*
 — *innominata*, *Couch.*
 — *bispinosa*, *Johnst.*
 — *collaris*, *Norman.*
 — *pertusa* (*Esper.*).
 — *labrosa*, *Busk.*
 — *simplex*, *Johnst.*
 — *tubulosa*, *Norman.*
Buskia nitens, *Alder.*

So little is known of the Scandinavian and Arctic Cœlenterata and Porifera that I have omitted these altogether from this list.

VIII.

Species peculiarly characteristic of the Fauna of the Outer Haaf.

The following list gives the species which impart a peculiar character to the fauna of the deep sea of Shetland, known as the "Outer Haaf," in a depth of 80–170 fathoms. The Molluscan inhabitants of this region are highly interesting, but it is not within my province here to speak of them. Crustacea are few in numbers, *Portunus tuberculatus*, *Munida*, two or three species of *Crangon*, *Pandalus brevirostris*, *Cumacea*, *Ampelisca*, and *Epimeria tricristata* being the most abundant. Echinodermata are abundant, and certain species sometimes in the most extraordinary profusion. Polyzoa and Sponges are very abundant, but of Cœlenterata there are but few species; those species which do occur belong, for the most part, to the Zoantharia. *Caryophyllia Smithii* var. *borealis* is found inhabiting these depths in marvellous abundance; *Zoanthus anguicoma* is common, creeping over Sponges from the greatest depths, and an occasional *Bulocera eques* or *Tuedice*, or a noble *Ulocyathus arcticus* presents itself to our admiring gaze. Very few Tunicata occur below seventy fathoms.

The names which follow are of the most abundant or, at any rate, more conspicuous species; the list might, had I so wished, have been greatly extended.

- | | |
|---|---|
| <i>Hyas coarctatus</i> , <i>Leach</i> . | <i>Cythere Jonesii</i> (<i>Baird</i>). |
| <i>Portunus pusillus</i> , <i>Leach</i> . | — <i>abyssicola</i> (<i>Sars</i>). |
| — <i>tuberculatus</i> , <i>Roux</i> . | — <i>crenulata</i> (<i>Sars</i>). |
| <i>Ebalia tuberosa</i> (<i>Penn.</i>). | — <i>leioderma</i> , <i>Norman</i> . |
| <i>Atelecyclus septemdentatus</i> (<i>Montagu</i>). | <i>Cytheridea papillosa</i> , <i>Bosquet</i> . |
| <i>Pagurus pubescens</i> , <i>Kröyer</i> . | — <i>punctillata</i> , <i>Brady</i> . |
| <i>Munida Bamffia</i> (<i>Penn.</i>). | — <i>subflavescens</i> , <i>Brady</i> . |
| <i>Crangon Allmani</i> , <i>Kinahan</i> . | — <i>Sorbyana</i> , <i>Jones</i> . |
| — <i>nanus</i> <i>Kröyer</i> . | <i>Eucythere declivis</i> (<i>Norman</i>). |
| — <i>spinosus</i> , <i>Leach</i> . | <i>Sarsiella capsula</i> , <i>Norman</i> . |
| — <i>serratus</i> , <i>Norman</i> . | <i>Cytheropteron nodosum</i> , <i>Brady</i> . |
| <i>Sabinæa septemcarinata</i> (<i>Sabine</i>). | — <i>latissimum</i> (<i>Norman</i>). |
| <i>Hippolyte securifrons</i> , <i>Norman</i> . | — <i>alatum</i> , <i>G. O. Sars</i> . |
| — <i>cultellata</i> , <i>Norman</i> . | <i>Bythocythere turgida</i> , <i>G. O. Sars</i> . |
| <i>Pandalus annulicornis</i> , <i>Leach</i> . | <i>Cypridina Norvegica</i> , <i>Baird</i> . |
| — <i>brevirostris</i> , <i>Rathke</i> . | <i>Conchoëcia obtusata</i> , <i>G. O. Sars</i> . |
| <i>Lophogaster typicus</i> , <i>M. Sars</i> . | <i>Polycope dentata</i> , <i>Brady</i> . |
| <i>Cumacea</i> , species. | — <i>orbicularis</i> , <i>G. O. Sars</i> . |
| <i>Anonyx tumidus</i> , <i>Kröyer</i> . | <i>Verruca Strömia</i> (<i>Müller</i>). |
| <i>Ampelisca</i> , species. | <i>Alcippe lampas</i> , <i>Hancock</i> . |
| <i>Kröyera altamarina</i> , <i>B. & W.</i> | <i>Nymphon Strömii</i> , <i>Kröyer</i> . |
| <i>Odius carinatus</i> (<i>Bate</i>). | <i>Scrupocellaria inermis</i> , <i>Norman</i> . |
| <i>Epimeria tricristata</i> , <i>Costa</i> . | <i>Bicellaria Alderi</i> , <i>Busk</i> . |
| <i>Amphithoë albomaculata</i> , <i>Kröyer</i> . | <i>Flustra Barleei</i> , <i>Busk</i> . |
| <i>Siphonœcetes typicus</i> , <i>Kröyer</i> . | <i>Hippothoa catenularia</i> , <i>Jameson</i> . |
| <i>Nænia rimapalmata</i> , <i>Bate</i> . | — <i>expansa</i> , <i>Norman</i> . |
| <i>Pontocypris mytiloides</i> (<i>Norman</i>). | <i>Membranipora sacculata</i> , <i>Norman</i> . |
| <i>Bairdia complanata</i> , <i>Brady</i> . | — <i>Dumerillii</i> (<i>Audouin</i>). |
| <i>Macrocypris minna</i> , <i>Baird</i> . | — <i>cornigera</i> , <i>Busk</i> . |
| <i>Cythere concinna</i> , <i>Jones</i> . | — <i>rhynchota</i> , <i>Busk</i> . |
| — <i>angulata</i> (<i>G. O. Sars</i>). | — <i>Rosselii</i> (<i>Audouin</i>). |
| — <i>dubia</i> , <i>Brady</i> . | — <i>vulnerata</i> , <i>Busk</i> . |
| — <i>costata</i> , <i>Brady</i> . | <i>Lepralia crystallina</i> , <i>Norman</i> . |
| — <i>mucronata</i> (<i>G. O. Sars</i>). | — <i>auriculata</i> , <i>Hass</i> . |
| — <i>antiquata</i> (<i>Baird</i>). | — <i>bella</i> , <i>Busk</i> . |

- Lepralia sinuosa*, *Busk*.
 — *cruenta*, *Norman*.
 — *ansata*, *Johnst*.
 — *Woodiana*, *Busk*.
 — *ventricosa*, *Hass*.
 — *laqueata*, *Norman*.
 — *abyssicola*, *Norman*.
 — *polita*, *Norman*.
 — *microstoma*, *Norman*.
 — *ringens*, *Busk*.
 — *monodon*, *Busk*.
Alysidota Alderi, *Busk*.
Celleporella lepralioides, *Norman*.
 — *pygmæa*, *Norman*.
Cellepora dichotoma, *Hincks*.
 — *ramulosa*, *Linn*.
 — *attenuata*, *Alder*.
 — *cervicornis*, *Ellis & Sol*.
Palmicellaria elegans, *Alder*.
Tessarodoma gracile (*Sars*).
Hemeschara struma, *Norman*.
Eschara lævis (*Fleming*).
 — *lorea*, *Alder*.
 — *Skenei* (*Ellis & Sol*).
Retipora Beaniana, *King*.
Crisia eburnea, var. *producta*, *Smitt*.
Hornera borealis, *Busk*.
 — *violacea*, *Sars*.
Idmonea Atlantica, *Forbes*.
Tubulipora lobularis, *Hassall*.
Alecto major, *Johnst*.
 — *compacta*, *Norman*.
 — *diastoporides*, *Norman*.
Defrancia truncata (*Jameson*).
Synapta digitata (*Mont*), purple variety.
Thyone raphanus, *Düb. & Kor*.
Thyonidium hyalinum (*Forbes*).
Cucumaria Hyndmanni (*Thompson*).
Spatangus purpureus (*Müller*).
 — *meridionalis*, *Risso*.
Echinocardium ovatum (*Leske*).
Brissopsis lyrifera (*Forbes*).
Toxopneustes pictus, *Norman*.
- Echinus Norvegicus*, *Düb. & Kor*.
 — *Flemingii*, *Bell*.
 — *esculentus*, var. *tenuispina*, *Norman*.
Cidaris papillata, *Leske*.
Cribrella sanguinolenta, var. *abyssicola*,
Norman.
Goniaster Phrygianus (*Parelius*).
Porania pulvillus (*Müller*).
Archaster Parelii (*Düb. & Koren*).
Astropecten acicularis, *Norman*.
Ophiura affinis, *Lütken*.
 — *Sarsii*, *Lütken*.
Amphiura Ballii (*Thompson*).
Antedon Sarsii (*Düb. & Kor*).
Bulocera eques, *Gosse*.
 — *Tuediæ* (*Johnst*).
Zoanthus anguicomus, *Norman*.
Caryophyllea Smithii, var. *borealis*,
Fleming.
Ulocyathus arcticus, *Sars*.
Diphasia alata, *Hincks*.
Tubiclava cornucopiæ, *Norman*.
Normania crassa, *Bowerbank*.
Ecionemia compressa, *Bow*.
Quasillina brevis (*Bow*).
Polymastia spinula, *Bow*.
Tethea cranium (*Müller*).
Halicnemis patera, *Bow*.
Dictyocylindrus rugosus, *Bow*.
Phakellia robusta, *Bow*.
 — *ventilabrum* (*Linn*).
Microciona, species.
Hymenaphia, species.
Hymedesmia, species.
Hymeniacion lingua, *Bow*.
 — *ficus* (*Esper*).
Halichondria forcipis, *Bow*.
Isodictya infundibuliformis (*Linn*).
 — *laciniosa*, *Bow*.
 — *fimbriata*, *Bow*.
Raphioderma coacervata, *Bow*.
Oceanapia Jeffreysii, *Bow*.
Verongia Zetlandica, *Bow*.

IX.

Species especially characteristic of the Fauna of the Southern portion of the British Isles, which are wholly absent from the Shetland Seas.

From this list are excluded most of such southern forms as are rare and very local in their distribution.

- Achæus Cranchii*, *Leach*.
Pisa, genus.
Maia squinado (*Herbst*).
Xantho floridus (*Montagu*).
 — *tuberculatus*, *Bell*.
Pilumnus hirtellus (*Linn*).
Perimela denticulata (*Mont*).
Portumnus latipes (*Penn*).
Portunus marmoreus, *Leach*.
- Portunus corrugatus* (*Pennant*).
 — *longipes*, *Risso*.
 — *arcuatus*, *Leach*.
Polybius Henslowii, *Leach*.
Pinnotheres pisum (*Penn*).
 — *veterum*, *Bosc*.
Nautilograpsus minutus (*Linn*) (= *Planes*
Linnæana, *Bell*).
Gonoplax angulata (*Fabr*).

- Corystes cassivelaunus (*Pennant*).
 Thia polita, *Leach*.
 Dromia vulgaris, *M.-Edw.*
 Diogenes varians (*Costa*) (=Pagurus
 Dillwynii, *Bate*).
 Callianassa subterranea (*Mont.*).
 Axius stirynchus, *Leach*.
 Gebia, genus.
 Palinurus vulgaris, *Latr.*
 Crangon sculptus, *Bell*.
 Alpheus, genus.
 Typton spongicola, *Costa*.
 Athanas nitescens, *Leach*.
 Hippolyte viridis, *Otto*.
 Palæmon serratus (*Penn.*).
 — Leachii, *Bell*.
 — varians, *Leach*.
 Pasiphæa sivado, *Risso*.
 Mysis Griffithsiae, *Bell*.
 Squilla, genus.
 Orchestia Mediterranea, *Costa*.
 — Deshayesii, *Aud.*
 Nicea Lubbockiana, *Bate*.
 Isæa Montagui, *M.-Edw.*
 Gammarella brevicaudata, *M.-Edw.*
 Mæra grossimana (*Mont.*).
 — semiserrata (*Bate*).
 — Batei, *Norman*.
 Dryope, genus.
 Caprella acutifrons, *Latr.*
 Paranthura Costana, *Bate*.
 Bopyrus squillarum, *Latr.*
 Gyge branchialis, *Cor. & Panc.* (=G.
 Galatheæ, *B. & W.*).
 Ione thoracica (*Montagu*).
 Rocinela Danmoniensis, *Leach*.
 Conilera cylindracea (*Mont.*).
 Idotea linearis (*Penn.*).
 — acuminata (*Leach*).
 — appendiculata (*Risso*).
 Dinamene, genus.
 Campecopea, genus.
 Næsa bidentata (*Adams*).
 Balanus spongicola, *Brown*.
 — perforatus, *Bruguère*.
 Acasta spongites, *Poli*.
 Pyrgoma anglicum (*Leach*).
 Scrupocellaria scrupea, *Busk*.
 Notamia bursaria (*Linn.*).
 Caberea Boryi (*Aud.*).
 Flustra papyracea, *Ellis*.
 Lepralia violacea, *Johnst.*
 — Gattyæ, *Lands*.
 — variolosa, *Johnst.*
 — figularis, *Johnst.*
 — Cecelii (*Aud.*).
 — divisa, *Norman*.
 — vulgaris (*Moll.*).
 — venusta, *Norman*.
 — armata, *Hincks*.
 Cellepora edax, *Busk*.
 Eschara foliacea, *Ellis & Sol.*
 — sanguinea, *Norman*.
 Amathia lendigera (*Linn.*).
 Mimosella gracilis, *Hincks*.
 Holothuria nigra, *Couch* (?=H. tubu-
 losa, *Linn.*).
 Echinus lividus, *Lamk.*
 Asterina gibbosa (*Penn.*).
 Zoantharia, numerous.
 Sphenotrochus M'Andrewanus, *M.-Edw.*
 Balanophyllea regia, *Gosse*.
 Gorgonia verrucosa, *Linn.*
 Sertularia nigra, *Pallas*.
 Plumularia cristata, *Lamk.*
 — tubulifera, *Hincks*.
 ? — fusca, *Johnst.*
 — pennatula (*Ellis & Sol.*).
 — obliqua (*Saunders*).
 Leuconia nivea (*Johnst.*).
 Grantia tessellata, *Bow*.
 Leucosolenia contorta, *Bow*.
 Tethea Collingsii, *Bow*.
 — Schmidtii, *Bow*.
 Halyphysema Tumanowiczii, *Bow*.
 Ciocalypta penicillus, *Bow*.
 Dictyocylindrus fascicularis, *Bow*.
 Hymeniacion Brettii, *Bow*.
 — albescens, *Bow*.
 — caruncula, *Bow*.
 — sanguinea (*Grant*).
 — aurea (*Mont.*).
 Halichondria corrugata, *Bow*.
 — nigricans, *Bow*.
 Isodictya rosea, *Bow*.
 — fistulosa, *Bow*.
 — mammeata, *Bow*.
 — simulans, *Johnst.*
 Desmacidon ægagrophila (*Johnst.*).
 Chalina Montagui (*Johnst.*).
 — limbata (*Montagu*).
 — seriata (*Johnst.*).

Enumeration of Species.

Class CRUSTACEA.

There is no text-book which embraces all the orders of Crustacea, and which can be followed in this class. Even for the separate orders few guides can be found that are at all up to the standard of the present state of our knowledge of the British forms. For the Podophthalmia I have in

the main followed the arrangement of Bell's 'British Stalk-eyed Crustacea;' but the law of priority in nomenclature is not sufficiently attended to in that work, and it is necessary therefore, in numerous instances, to substitute the earlier names under which the species was described; and moreover so greatly has the study of even these larger and better known Crustacea advanced during the last few years that, of the seventy-eight species of this subclass here recorded, no less than thirty-one are undescribed in the work referred to. In the Amphipoda and Isopoda I have followed the general arrangement of the recently published work upon 'The British Sessile-eyed Crustacea,' by Messrs. Bate and Westwood. In the Ostracoda, two admirable guides exist in Herr G. O. Sars's 'Oversigt af Norges marine Ostracoder, 1865,' and Mr. G. S. Brady's "Monograph of the recent British Ostracoda" (Trans. Linn. Soc. vol. xxvi. 1868). In the Copepoda, I have derived great assistance from Dr. Claus's 'Die frei-lebenden Copepoden,' and from the smaller memoirs by the same author. Descriptions of most of the remaining species in the following catalogue must be sought in the various papers, monographs, and works which will be found referred to in the text.

Order BRACHYURA.

Stenorhynchus rostratus (Linn.) (*S. phalangium*, Penn.). 5-70 fathoms, hard ground, frequent.

— *longirostris* (Fabr.) (*S. tenuirostris*, Leach). A few specimens off Balta &c.

Inachus Dorsettensis (Penn.). Very rare. One specimen in 1864, and a few more in 1867.

— *dorhynchus*, Leach. Bressay Sound, off Balta, &c.

— *leptochirus*, Leach. Not rare in deep water.

Hyas araneus (Linn.). Large in laminarian zone.

— *coarctatus*, Leach. The most abundant of the higher Crustacea in the Shetland seas.

Eurynome aspera (Pennant). Rare.

Xantho rivulosus (Risso). One young specimen dredged (1867) near the Island of Balta. Small examples have been taken in Sweden by Lovén and Göes.

Cancer pagurus, Linn.

Carcinus mænas (Linn.). Remarkably large.

Portunus depurator (Linn.). Very rare, only two specimens.

— *holsatus*, Fabr. Frequent.

— *pusillus*, Leach. Frequent.

— *tuberculatus*, Roux, Crust. de la Méditerranée, pl. xxxii. figs. 1-5, = *Portunus pustulatus*, Norman, Brit. Assoc. Rept. 1861 (1862), p. 151.

This fine addition to our fauna was first procured by me in 1861, and has been taken every year since. It is the most abundant of the genus in the Shetland seas, living in 80-120 fathoms. The fact of this fine Mediterranean species occurring in the deep Shetland seas, in company with many other southern forms, which are not known in intermediate localities between the Mediterranean and the most northern portion of the seas, is highly interesting. *Portunus tuberculatus* is distinguished by its tubercular, pustulose carapace, by the acuteness of the latero-anterior teeth, and the great size of the posterior tooth, which is double the length of the preceding ones, and by the last legs having the swimming-blade furnished with a raised median line.

- Ebalia tuberosa* (Pennant) (*E. Pennantii*, Leach). Abundant.
 — *tumefacta* (Mont.) (*E. Bryerii*, Leach). A single specimen, 1864. Curiously I have not found *E. Cranchii* in Shetland, though it seems widely distributed on the Scotch coast.
Atelecyclus septemdentatus (Montagu), = *A. heterodon*, Leach. Common.

Order ANOMURA.

- Lithodes maia* (Linn.).
Porcellana platycheles (Pennant). Tide-marks, Out Skerries and Lerwick.
 — *longicornis* (Linn.). Common; a pretty variety with white carapace in the neighbourhood of the Out Skerries.
Pagurus Bernhardus (Linn.).
 — *Prideauxii*, Leach. Common, always with *Adamsia*.
 — *cuanensis*, Thompson. Rare, 15 fathoms. Vidlom Voe, 1861; also 5–7 miles off Balta, 40–50 fathoms, 1867.
 — *pubescens*, Kröyer (*P. Thompsoni*, Bell). Common. A variety occurs in which the hands are entirely free from the hairs which ordinarily clothe them.
 — *Hyndmanni*, Thompson. 3–12 fathoms; Bressay and Balta Sounds; hard ground.
 — *lævis*, Thompson. Common on the Haddock (soft) grounds.
 — *ferrugineus*, Norman, Ann. Nat. Hist. Oct. 1861, pl. xiii. figs. 1–3. Two specimens taken in Dourie Voe, 1861.
 — *tricarinatus*, n. sp. Right chelate foot much larger than left; metacarpus nearly smooth above, but having a few slender porrected spines on the distant margin, below (as well as succeeding joints) tuberculate; wrist spinosely tuberculate; hand ovate, broad, with three much raised keels, one median and two lateral, which are denticulate on the crest; surface of hand, in the hollow between the keels, tuberculate; finger broad, flattened, having the outer margin covered with much elevated tubercles. Left hand and wrist narrow, pinched up (as in *P. pubescens*) into a spine-crowned keel; outer margin of hand with a row of spines. First two pair of walking legs having the upper margin spined. All the limbs slightly hispid, the hairs more especially developed on the left cheliped. Length $1\frac{3}{4}$ inch. Three examples dredged in deep water in 1867.

There are two Mediterranean species to which this fine *Pagurus* closely approaches, *Pagurus angulatus*, Risso, and *Pagurus meticulous*, Roux. The figures of the former would well accord with *P. tricarinatus*, were it not that the keels of the hand are smooth instead of strongly tuberculate; and the latter appears to differ from our Shetland form in the more elongated hands. It is, however, not improbable that the *Pagurus* here described may hereafter prove to belong to one of these southern species.

Order MACRURA.

- Galathea strigosa* (Linn.).
 — *squamifera* (Montagu).
 — *nexa*, Embleton. Rare, one specimen only, near Whalsey Skerries, 1861.
 — *intermedia*, Lilljeborg (*G. Andrewsii*, Kinahan). Not common. I am indebted to Prof. Lilljeborg for typical specimens of this species, which

enable me to identify it with the British *G. Andrewsii*, and to correct an error I had fallen into in considering it, from his description, to be synonymous with *G. dispersa*, Bate.

Galathea dispersa, Bate. Abundant.

Munida Bamffia (Pennant) (*M. Rondeletii*, Bell).

Homarus gammarus (Linn.).

Crangon vulgaris, Fabr.

— *Allmanni*, Kinahan. Everywhere in deep water. It is unquestionably distinct from the last, which never occurs in deep water.

— *fasciatus*, Risso. Five specimens, 1868.

— *nanus*, Kröyer (*C. bispinosus*, Hailstone). 5–8 miles east of Balta, 40–50 fathoms, common; also Whalsey Skerries Haddock ground, and occasionally elsewhere.

— *trispinosus* (Hailstone). One specimen near Balta, 1863.

— *spinosus*, Leach. Common.

— *serratus*, Norman, Brit. Assoc. Report, 1861 (1862), p. 151 = *C. echinulatus*, M. Sars, Videnskabs Selsk. Forhandl. i Christiania, 1861, p. 186. This species was discovered by Prof. Sars and myself about the same time. In 1861 two specimens were taken sixty miles east of Shetland; it was not again procured in Shetland until 1867, when it was met with in St. Magnus Bay.

Sabinea septemcarinata (Sabine). The only known British example was dredged, in company with the last, in 80–90 fathoms, in 1861.

Nika edulis, Risso. Very local; abundant in one day's dredging, 25 miles N. by E. from Unst, 90–100 fathoms, 1863; St. Magnus Bay, 1867.

Doryphorus Gordonii, Bate. Deep water, very local.

Hippolyte varians, Leach (*H. smaragdina*, Kröyer).

— *pusiola*, Kröyer (*H. Andrewsii*, Kinahan, *H. Barleii*, Bate).

— *Cranchii*, Leach. Rare, and only the variety with the extremity of rostrum trifid (= *H. mutila*, Kröyer = *H. Yarrellii*, Thompson).

— *pandaliformis*, Bell. Very fine; abundant in the West Voe, Whalsey Skerries, 1861; also Balta, 1863, and Hillswick, 1867; always in laminarian zone.

— *securifrons*, Norman. Not uncommon in deep water.

— *cultellata*, Norman, Brit. Assoc. Report, 1866 (1867), p. 200. Two specimens 40 miles east of Whalsey Skerries in 1861, then recorded as "*H. polaris*." There are certain particulars, however, in which Kröyer's description does not accord with the British form, though an actual comparison of specimens may hereafter prove them to belong to the same species.

Pandalus annulicornis, Leach.

— *brevirostris*, Rathke (*Hippolyte Thompsoni*, Bell, *Pandalus Jeffreysii*, Bate). Very common.

Palæmon squilla (Linn.). Tidemarks, Lerwick, rare, 1861.

Order STOMAPODA.

Lophogaster typicus, M. Sars, Skand. Naturf. Møte Christiania, 1856, p. 160, Christiania Universitets-program, 1862. *Ctenomysis alata*, Norman, Report British Association, 1861 (1862), p. 151. One specimen, Outer Haaf, Whalsey Skerries, in 1861; a second, Unst Haaf(?), 1868. This species, described by me in 1861, was the subject of a most elaborate monograph by Professor Sars in the following year.

Thysanopoda norvegica, M. Sars, Om Slægten *Thysanopoda* og dens norske 1868.

Arter (Videnskabs Selsk. Forhandl. for 1863), p. 2. Some young *Thysanopoda* were taken in the surface-net at the Out Skerries in 1861; but only one specimen is sufficiently developed to enable me to feel confident that it has acquired the characters of the adult, and that one being a male, which is not separately described by Sars, I feel some doubt as to the identification, more especially as the young females differ in some respects (which may be the result of age) from Sars's description.

Mysis flexuosa (Müller) = *Mysis chamæleon*, Bell, Brit. Crust. p. 336. Common in rock-pools.

— *inermis*, Rathke, Beitr. zur Fauna Norw. Nov. Act. Cæs.-Leop. xx. p. 20; Lilljeborg, Öfvers. af Vet. Akad. Förhandl. 1852, p. 3; Frey u. Leuckart, Beiträge zur Kenntniss, Wirbellos. Thiere, p. 160; G. O. Sars, Beretning (1863) Zool. Reise i Christiania (1864), p. 16, = *Mysis cornuta*, Naturhistorisk Tidsskrift, Tredie Række, vol. i. (1861) p. 26, pl. i. fig. 3, a-g; Göes, Crust. Decap. Podoph. Sueciæ, p. 14.

Antennal scale oblong, 4-5 times as long as broad, not half as long again as peduncle of upper antennæ, about twice as long as the eye; apex very obliquely truncate, a spine at the external angle; outer margin smooth. Rostrum distinctly produced into a triangular spine of moderate length. Eye-stalks ornamented with dendritic pigment markings. Pereiopods with the propodos 4-articulate; nail well formed. Telson closely resembling that of *M. flexuosa*, the cleft slightly deeper and narrower; 16-18 spines on each side, greatest distance between the last and penultimate spine. Fourth abdominal foot in male less slender and more evenly rounded throughout its length than that of *M. flexuosa*, to which, in its general character, it closely approaches; antepenultimate joint not having any angular projection at its extremity; its seta fully half as long as penultimate joint, which does not exceed the last joint in length.

Distinguished from *M. flexuosa* chiefly by its large and acuter rostrum, and its shorter antennal scale. Rock-pools, Shetland, scarce; also Cullercoats, Northumberland (A. M. N.), and Banff (Mr. Edward).

— *spiritus*, Norman, Ann. Nat. Hist. Dec. 1860, pl. viii. fig. 1; Trans. Tyneside Nat. Field Club, vol. iv. p. 329, pl. xvii. fig. 1; G. O. Sars, Beretning (1865) Zoologisk Reise ved Kysterne af Christianias og Christiansands Stifter, 1866, p. 19. 5-8 miles off Balta, 40-50 fathoms, 1867.

The following are important characteristics of this species, to distinguish it from the next:—Antennal scale not widening from base to the spine on external margin, that spine (in both sexes) at about three-fifths of the distance from the base to the extremity. Eyes on long stalks, which project beyond sides of carapace. Inner margin of inner uropods with a dense crowded row of unequal-sized spines, so closely packed as to touch each other at their bases. Male having the sexual lobe of superior antennæ much shorter than the peduncle; the fourth foot of pleon with the first three joints subequal in length, and the last joint subequal to the fourth.

— *ornata*, G. O. Sars, Beretning (1863) Zoologisk Reise i Christiania-stift. 1864, p. 18.

Eyes short, scarcely reaching beyond the sides of the carapace, and thick, widening at the cornea, which is somewhat kidney-shaped. Superior antennæ with a stout peduncle, which is shorter than the peduncle of the inferior antennæ; flagella longer than the pereion. Inferior

antennæ having basal joint very short, triangular, the second long, the third two-thirds length of second; flagellum long; antennal scale about one-third longer than the peduncle, widening from the base to the spine of external margin, thence narrower by a very oblique truncation to the apex; the very large spine in the middle of the external margin; external margin below the spine naked, beyond the spine, apex, and inner margin with long plumose setæ, the second joint of scale having one seta on each side and three terminal. Last joint of pereopods 7-articulate. Sixth segment of pleon only slightly longer than fifth. Telson subequal in length to inner lamellæ, and longer than preceding segment; lateral spines 25–30; cleft moderately deep, and wide toward the extremity, the sides being only slightly convex, and the serration longer and larger than usual distally. Inner uropods furnished with long plumose setæ all round, and a row of 16–19 rather long subequal spines, separated from each other on the inner margin. Outer lamellæ narrow, and of nearly equal breadth throughout, nearly half as long again as the inner. The male has the sexual lobe of the superior antennæ unusually long, as long as the whole peduncle. The antennal scale is narrower than in the female, the spine nearer the apex than the base, and the breadth not greater at that point than nearer the base. The fourth foot of pleon is very long, and reaches beyond the telson; the outer branch very like that of *M. spiritus*, but the third joint is much longer than either of the two first, which are subequal; fifth joint not more than half the length of the fourth. Animal more or less tinted with yellowish or red. A specimen sent to me by Mr. Edward of Banff was of a very delicate rose-colour.

Taken 5–8 miles east of Balta, in 40–50 fathoms; and also off Seaham on the Durham coast (A. M. N.), Banff (Mr. Edward).

Mysis vulgaris, J. V. Thompson. In the stream which runs into Deal Voe, near Lerwick.

Mysidopsis didelphys (Norman). *Mysis didelphys*, Tyneside Nat. Field Club, vol. v. p. 270, pl. xii. figs. 9–11; *Mysidopsis didelphys*, G. O. Sars, Beretning (1863) Zoologisk Reise i Christiania-stift. (1864) p. 27. Rare, 5–8 miles east of Balta, 40–50 fathoms.

—? *hispidus*, n. sp. Body hispid all over, the hispidity evident even on the peduncles of the eyes. Eye-stalks of moderate length. Carapace produced into a broadly triangular rostrum of considerable length, reaching beyond the middle of the first joint of the superior antennæ; a notch on each side of the front margin of carapace opposite the centre of the insertion of the eye. Superior antennæ with peduncle twice as long as the eye-stalk; first joint long, slender, very concave above, two following much thicker, the third double the length of the second, hispid like the body. Inferior antennæ with peduncle only reaching the extremity of the penultimate joint of the superior; scale produced, slenderly subulate, nearly twice as long as peduncle of superior antennæ (somewhat less in ♂), two-jointed, second joint one-third total length, both margins fringed with long plumose setæ, the second joint having on each side four lateral at long intervals, and three terminal. Last joints of pereopods 4-articulate, first articulation as long as the two following. Pleopods as in *Mysis*. Telson linguiform, long and narrow, subequal to preceding segment; sides margined with 30–35 spines, which are of equal length at first, but towards the extremity much larger spines alternate at various distances (*e. g.* every

second, third, fifth, or seventh) with smaller spines, the rounded entire apex terminating in four spines, the outer pair much longer than the middle pair; on examining the telson from below, it is seen to form, for about half its length, an open tube, the opening consisting of a central slit, the margins of which are edged with small spines. Interior lamellæ swollen at the base for the reception of the acoustic organ, but afterwards very narrow, slightly longer than telson. Outer lamellæ remarkably long and very narrow, fully half as long again as inner pair; both margins of both pairs fringed throughout with long plumose setæ; inner margin of inner lamellæ also closely beset with spines, which are of unequal size.

In the male, the superior antennæ have the last joint of the peduncle furnished with the usual lobe and dense tuft of hair. All the pleopods have a stout, large basal joint, which gives support to two branches, the inner of which in the last four pair is multiarticulate and setose, and gives off, close to the base, a small lateral lobe terminating in short setæ, but in the first pair the inner branch is rudimentary. The outer branch in the first three and the last pair is also multiarticulate and setose, but in the fourth pair is a more complicated organ, and consists of six joints at the base, all furnished on each side with a long plumose seta, and two branches of equal length, one slender, one-jointed, of equal thickness throughout, ciliate, the other having a much stouter basal joint and two multiarticulate ciliated filaments.

A single male in 40–50 fathoms, 5–7 miles off Balta, in 1857; and both sexes previously sent to me by Mr. Edward from Banff.

The descriptions of *Mysis gracilis* and *M. linguura*, G. O. Sars, come very near to the female of this species, but the present is at once distinguished by having the antennal scale two- and not three-jointed.

Genus GASTROSACCUS, Norman.

A genus of *Mysidea*. Female: marsupial pouch attached to last segment of pereion and first of pleon. First pleopod composed of a much elongated basal joint, and two short one-jointed branches; second to fifth pairs consisting of a single joint. Male having all the pleopods consisting of a basal joint, and two branches differently developed on the different segments, and the third pleopod the greatly developed sexual organ.

Gastrosaccus sanctus (Van Ben.) = *Mysis sancta*, Van Beneden, Recherch. sur la Faune Litt. de Belgique, Crustacés (1861), p. 17, pl. vii. figs. 1–4 (the male), = *Mysis spinifera*, Göes, Crust. Decap. Podophth. marina Sueciæ (1863), p. 14 (the female), = *Gastrosaccus sanctus*, Norman, Rep. Brit. Assoc. 1867 (1868), p. 438.

Female.—Sides of carapace extending much beyond the dorsal portion, which has its margin elegantly scalloped; fifth segment of pleon producing backwards on the back into a well-developed spine. Rostrum slightly produced, rounded at the extremity. Eyes cylindrical, on short peduncles. Superior antennæ with greatly developed peduncles; first joint as long as two following, cylindrical, smooth; second joint half length of last, with three large spines in a longitudinal row on the outer margin; filaments long and slender, the outer with its first joint long (equal about eleven of inner), and furnished on its inner face with a cutaceous process, apically setose, which reminds us of the lobe of the males of *Mysis*. Inferior antennæ having peduncle reaching the last joint of peduncle of superior antennæ; scale short, subequal in length

to the penultimate joint of the peduncle, subquadrate; external margin smooth, terminating in a spine; apex obliquely truncate, not extending beyond level of the tip of the spine of outer angle; inner margin and apex with plumose setæ. Mandible palp three-jointed, last two joints long, subequal, last slender, both setose. Flattened scalar basal joint of pereopods having a naked external margin, terminating in a spine-like point. Last portion of pereopod multiarticulate; in last pair articulations thirteen in number, each with a spine on both margins, and spine-like setæ on inner margin. Marsupial pouch attached to last pereopods and first pleopods; the latter composed of a long basal joint (closely resembling a thigh-bone in form), naked during its length, but having at the base a little lobe, bearing four long plumose setæ, and having its expanded apex surrounded with a circlet of similar long setæ, within which the two little branches in which the member terminates nestle; these branches one-jointed, terminated by setæ; one branch half the length of the other. The remaining pleopods, in the form of a narrow scale, furnished with plumose setæ. Telson cleft at the apex to about one-fifth of its length; sides furnished with 7-9 spines of great size, more especially the distal ones, which are equal in length to the cleft; cleft margined with rather long, sharp, slender serrations. Inner laminae subequal in length to (spines of) telson, narrow, fringed with long setæ, and inner margin also with about ten slender spines; acoustic organ unusually small. External laminae shorter than inner, rounded on apex; outer margin having about twelve greatly developed curved spines instead of the usual plumose setæ.

Male.—The male, instead of having a separate lobe to superior antennæ, as in *Mysis*, has the first joint of external filament expanded in a similar manner to the female, but is more strongly developed. All the pleopods composed of a large basal joint (in the first furnished with large plumose setæ, in the others naked) and two branches; first, fourth, and fifth pairs with outer branch half as long again as peduncle, multiarticulate and setose: inner branch short, with widely diverging plumose setæ; second pair with both branches multiarticulate and plumose, the external branch rather more developed than the inner, the latter with a small lateral lobe at the base; third pair having outer branch of considerable length, consisting of four long, rounded, slender, smooth joints, the last having two minute marginal spines, and terminating in two slender spines; inner branch shorter than first joint of outer, multiarticulate and plumosely setose; basal joint giving off a small lateral lobe. Length three-quarters of an inch.

Dredged 5-8 miles east of Balta, in 40-50 fathoms; also Banff (Mr. Edward), Firth of Clyde (Mr. D. Robertson), and off the mouth of the Tees and Norfolk coast (Mr. G. S. Brady).

Genus NEMATOPUS, G. O. Sars.

Allied to *Mysis*. Superior antennæ having first joint of peduncle with a setiferous process on the outer margin; the last joint in male with a hirsute lobed appendage. Pereopods very long and slender, 8-jointed, nearly filiform, with very few hairs, terminating in a well-formed nail. No external branchiæ. Marsupial pouch as in *Mysis*. Pleopods in female rudimentary as in *Mysis*, but in male well developed, two-branched; branches multiarticulate; the external branch with a setiferous process on its inner margin; in the first pair the terminal part rudimentary, and without setæ. Telson

very short, scarcely longer than broad, apically broadly truncate, and terminating in four strong spines and two plumose setæ. Acoustic organ large. *Nematopus serratus*, G. O. Sars, Om en i Sommeren 1862, Zoolog. Reise i Christ, og Trondhjems Stifter (1863), p. 43.

Carapace rounded in front, not produced into a rostrum, but a spine springs from between the eyes, and bears the appearance of a rostrum. Eyes reniform, clavate, wider than long. Superior antennæ with middle joint of peduncle very short, first and third subequal. Antennal scale lanceolate, about half as long again as peduncle of inferior antennæ, transversely truncate at the apex; external margin having 8–9 spine-like processes down the side (each similar in character to the single apical spine of the scale in *Mysis flexuosa* and its allies). Pereiopods remarkably long and slender, last joint terminating in a bunch of hairs. Telson not half the length of the inner laminae, no lateral spine, distally broadly truncate, and furnished with four long spines, the inner pair the more greatly developed; in the middle between these are two plumose setæ. External laminae considerably longer than inner, narrow, and of nearly equal width throughout; both margins of both pairs of laminae fringed with plumose setæ, which on external margin of outer laminae are slender and short. Colour white, with a reddish spot on each side of each segment of pleon, and a band across the fourth; sometimes also a longitudinal line on each side of the carapace. The very large reniform eyes are of a lovely and brilliant ruby-red. Length half an inch. Dredged on muddy bottom in 40–60 fathoms, St. Magnus Bay, 1867.

Order CUMACEA.

Nannasticus binoculoides, Bate, Ann. Nat. Hist. 3rd ser. vol. xv. (1865) p. 87, pl. i. fig. 4. The type specimen dredged in 1863; again in surface net, Lerwick Bay, 1867, by Mr. D. Robertson.

Diastylis echinata, Bate, Ann. Nat. Hist. 3rd ser. vol. xv. (1865) p. 87, pl. i. fig. 1. The type specimen dredged in 1863.

— *bispinosa* (Stimpson) = *Cuma bispinosa*, Stimpson, Marine Invertebrata Grand Manan, p. 39; Danielssen, Reiseberetning i Thr. Vid. Selsk. Skrift. Bd. iv. p. 108, = *Cuma cornuta*, A. Boeck, Videnskabs Selsk. Forhandl. 1863, p. 190, = *Diastylis bicornis*, Bate, Ann. Nat. Hist. 3rd ser. vol. xv. (1865) p. 84, pl. i. fig. 2, = *Diastylis bispinosa*, G. O. Sars, Om den aberrante Krebsdyrgruppe Cumacea og dens nordiske Arter (1864), p. 39. The first British specimen dredged in Shetland in 1863, and described by Mr. Bate under the name *Diastylis bicornis*.

— *lævis*, n. sp., =? *Alauna rostrata*, Goodsir, Edinb. New. Phil. Journ. vol. xxxiv. (1843) p. 130, pl. iv. figs. 1–10.

Pereion, viewed laterally, elongated ovate, seen from above, widest in the middle, ovate; carapace rather longer than the free segments, dorsal margin well arched, surface only slightly hispid, wholly devoid of spines; lateral margins spined; rostrum acute, slightly bending upwards. Last segment of pereion with the sides produced backwards into short blunt processes. Upper antennæ having last joint of peduncle as long as the first and longer than the second; filament as long as last joint of peduncle. First feet with the first joint very long, equal, or nearly equal, to the remaining portion of the limb; both margins furnished with plumose setæ, spinose on the side; last three joints subequal. Second feet having the fourth joint as long as the first, and longer than

the last two combined. Telson subequal to the long peduncle of lateral appendages, lageniform, gradually tapering from near the base to the extremity, about twelve spines on each side; terminal spines not larger than preceding. Lateral appendages with long and slender peduncle, with about 25–30 spines on the inner margin; inner ramus not half so long as peduncle; first joint equalling in length the two others; inner margin furnished with spines of similar character to those of peduncle, eight on first joint, three on second, four on last; the spines are peculiar, having a minute cilium springing from them at half their length: outer ramus longer than inner, ending in 3–4 long spine-like setæ; margins almost naked, only having very few scattered setæ.

Male wholly devoid of spiny armature on cephalothorax and pleon. First joints of first and second legs spinose. Telson with fewer (about eight) and much more slender lateral spines, and the terminal spines considerably larger than the others. Lateral appendages nearly as in ♀, but the branches longer, the inner more than half length of the peduncle. Length half an inch.

This seems to be the commonest species in our seas. It is nearly allied to *D. Rathkii*, but the cephalothorax is shorter and more tumid, and free from spines.

Shetland and Durham coast (A. M. N), Moray Firth (Mr. T. Edward). *Diastylis lamellata*, Norman, Brit. Assoc. Report, 1866 (1867), p. 200. Two specimens, St. Magnus Bay.

— *spinosa*, n. sp. *Male*.—Pereion, viewed laterally and dorsally elongated ovate; carapace toothed in the latero-anterior margin, and having a crested line passing from behind, very near to and subparallel with the inferior margin, which curving round in front meets the crest which comes from the opposite side at a short distance behind the rostrum; this crest, throughout the greater part of its length, is composed of little flat plates, which lie close against each other; in front, however, the line is broken up into distinct and separate spines. Rostrum with rows of small spines on each side; a slight central carina on the carapace. Segments of pereion smooth, not spined; last segment produced backwards laterally into much produced and acute processes. Pleon having each of the first five segments furnished with three more or less developed longitudinal rows of spines on the back, and two at the edges of the underside; the hindermost spine of each row the most developed. Sixth segment unspined. Superior antennæ much developed; peduncle long, last joint furnished with a dense brush of auditory cilia; filaments long. First joint of last gnathopods and of all the pereiopods with strong spines. First pereiopods with the antepenultimate joint extending beyond the rostrum; penultimate joint equal in length to third and fourth combined, last joint subequal to fourth. Second pereiopods having first joint strongly spined, second very short, fourth long and unusually slender. First pleopods with basal joint and two very unequal branches; second with two branches of nearly equal length, but one with more numerous and much longer plumose setæ than the other; infero-posteal margin of second segment of pleon with a row of (six) long plumose setæ; plumose setæ under the third and fourth segments. Telson suddenly bent downwards at a short distance from the base, gradually attenuated, much produced, but not as long as the long peduncle of uropods; twelve pairs of long, slender, lateral spines; terminal spines rather stouter. Inner margin of peduncle of uropods with numerous spines, with closely

ciliated margins; inner ramus subequal in length to outer, with inner margin of first joint spined, and clothed with dense short fur, of two following joints spined, the last with seven spines, which are more developed distally; outer ramus suddenly contracted in width on the inner margin at a short distance from the base; inner margin smooth (except quite at distal extremity, where there are two or three spine-like setæ); outer margin with spine-like (annulated?) setæ, and a row of similar setæ passing down the back, and ultimately passing obliquely to the distal extremity of the inner margin. Length half an inch.

Only the male is known to me. One specimen, Shetland, 1863, and a second received from Mr. Edward of Banff.

Eudorella truncatula (Bate) = *Eudora truncatula*, Bate, Ann. Nat. Hist. N. S. vol. xvii. (1856) p. 457, pl. xiv. fig. 3; G. O. Sars, Om den aberrante Krebsdyrgruppe Cumacea (1864), p. 61, = *Eudorella truncatula*, Norman, Brit. Assoc. Report, 1866 (1867), p. 197, note. Haddock Ground, near the Out Skerries, in 1861.

Lamprops rosea (Norman) = *Vaunthompsonia rosea*, Norman, Trans. Tyneside Nat. Field Club, vol. v. (1863) p. 271, pl. xiii. fig. 1-3 (*the female*), = *Cyrianassa elegans*, id. ib. p. 275, pl. xiv. fig. 1-6 (*the male*), = *Lamprops rosea*, G. O. Sars, Om Cumacea, p. 64. St. Magnus Bay, rare.

Cumella agilis, n. sp. *Male*.—Pereion longer than pleon, five segments uncovered by carapace. Carapace longer than free segments of pereion, much deeper in front than behind; no distinct rostrum; anterior margin deeply concave at the side; infero-anteal corner produced and toothed; teeth 2-3; surface of carapace smooth. Inferior antennæ not so long as pereion; second joint of peduncle with a dense tuft of hair above, third joint also hispid. All pereiopods, except last, furnished with a palp of unusual structure, which has a second joint which is longer than the first, and slender, not setose; then several (? five) very short setiferous joints which, combined, do not equal more than one-third length of second joint. First joint of 1st to 4th pairs of pereiopods monstrously developed, long, and very massive, while the remaining portion of the limb is very slender; first pair short, scarcely reaching extremity of the head; first joint with a long slender spine at the extremity of the hinder margin, fourth joint equalling in length the two following; third and fourth pereiopods with 2nd to 6th joints not equalling length of first; no whip-setæ; sixth joint in form of a long slender nail. No pleopods. Telson rudimentary, widely truncate at extremity. Uropods with peduncle longer than rami, a few scattered spines on inner margin; inner ramus uniaarticulate, longer and much stouter than the outer, with ten spines on inner margin, increasing in size distally; outer ramus two-jointed, terminating in a long slender spine, with a minute spine on each side of it, no other spines or setæ. Length scarcely more than an eighth of an inch.

Taken abundantly (only males) in the surface-net at night in Balta Sound, 1863 (A. M. N.); and by similar means in Lerwick Bay and Kirkwall, 1867 (Mr. D. Robertson).

Iphinoë serrata, Norman, Brit. Assoc. Report, 1866 (1867), p. 201. One specimen in 70-80 fathoms, sand, Outer Haaf, Out Skerries, 1861, and again in St. Magnus Bay, 30-60 fathoms, 1867.

— *gracilis*, Bate = *Venilia gracilis*, Bate, Ann. Nat. Hist. 2nd ser. vol. xvii. (1856) p. 460, pl. xvi. fig. 7, = *Cyrianassa gracilis*, Bate, Ann. Nat. Hist. 2nd ser. vol. xviii. (1856) p. 187. Rare, near Balta Sound, 1863, in towing-net.

The genus *Cyrianassa* is founded on the male of *Iphinoë*. The genus is characterized (chiefly) by having the pereion very long, five segments uncovered by carapace, and its posterior segments scarcely deeper than those of pleon; the last four pereopods in both sexes without a palp; the telson rudimentary; the uropods with both branches biarticulate, the inner strongly spined: and in the male by having the first five segments of pleon furnished with well-developed biramous pleopods. I am by no means certain that the present species is not the male of *Iphinoë trispinosa*. Undoubted males of that species resemble the *I. gracilis* very closely, except that they have 2-3 spines on carapace, and the pleopods have not the long plumose setæ which adorn those of the latter species. It is possible, however, that the development of these setæ may depend upon age, and that the presence or absence of the small dorsal spines may not constitute more than varietal distinction. Future observation must be left to clear up this point.

Cuma scorpioides, Bate, Ann. Nat. Hist. 2nd ser. vol. xvii. (1856) p. 456, pl. xiv. fig. 2, =? *Cancer scorpioides*, Montagu, Linn. Trans. vol. ix.

Taken in Balta Sound in 1863. Known by its strong angular and keeled carapace. Only four segments of pereion are exposed, and the penultimate and the antepenultimate of these are raised into a rounded rib across the back. The uropods have both branches two-jointed, and only half as long as peduncle, subequal to each other, inner with numerous short blunt spines, but the two distal ones of each joint long, outer with plumose setæ on the inner margin; peduncle without spines or setæ, but minutely serrulate on inner margin. The male, as in *Iphinoë*, has five well-developed pairs of pleopods.

Order AMPHIPODA.

Talitrus locusta (Linn.).

Orchestia littorea (Montagu).

Probolium monoculoides (Montagu) = *Montagua monoculoides*, Bate & Westwood. Bressay Sound, and 5-8 miles off Balta, 50 fathoms. Costa's genus *Probolium* (Ricerche sui Crostacei Anfipodi del regno di Napoli, 1853, p. 199) is synonymous with, and has precedence of, Bate's *Montagua*, which was established in 1855.

—— *marinum* (Bate) = *Montagua marina*, Bate & Westwood. 5-8 miles east of Balta, 50 fathoms, and on the Skerries Outer Haaf, in 70-80 fathoms.

—— *Alderii* (Bate) = *Montagua Alderii*, B. & W. A single specimen of what I consider a variety of this species taken in Lerwick Bay. It differs from the ordinary form in having the hand of the second gnathopods longer, being more than twice as long as broad, and in the palm being less oblique, crenately toothed throughout (instead of in part only), and the projecting tooth-like process bounding the palm of smaller size.

—— *serratipes*, n. sp. Antennæ rather short. Second gnathopods with the metacarpus posteally produced into a small tooth-like process; wrist produced below into an elongated lobe, which stretches along the posterior margin of the hand (after the manner of the genus *Monoculodes*) to half its length, and terminates in two or three setæ; hand of large size, elongated, of somewhat unusual form, widest in the middle, from which point the posterior margin gently slopes towards the anterior

margin, both towards the base and towards the finger, at this point the elongated lobe of the wrist terminates and the palm begins; this is gently arched, sloping away to the base of the claws, with the margin denticulately serrated throughout (no spines or larger teeth); finger as long as the palm, slender, curved correspondingly to the palm. First and second pereopods slender, propodos and nail long. Last pereopods having the metacarpus infero-posteally produced (as is usual in the genus) to half the length of the wrist; no portion of the limb serrated. Length one-twelfth of an inch. One specimen, dredged in about 50 fathoms in St. Magnus Bay, 1867. *Probolium polyprion*, Costa, agrees with the present species in having a serrated palm to the second gnathopods, but differs in the form of the hand, and the presence of spines at the distal extremity of the palm, in the wrist not being produced, and in the anterior margin of the last pair of pereopods being serrated.

Probolium pollexianum (Bate) = *Montagua pollexiana*, Bate & Westwood. 5–8 miles east of Balta in 50 fathoms; apparently rare in Shetland, one specimen only having been found.

Lysianassa Costæ, M.-Edwards. Scarce.

— *Audouiniana*, Bate. A specimen taken among Laminariæ, 3–5 fathoms, Out Skerries Harbour, in 1861, and then submitted to Mr. Bate, was considered by him to be a “black-eyed variety” of this species.

— *longicornis*, Lucas. One specimen, 20–25 miles north of Burrafirth Lighthouse in 1863.

Anonyx longicornis, Bate. A few specimens, deep water, St. Magnus Bay. This species is recognized instantly by the peculiar dorsal and lateral angles of the body, and the curious hooded form of the large first joint of the superior antennæ.

— *serratus*, A. Boeck, Forhandl. ved de Skand. Naturs. 8 de Möde, 1860, p. 641; Lilljeborg, Crustac. Lysianassina of Norway and Sweden, 1865, p. 29. *Anonyx Edwardsii*, Bate & Westwood, Brit. Sessile-eyed Crust. vol. i. page 94 (but not *A. Edwardsii* of Kröyer). Dredged in Vidlom Voe, and between tide-marks at Lerwick in 1861.

— *Holbölli*, Kröyer, Naturhist. Tidsskr. 2 Række, Bd. ii. p. 8; Voyage Scand. Crustac. pl. xv. figs. 1, a–s; Lilljeborg, Crust. Lysianassina of Sweden and Norway, p. 31; Bruzelius, Skand. Amphip. Gamma-ridea, p. 43 (but not *A. Holbölli* of Bate and other British authors), = *Anonyx denticulatus*, Bate & Westwood, Brit. Sessile-eyed Crust. vol. i. p. 101.

Common, Bressay Sound, 15 fathoms; Bressay Sound, 7 fathoms; off Balta, 50 fathoms; Balta Sound and St. Magnus Bay.

— *gulosus*, Kröyer, Naturhist. Tidsskr. Anden Række, 1 Bd. p. 611; Voyage en Scandinavie, pl. xiv. fig. 2; Bruzelius, Skand. Amphip. Gamm. p. 44; Lilljeborg, Crust. Amphip. Lysianassina, p. 24, = *Lysianassa gulosa*, Göes, Crust. Amphip. maris Spetsbergiam alluentis, p. 4, = *Anonyx Holbölli*, Bate & Westwood, Brit. Sessile-eyed Crust. vol. i. p. 104 (but not *A. Holbölli* of Kröyer).

2–5 fathoms, Out Skerries Harbour, among Laminariæ, 1861.

— *nanus*, Kröyer, Naturhist. Tidsskr. 2 Række, 2 Bd. p. 30; Lilljeborg, Crust. Amphip. Lysianassina, p. 28.

Dredged in deep water, St. Magnus Bay, 1867. New to Britain. I have received it also from Mr. D. Robertson, who took it in the surface net in the Firth of Clyde; and from Mr. Laughrin from Polperro, where it would seem to be remarkably abundant.

- Anonyx nanoides*, Lilljeborg, Crust. Amphip. Lysianassina, p. 25, pl. iii. figs. 32-34, = ? *Anonyx nanus*?, Bruzelius, Skand. Amph. Gammaridea, p. 42.
- Another addition to our fauna, procured in 1867, in shallow water, in Bressay and Balta Sounds, among Laminariæ.
- *plautus*, Kröyer. Mr. Spence Bate doubtfully referred to this species an *Anonyx* from the laminarian zone in the Out Skerries Harbour, procured in 1861.
- *longipes*, Bate. *A. longipes*, Bate & Westwood, British Sessile-eyed Crust. vol. i. p. 113, *the female*, = *A. ampulla*, Bate & Westwood, *l. c.* p. 116, *the male* (but not *A. ampulla* of Kröyer), = *A. longipes*, Lilljeborg, Crust. Amphip. Lysianassina, p. 23, pl. iii. figs. 23-31. Prof. Lilljeborg is unquestionably right in considering the *A. ampulla* of the 'British Sessile-eyed Crustacea' to be the male of *A. longipes*. I have taken both sexes in Balta Sound and in St. Magnus Bay. The true *A. ampulla* of Kröyer is the next species which is now added for the first time to our fauna.
- *ampulla* (Phipps). *Cancer ampulla*, Phipps, Voyage towards the North Pole, 1773, p. 191, pl. xii. fig. 2, = ♀ *Anonyx lagena*, Kröyer, Grönlands Amphipoder, p. 237, pl. i. fig. 1; M.-Edwards, Hist. Nat. des Crustac. vol. iii. p. 21; Bate, Cat. Amphip. Crust. p. 77, pl. xii. fig. 7; Göes, Crust. Amphip. maris Spetsber. alluentis, p. 2, = ♂ *Anonyx appendiculosa*, Kröyer, Grönlands Amphipoder, p. 240, pl. i. fig. 2; M.-Edwards, Hist. Nat. des Crust. iii. p. 21, = *Anonyx ampulla*. Kröyer, Naturhist. Tidsskr. Anden Række, Bd. i. p. 578; Voyage en Scandinavie, pl. xiii. fig. 2; Bruzelius, Skand. Amphip. Gamm. p. 39; Lilljeborg, Crust. Lysianassina of Norway and Sweden, p. 23 (but not *A. ampulla* of Cat. Amphip. Crust. Brit. Mus. nor of Sessile-eyed Crustacea).
- This *Anonyx*, the specimens agreeing in all respects with Spitzbergen examples, received from Prof. Lovén, except that they are not more than a quarter the size, was procured on the Out Skerries Middle Haaf, in 1861. It occurred in hundreds upon a fish which had been brought up dead on a fisherman's long line. It would appear to be one of the scavengers of the seas; for Göes also writes of it, "Ad Spetsbergiam inter algas, præsertim fundo arenoso et argillaceo profunditate orgyrum trium usque ad sexaginta copia stupenda, eo ut, si perite ac prudenter in captura versaris, hos pelagi voracissimos vespellones molibus milliariis cadavere avium vel phocarum brevi e fundo elicere potes." The contour of this *Anonyx* is peculiarly rounded and smooth, by which character it may, without microscopic examination of the limbs, be distinguished from *longipes*. It is now first added to our fauna.
- *tumidus*, Kröyer, Naturhistorisk Tidsskr. Anden Række, Bd. ii. p. 16; Voyage en Scandinavie, pl. xvi. fig. 2; Bruzelius, Skand. Amphip. Gammarid. p. 41; Spence Bate, Cat. Amphip. Brit. Mus. p. 73; Lilljeborg, Crust. Amphip. Lysianassina, p. 32, pl. iv. fig. 51; Heller, Amphip. des adriatischen Meeres, p. 25, pl. iii. fig. 6-12, = *Lysianassina tumida*, Göes, Crust. Amphip. maris Spetsbergiam alluentis, p. 2.
- A single specimen taken in the branchial sac of an Ascidian in 1863, and many more in 1867, living in a fine undescribed sponge, *Raphioderma coacervata* of this Report, which was dredged 25-30 miles N.N.W. of Burrafirth Lighthouse in 170 fathoms.
- *melanophthalmus*, Norman, Brit. Assoc. Report, 1866 (1867), p. 201. One, 5-8 miles off Balta, in 50 fathoms, 1867.

Acidostoma obesum (Bate), = *Anonyx obesus*, B. & W., Brit. Sessile-eyed Crust. vol. i. p. 98, = *Acidostoma obesum*, Lilljeborg, Crust. Lysianassina, p. 34, pl. v. fig. 53-65. St. Magnus Bay, in deep water.

Callisoma crenata, Bate. Out Skerries, Middle Haaf, 40 fathoms; off Isle of Balta, 40-50 fathoms; St. Magnus Bay.

Stegocephalus ampulla (Phipps), *Cancer ampulla*, Phipps, Voyage toward the North Pole, 1774, p. 191, pl. xii. fig. 3, = *Stegocephalus inflatus*, Kröyer, Naturhist. Tidsskr. Første Række, Bd. i. p. 150; Bruzelius, Skand. Amphip. Gammarid. p. 38, = *Stegocephalus ampulla*, Bate, Cat. Amphip. Brit. Mus. p. 63, pl. x. fig. 2; Göes, Crust. Amphip. maris Spetsberg. alluentis, p. 5.

A female laden with eggs was dredged in 1867 in St. Magnus Bay, in about 50 fathoms. It was not quite a quarter of an inch in length, a pigmy compared with its giant brethren from Spitzbergen, with which, however, it agrees closely in all particulars. This arctic species is a very interesting addition to the British fauna.

Opis leptochela, Bate & West. MS. "Shetland, received from Mr. Jeffreys," Bate in litt. A species not yet described.

Pontoporeia affinis, Lindström, Öfvers. af K. Vet. Akad. Förh. 1855, p. 63; Bruzelius, Skand. Amphip. Gammarid. p. 48; Bate, Cat. Amphip. Brit. Mus. p. 83, pl. xiv. fig. 2. "Shetland, from Mr. Jeffreys," Bate in litt.

Ampelisca æquicornis, Bruzelius, Skand. Amphip. Gammarid. p. 82, pl. iv. fig. 15.

Superior antennæ much longer than peduncle of inferior; third joint half length of first, and scarcely more than one-fourth of second. Inferior antennæ with last two joints of peduncle subequal, both pairs of antennæ fringed with long hairs, and speckled with crimson throughout, a stain of the same colour at the joints of the peduncle; nail of first two pairs of pereopoda longer than the two preceding joints combined. Last pereopods having the posterior lobe of the basos produced downwards to the distal extremity of following joint, rounded inferiorly; meros not posteally produced; propodos and nail broad and flat. Inferoposteal angle of third segment of pleon not produced. Last uropods much longer than preceding pairs, branches nearly as long again as peduncle. Telson cleft almost to the base, reaching one-third the length of the branches of last uropods. Generally a conspicuous hump on the back of the fourth segment of pleon, and a hollow in the back of the sixth. A common species in our seas. Shetland, Skye, Northumberland and Durham coasts, Guernsey.

— *tenuicornis*, Lilljeborg, Öfvers. af Kong. Vet. Akad. Förhand. 1855, p. 123; Bruzelius, Skand. Amphip. Gammarid. p. 84; Bate, Cat. Crust. Amphip. Brit. Mus. p. 96.

Head produced, obliquely truncate in front, the antennæ attached to the oblique truncation and directed downwards. Superior antennæ about equal in length to peduncle of inferior; second joint of peduncle much more slender than first; third joint scarcely differing in size or length from the joints of the filament, rather more than half length of second. Inferior antennæ with last two joints subequal, very long and slender; filament very long and slender; antennæ speckled with red. Nail of first two pairs of pereopoda longer than two preceding joints combined. Last pereopods having the posterior lobe of the basos produced downwards to the distal extremity of the following joint, rounded inferiorly; meros not posteally produced; propodos and nail

not very broad or much flattened. Infero-posteal angle of third segment of pleon not produced. Last uropods much longer than preceding pairs; branches about half as long again as peduncle. Telson cleft nearly to the base, equal in length to the penultimate uropods, and reaching to one-third the length of the rami of the last pair.

A smaller species than the last, distinguished by the oblique truncation of the extremity of the head, and by the slenderness of the antennæ, and their great difference in length. It is usually prettily painted with lilac or rose-colour about the lower parts. Shetland, Skye, Guernsey (A.M.N.), and Aberdeenshire (Mr. Dawson). I have had the opportunity, through the kindness of Professor Lovén, of comparing the individuals here described of this species and of *A. lævigata* with Bohuslän examples, and thus am enabled to speak positively as to their identity.

Ampelisca carinata, Bruzelius, Skand. Amphip. Gammarid. p. 87, pl. 4. fig. 16; Bate, Cat. Amphip. Crust. Brit. Mus. p. 371, = *Ampelisca Gaimardi*, Bate, Cat. Amphip. Crust. Brit. Mus. p. 91; Bate and Westwood, Brit. Sessile-eyed Crust. p. 127 (but not *A. Gaimardi* of Kröyer and Bruzelius).

Head vertically truncate. Superior antennæ a little longer than peduncle of inferior; peduncle reaching middle of penultimate joint of peduncle of inferior; second joint scarcely longer than first; third joint about one-third as long as second; lower side of whole peduncle beset with numerous transverse tufts of short hair; first joint of filament larger than usual, looking more like a joint of the peduncle, furnished below with a bunch of (? auditory) setæ. Inferior antennæ extremely long, equalling whole length of animal; upper margin of peduncle clothed with transverse rows of tufted hair, similar to those on lower side of superior antennæ; last joint nearly half as long again as penultimate; filament very slender. Nails of first two pairs of pereiopoda not longer than two preceding joints combined. Two last segments of pleon (fifth and sixth are coalesced into one) elevated dorsally into very conspicuous humps. In other respects agreeing closely with *A. æquicornis*, of which species I strongly suspect that it is the male. Shetland (A. M. N.); Kirkwall Bay, Orkney (Mr. D. Robertson); Aberdeenshire coast (Mr. Dawson).

The species described by British authors as *A. Gaimardi* is unquestionably the *A. carinata* of Bruzelius; the true *A. Gaimardi*, according to that author's characters, differs from all British forms in the structure of the last uropods and telson. "Pedes abdominis ultimi paris duo paria antecedentia haud superantes. Appendix caudalis brevis, lata, parum fissa."

— *lævigata*, Lilljeborg, Öfvers. af Kong. Vetensk. Akad. Förhandl. 1855, p. 123; Bruzelius, Skand. Amphip. Gammarid. p. 84; Bate, Cat. Amphip. Crust. Brit. Mus. p. 96.

Head much produced, squarely truncated in front. Superior antennæ very short, not reaching end of penultimate joint of peduncle of inferior; second joint of peduncle half as long again as first, third joint closely resembling joints of filament, which are only about six. Inferior antennæ with a very long peduncle, the last joint distinctly shorter than preceding. First and second pereiopods having the nails very long, considerably longer than the two preceding joints combined. Last pereiopods having the posterior lobe of the basos produced downwards to the distal extremity of the following joint, truncate inferiorly, and closely fringed with long plumose setæ; meros produced backwards and downwards

into a rounded lobe of considerable size, fringed with plumose setæ; carpus antero-distally bearing a circlet of strong spines; propodos much flattened and expanded. Third segment of pleon having the posterior margin waved, and produced backwards at the infero-posteal angle into an acute hastate point. Telson cleft almost to the base, having a row of spine-like hairs down middle of each portion, reaching to the middle of the branches of the last uropods, which are much longer than the preceding pairs. Balta Sound and St. Magnus Bay, Shetland (A. M. N); Kirkwall Bay, Orkney (Mr. D. Robertson); Aberdeenshire (Mr. Dawson).

[*Ampelisca macrocephala*, Lilljeborg, Öfversigt af Kong. Vetensk. Akad. Förhandl. 1852, p. 7, and 1855, p. 137; Bruzelius, Skand. Amphip. Gammarid. p. 85; Bate, Cat. Crust. Amphip. Brit. Mus. p. 94, agrees with *A. lævigata* in having the infero-posteal angle of the third segment of the pleon produced backwards into a spine-like point, but differs in that the meros of the last pereopods has no posterior lobe. I have dredged it in the Sound of Skye. The *Ampelisca Belliana* of Bate appears to be referable to this species.]

Phoxus Holbölli, Kröyer. Out Skerries Harbour, 3–5 fathoms; St. Magnus Bay.

— *plumosus*, Kröyer. Balta Sound, St. Magnus Bay; Outer Haaf, 3–90 fathoms.

Ædiceros parvimanus, Bate & Westwood. The type specimens were procured in 1861, in 70–90 fathoms, sixty miles east of Shetland; and I have since found it in other directions on the Haaf, and very abundantly on the soft muddy ground of St. Magnus Bay.

— *æquicornis*, n. sp. Rostrum extending beyond the first joint of upper antennæ. Upper antennæ having the three joints of the peduncle of nearly equal length, each more slender than preceding; filament equal the length of last two joints of peduncle, composed of five long articulations. Lower antennæ slender but short; peduncle exceeding the length of that of superior by nearly the last joint, which is equal in length to the penultimate; filament very slender, 4–5 jointed, equal in length to the last joint of peduncle. First gnathopods with wrists inferiorly produced into a wide rounded lobe reaching forwards to the commencement of the palm; hand obovate, widest in the centre where the palm commences, which is very oblique; finger slender, simple, as long as palm. Second gnathopods very like the first, but the hand slightly larger, and rather more elongated. All the pereopods with very long and nearly straight nails, which about equal the propodos in length; propodos much longer than carpus. Penultimate pereopods with a row of setæ down the middle of the basos. Last pereopods with the basos small, elongated, pear-shaped, equally produced anteally and posteally; both margins with small cilia, the hinder margin also crenated; the last four joints all greatly produced, and each longer than the basos; the whole limb very long. Length about one-fourth of an inch. A single specimen from St. Magnus Bay, in 30–60 fathoms, 1867. *Æ. æquicornis* comes near to *Æ. brevicar* of Göes; but his figures represent the hands narrower in proportion to the wrists than in the present species, and there are other slight points of difference. He does not describe or figure the last pereopods, which are the most characteristic organs in *Æ. æquicornis*.

Genus SYRRHOË, Göes.

Head produced into a rostrum. Eyes like those of *Ædiceros*. Upper an-

tennæ with a secondary appendage. Mandible having a three-jointed palp. Gnathopods not subchelate. Telson squamiform, deeply cleft.

Syrrhoë hamatipes, n. sp. None of the segments of pleon serrated or toothed. Superior antennæ with a smooth round peduncle, reaching the middle of the penultimate joint of the inferior, the first joint nearly as long as two following combined, which are subequal to each other, the last rather the shorter; filament rather longer than peduncle, composed of 7-8 long slender articulations; secondary appendage two-jointed. Inferior antennæ with a long peduncle, last joint rather longer than the first, and two-thirds as long as second; filament shorter than peduncle, 7-jointed, joints very long and slender. Gnathopods not subchelate, almost identical in structure; wrist with subparallel margins, of nearly equal breadth throughout; hand much narrower than and about two-thirds the length of wrist, which it resembles in form; posterior margins of both wrist and hand with numerous plumose setæ; anterior margin with two or three such setæ; finger two-thirds length of hand, only very slightly curved, not capable of being closed with the hand. Pereiopods with meros and carpus of equal length; propodos rather more than half length of carpus and much narrower; nail small, bent at right angles to propodos, and having a little spine at half its length; two spines project forwards from the extremity of the propodos, which are as long as the nail. Last pereiopods short, having the basos greatly produced backwards and downwards into a *membranaceous* lobe, which extends to the distal extremity of the meros; meros and carpus subequal in length, both very wide and flat, the latter slightly tapering distally; both margins fringed with plumose setæ, and the carpus terminating in such setæ of considerable length and extending beyond the nail; propodos styliform, much shorter than and scarcely a quarter as broad as the carpus; nail (similar to those of preceding pereiopods) slender, small, bent at right angles to the propodos, and having a little spine at half its length. Last uropods two-branched; branches subequal, lanceolate. Telson squamiform, not long, cleft to the base. Length one-fourth of an inch. One specimen, dredged in St. Magnus Bay, 1867.

I place this species provisionally in the genus *Syrrhoë*; the head having been crushed, I am unable to speak with precision respecting the eyes and rostrum.

Monoculodes carinatus, Bate = *Ædiceros affinis*, Bruzelius, Skand. Amphip. Gammarid. p. 93, pl. iv. fig. 18. St. Magnus Bay, 1867. Male and female; the antennæ much longer in the former, as is also the case with *Ædiceros parvimanus*.

— *Stimpsoni*, Bate. Sixty miles east of Shetland, in 70-90 fathoms, one specimen, 1861.

Kröyera altamarina, Bate & Westwood. The type, taken sixty miles east of Shetland in 1861; also 5-8 miles east of Balta, in 40-50 fathoms, 1867.

Urothoë marinus, Bate. Balta Sound; 5-8 miles east of Balta, and St. Magnus Bay, 5-60 fathoms.

— *elegans*, Bate. In the same localities as the last; also on the Out Skerries Haaf, in 60-70 fathoms.

— *Bairdii*, Bate. St. Magnus Bay.

Lilljeborgia Shetlandica, Bate & Westw. The types were dredged in 40 fathoms, one mile north of Whalsey Lighthouse, and in 2-5 fathoms in Out Skerries Harbour in 1861.

Iphimedia obesa, Rathke. Widely distributed, 2-50 fathoms.

Odius carinatus (Bate). *Otus carinatus*, Bate & Westw. Brit. Sessile-eyed Crust. p. 224. Very rare; two specimens only, in 70–80 fathoms, sixty miles east of Shetland, 1861. The type was taken by Mr. Barlee in his last expedition to the Shetland Islands. The name *Otus* being preoccupied, Lilljeborg has substituted that of *Odius* for this genus (Lilljeborg, Crust. Amphip. Lysianas. p. 19).

Helleria coalita, Norman, Ann. Nat. Hist. 4th ser. vol. ii. (Dec. 1868) p. 418. Surface-net, Lerwick (Mr. D. Robertson).

Epimeria tricristata, Costa, Ricerche sui Crostacei Anfipodi del regno di Napoli (1853), p. 197, pl. ii. fig. 2, = *Acanthonotus Owenii*, Bate, Brit. Assoc. Rep. 1855, p. 58; Bate and Westwood, Brit. Sessile-eyed Crust. p. 232. Common in deep water. This species is well described and figured by Costa, whose name must be adopted, since the specific name is four years prior to that of Bate; and as regards the genus, *Acanthonotus* being preoccupied among the Fishes, and *Vertumnus* only a MS. title, we must also take that of the Italian naturalist.

Dexamine spinosa (Montagu). Out Skerries Harbour, Lerwick and Balta Sounds, among Laminariæ, always in shallow water.

— *tenuicornis*, Rathke. In similar localities to the last.

— *Vedlomensis*, Bate & Westwood. The type taken in Vidlom Voe in 1861, since dredged in St. Magnus Bay, 60 fathoms; and 5–8 miles off Balta, 40–50 fathoms.

Atylus Swammerdamii (M.-Edwards) = *Amphithoë compressa*, Lilljeborg, Öfvers. af K. Vet. Akad. Förhandl. 1852, p. 8. Bressay Sound and Hillswick, among seaweeds.

— *gibbosus*, Bate. An interesting species on account of the peculiar character of the carpi of the pereopoda. It appears constantly to live parasitic in sponges (*Halichondria panacea* chiefly) between tide-marks and in shallow water. Abundant in Burrafirth Caves, also Balta Sound, Out Skerries Harbour, &c.

— *bispinosus*, Bate. St. Magnus Bay, in 50 fathoms.

— *macer*, n. sp. Pleon having the posterior margin of the first five segments serrated right across the back, with a larger central hastate tooth, which increases in size from the first to the fourth segment, where it attains its greatest development. All the members of the body unusually long and slender; pereopods excessively long and delicate; basos of posterior pairs narrow; meros and carpus both very long, the former the longer, and both longer than the long propodos; nail very slender (half as long as propodos), with a single seta beyond the middle of the inner margin. Uropods very long, the last pair with peduncle and rami subequal, the whole organ as long as four segments of pleon (*i. e.* third to sixth). First gnathopods the longer, second the stouter; in both pairs the hand shorter than wrist, and the palm undefined. Telson deeply sulcated. Length a quarter of an inch. St. Magnus Bay, muddy bottom, 60 fathoms, 1867. The eye in this species is situated unusually low down and opposite the base of the inferior antennæ; the antennæ are broken off in my specimens. The slenderness of the anterior pereopods is very remarkable.

Pherusa bicuspis (Kröyer). *Amphithoë bicuspis*, Kröyer, Grönlands Amphip. p. 273, pl. ii. fig. 10. Balta Sound, 5 fathoms; and Bressay Sound, 3–7 fathoms.

— *fucicola*, Leach. Out Skerries Harbour, 3–5 fathoms, 1861.

Calliopius Ossiani (Bate). One mile north of Whalsey Lighthouse, 40 fa-

thoms; forty miles east of Whalsey Skerries, 70-90 fathoms. The name *Calliope* being preoccupied, Lilljeborg has changed the title of this genus to *Calliopius*.

Calliopius Fingalli (Bate & Westw.). The type specimen found in 1861.

Eusirus Helvetiæ, Bate = *Eusirus bidens*, Heller, Amphip. des adriatischen Meeres, p. 32, pl. iii. fig. 19. Five to eight miles east of Balta, in 40-50 fathoms, sand, 1867. Thighs of last three pereopods strongly serrated behind; first two segments of pleon dorsally produced into a central tooth; hinder margin of third segment of pleon serrated on the side, lower serrations directed upwards, upper serrations directed downwards; all the uropods subequal in length; telson reaching to the middle of the rami of the last pair.

Leucothoë furina (Savigny). St. Magnus Bay and Balta Sound.

— *articulosa* (Montagu). In branchial sac and water-passages of *Ascidia mentula* and *A. venosa*. This species and *Anonyx tumidus* are the two Amphipoda which, with a number of Copepoda, constitute the crustacean parasites of the *Ascidiadæ*.

Gossea microdeutopa, Bate. Found in 1861; the exact habitat forgotten.

Aora gracilis, Bate = *Autonoë punctata*, Bruzelius, Skand. Amphip. Gammarid. p. 24, pl. i. fig. 3. Common in shallow water in all the Voes, among Laminariæ. The female differs widely from the male in the structure of the first gnathopods. In these organs the meros is not abnormal (as in male), the wrist subquadrate, slightly widening distally, posteriorly fringed with setæ, and a tuft of setæ on the side; propodos broadly ovate, with tufts of setæ on both margins; palm undefined, except by the presence of a spine with which the finger when closed impinges; finger strong, half length of hand, serrate on the inner margin, with a small cilium in each serration. I believe, judging from specimens named for me by Mr. Bate, and the figure and description which represent an animal "sparingly scattered with black dots," that the *Microdeuteropus anomalus* of Bate and Westwood, p. 293 (not of Rathke), is the female of this species; but the females of this and of the next species are so very much alike as to be almost undistinguishable.

Microdeuteropus anomalus (Rathke). *Gammarus anomalus*, Nova Acta Leop. 1843, p. 63, pl. iv. fig. 7, = *Autonoë anomala*, Bruzelius, Skand. Amphip. Gammarid. p. 25, pl. i. fig. 4 (but scarcely *Microdeutopus anomalus*, Bate & Westwood, Brit. Sessile-eyed Crust. p. 289), = *Microdeutopus gryllotalpa*, Bate & Westwood, l. c. p. 289 (but not of Costa).

The figure in the 'Brit. Sessile-eyed Crustacea' of *Microdeutopus gryllotalpa* represents the young male of this species; in the adult male the strong tooth-like process of the carpus of the first gnathopods is itself furnished with a secondary (lateral) tooth; and the hand is much narrower at the base than at the apex, the posterior margin being concave; this state is well represented by Bruzelius, pl. i. fig. 4, *d*. The female is extremely like that of the last species, and is sufficiently well represented at p. 293, Brit. Sessile-eyed Crust.; though, for reasons already stated, I incline to think that that figure really is drawn from the female of *Aora*. This species is most certainly not the *Microdeutopus gryllotalpa* of Costa (Ricerche sui Crostacei Amphip. del regno di Napoli, p. 231, pl. iv. fig. 10), which, from the four teeth of the carpus, seems to be closely allied to, if not identical with the *Autonoë grandimana* of Bruzelius. Dredged in 70-90 fathoms, about forty miles east of the Out Skerries, 1861.

Microdeuteropus versiculatus, Bate. The figures given of this species represent the female. The male differs greatly in the structure of the first gnathopods; these have the carpus very large, ovate, and very broad, infero-posteally produced into a simple tooth-like process, which reaches forward to not quite half the length of the hand; hand as wide or wider at the extremity than at the base; posterior margin convex, undulated; finger internally serrated, serrations very few, three to five only. Rare in Shetland; 70–80 fathoms, Outer Haaf.

— *Websteri*, Bate. Bate and Westwood's figure represents the male. Specimens from Bressay Sound have a deep brown broad band across the pereion; and in company with them were other specimens similarly marked, and agreeing in general characters, but with gnathopods of totally different structure. These I take to be the females. They so closely resemble the females of *Aora gracilis* and *Microdeuteropus anomalus* that one description would suffice for all. Also taken among Laminariæ in St. Magnus Bay and on the Haaf. I question whether there are sufficient grounds for separating the genus *Aora* from *Microdeuteropus*. We have seen that the females of two are almost undistinguishable; and if *Aora* be divided from *Microdeuteropus* because the tooth-like projection proceeds from the meros and not the carpus, *M. Websterii* must in justice have a similar distinction conferred upon it, because in that species the tooth-like projection does not spring from either meros or carpus, but from the hand.

Genus MEGAMPHOPUS, n. g.*

Antennæ slender (imperfect), the insertion of the lower so much behind that of the upper that the end of the third joint of the peduncle is only on a level with the end of the head. First segment of pereion produced forwards and downwards on each side into a remarkable horn-shaped process. Both pair of gnathopods greatly developed, of equal size, and subchelate. First three pereopods short, last two much longer. Telson tubular.

Megamphopus cornutus, n. sp. (species typica). Head produced greatly beyond the origin of the inferior antennæ; eye round, black, immediately behind the base of the superior antennæ, and thus greatly in advance of the origin of inferior antennæ. Superior antennæ slender, first joint very much thicker than but only about half the length of second, subequal in length to last; (there is perhaps a *very minute* secondary appendage, one-jointed, not half length of first joint of filament; but as the filaments of the antennæ are imperfect, I cannot speak with certainty on the point, all I am confident of is that if there is a secondary appendage it is excessively minute). Inferior antennæ with the distal extremity of the third joint only reaching the extremity of the head; fourth joint twice as long as third, and last joint rather longer than fourth; filament subequal in length to last joint of peduncle, composed of eight long articulations. First segment of pereion produced forward and downwards into a curious horn-like process, the form of the side of the segment and its process reminding one strongly of the side of a wheelbarrow and its handle. First gnathopods greatly developed; basos long and slender, two following joints short; carpus long, nearly four times as long as broad, anterior margin straight, naked, posterior margin gently convex, with little tufts of setæ, distally produced into a short blunt process which curves backwards; propodos

* Μέγας, great; ἀμφω, both; πούς, a foot.

not quite so long as carpus, ovate; palm continuous with the hand, with a row of about eight strong spines; finger gently curved, shutting closely against the hand, which it nearly equals in length. Second gnathopods in general character very like the first, but the propodos somewhat broader and longer (as long as carpus), with two or three longitudinal rows of hairs in place of the spines of the first pair, and the finger only about half its length. Basos of the anterior pairs of pereopods of somewhat twisted form, the front margin armed with several (5-6) strong spines. All the uropods subequal in length, bearing the same general characters as in the genus *Microdeuteropus*. Telson tubular. Length a third of an inch. A single specimen procured in 1863.

Protomedeia pectinata, n. sp. Superior antennæ with second joint of peduncle subequal in length to but much more slender than first, last joint two-thirds length of second; filament slightly longer than peduncle, consisting of about ten long articulations; secondary appendage two-jointed, scarcely longer than first articulation of filament. Inferior antennæ subpediform, short; filament not longer than last joint of peduncle. First gnathopods having basos fringed anteriorly with a few scattered long setæ; ischium having a postero-distal dense tuft of long setæ; meros, carpus, and propodos all posteriorly thickly clothed with rather long setæ, the last two subequal in length, the propodos oblong, subparallel sided, twice as long as broad, distally truncate; finger strong, much longer than the truncated extremity of propodos, not internally serrate (as in ♀ of *Microdeuteropus versiculatus*, which this species resembles in general structure of first gnathopods), but furnished with a single large spine on the inner edge near the apex. Second gnathopods having basos long (equal in length to four succeeding joints), posteriorly straight, anteriorly convex, and furnished with two rows (one on edge and the other a little within it) of very long slender setæ, arranged in a comb-like manner; ischium and meros narrower than carpus; carpus narrow, only slightly widening distally; propodos subequal in length to carpus, lanceolate, tapering from base to distal extremity, both margins fringed with long setæ, those of the anterior side the longer; finger long, narrow, of equal thickness throughout, more than half as long as propodos, not unguiculate, nor capable of being bent back upon the propodos; the blunt distal extremity terminated by two or three setæ. First pereopods not having the meros anteriorly produced; finger very long and slender, subequal to propodos, and much longer than carpus. Last pereopods with hinder margin of basos not serrated, furnished with a row of distant setæ, which take their origin from some little distance within the margin. Telson and uropods closely resembling in structure those of the species of *Microdeuteropus*.

A single specimen (a female?) dredged in St. Magnus Bay, 1867.

— (?) *Whitei*, Bate. Five to eight miles off the island of Balta, 40-50 fathoms, and in Balta Sound, about 7 fathoms.

This species is certainly no *Protomedeia*; the squamate, double telson separates it from that genus. I believe it to be the female of *Lilljeborgia Shetlandica*; at any rate the male of the present species most closely resembles the drawing and description of that species in all respects except that the basos of the last pereopods is not so distinctly serrated as figured. Unfortunately my type specimens of *Lilljeborgia Shetlandica* have been mislaid; and for the present it will be better to

keep the species apart, notwithstanding a very strong suspicion that they will hereafter prove to be the same.

Protomedeia hirsutimana, Bate. Unst Haaf, 90–100 fathoms, and 5–8 miles east of Balta, 40–50 fathoms. The posterior portion of the body, unknown to Mr. Bate, has some very remarkable characters. The last three pereopods successively increase in length, the apex of the palm is truncate, the finger is short, strong, and bifid, and takes its origin from one-half only of the end of the propodos, while from the other half spring several long, spine-like setæ. First and second uropods subequal in length; the first with the branches furnished with the usually formed spines; the second of most unusual and remarkable character, excessively strong and massive, the branches furnished on their upper edge with two rows of immensely strong, but very short, stout, blunt spines; last uropods shorter than preceding pairs; branches subequal to peduncle, each bearing about three strong spines and terminating in a tuft of setæ. Telson tubular.

The extraordinarily massive and immensely strong spined second uropods have no parallel, as far as I am aware, among the known species of Amphipoda.

Bathyporeia pilosa, Lindström. Forty miles east of Out Skerries, 70–90 fathoms; 5–8 miles east of Balta, 40–50 fathoms; Balta Sound, 5–7 fathoms.

— *Robertsoni*, Bate. “Two specimens have been dredged by our friend Mr. J. Gwyn Jeffreys in the Shetlands” (Bate and Westwood).

Melita obtusata (Montagu) = *Melita proxima*, Bate & Westw. Brit. Sessile-eyed Crust. p. 344 (the more common variety of male), = *Megamæra Alderi*, Bate & Westwood, p. 407 (the female). St. Magnus Bay, off Balta, Outer Haaf, &c.

Melita proxima is the common form of the male, and *Megamæra Alderi* is the female. The variety of the male with a central dorsal tooth on the second and third segments of pleon is far less common, and is the typical *Melita obtusata* (Mont.); one specimen of this variety has occurred to me in Shetland, and other specimens show scarcely visible rudimentary teeth on those segments.

Mæra longimana (Leach) = *Megamæra longimana*, Bate & Westw., the male = *Megamæra othonis*, Bate & Westw., the female. St. Magnus Bay, both sexes.

— *brevicaudata* (Bate) = *Megamæra brevicaudata*, B. & W. A specimen determined by Mr. Bate, dredged in 4 fathoms, Bressay Sound, 1861.

Eurystheus erythrophthalmus (Lilljeborg). 5–8 miles off Balta, 40–50 fathoms.

Amathilla Sabini (Leach). Tide-pools, frequent.

Gammarus marinus, Leach. Between tide-marks.

— *campylops*, Leach. “Our friend the late Mr. Barlee sent us some from the Shetlands” (Bate and Westwood).

— *locusta*, Linn.

— *pulex*, Linn.

Heiscladus longicaudatus, B. & W. The type specimens were taken in 1861, in 2–5 fathoms, Out Skerries Harbour; also St. Magnus Bay, and Balta and Bressay Sounds.

Amphithoë rubricata (Montagu).

— *littorina*, Bate.

— *albomaculata*, Krøyer. The only known British specimen, dredged in 1861, sixty miles east of Shetland, in 70–90 fathoms.

- Sunamphithoë hamulus*, Bate. Out Skerries Harbour, 2–5 fathoms, 1861; Hillswick, among Laminariæ, 1867.
- *conformata*, Bate. “Sent to us by the late Mr. Barlee, who took it off the Shetlands” (B. & W.).
- Podocerus pulchellus* (Leach). Among *Tubularia indivisa*, in the caves of Burrafirth; and among Laminariæ at Hillswick.
- *variiegatus*, Leach. One mile north of Whalsey Lighthouse, in 40 fathoms; and in the Burrafirth caves.
- *capillatus*, Rathke. Among *Tubularia indivisa*, in Halse Hellyer, Burrafirth; among Laminariæ, Hillswick; Out Skerries Harbour, 3–5 fathoms; and one mile north of Whalsey Lighthouse, in 40 fathoms.
- I question whether B. and W.’s figure of the entire animal represents, as they suppose, the immature state of this *Podocerus*; but the figures of the gnathopod and superior antennæ illustrate the strongly marked features of the mature *P. capillatus*.
- *falcatus* (Montagu). Out Skerries Harbour, 3–5 fathoms; Burrafirth caves; Bressay and Balta Sounds.
- *pelagicus* (Leach). With the last, of which I believe it to be the female. I have never met with a male *pelagicus*, nor a female *falcatus*. The two forms occur in company, and the structural differences seem confined to the exact form of the hand of the gnathopods, organs which seem generally to differ among the Amphipoda according to the sex.
- Cerapus abditus*, Templeton. Balta Sound and Hillswick.
- *difformis* (M.-Edwards) ♂, = *Darcothoë punctatus*, M.-Edwards, ♀. Vidlom Voe; off Balta and St. Magnus Bay. *Darcothoë punctatus* is unquestionably the female of *C. difformis*, not of *C. abditus*. The form which B. and W. figure as the female of *C. difformis* is probably a variety of the male.
- Siphonocetes typicus*, Krøyer. The first British specimen, dredged in 1861, sixty miles east of Shetland, in 70–90 fathoms; also 5–8 miles east of Balta, 40–50 fathoms, 1867.
- Nænia rimapalmata*, Bate. St. Magnus Bay, and 5–8 miles east of Balta; 40 miles east of Whalsey Lighthouse, 70–90 fathoms.
- *excavata*, Bate. Off Balta, and in St. Magnus Bay.
- Cyrtophium armatum*, n. sp. Body strongly tuberculated; head with a central tubercle; first segment of pereion with two tubercles, one behind the other, all the remaining segments of pereion and first two of pleon having a transversely placed pair of tubercles, one on each side of the back, the tubercles of the last segment of pereion and of the first two of pleon much larger than the others. First gnathopods with wrist and hand subequal in length, the former wider at the base than at the distal extremity, with many setæ on sides and posterior margin, but none on the anterior margin; the latter subtriangular, widest in the middle (at the commencement of the palm), sloping thence equally to the base and to the origin of the finger, anterior margin gently convex, dorsal margin, sides, and palm bearing many setæ; finger not quite as long as the palm, strong, with a slightly bifid extremity. Second gnathopods with basos antero-distally produced into a strong spine-formed process; ischium, meros, and carpus all very short, and subequal in length, the meros on the posterior side running out into a very large spine-formed lobe; hand very large, obovate, very broad; palm half its length, bearing a few small setæ; finger very large and strong, well arched, inner margin simple. Pereiopods with the basos not at all expanded, nor wider than

the following joints; nails strong, scimitar-shaped, the entire limbs almost naked (having only a very few short setæ upon them). Length one-fifth of an inch. A single female dredged in 100–110 fathoms, twenty-five miles N. by W. from Burrafirth Lighthouse, in 1867. The specimen is imperfect, having lost antennæ, &c. The sixth and seventh segments of the pereion appear to be coalesced. It approaches *Latmatophilus tuberculatus* of Bruzelius, but is much more strongly tuberculated, and the gnathopods of different structure, the first smaller, the second larger, the hand broader, and the basos spined.

Unciola planipes, Norman, Nat. Hist. Trans. of Northumberland and Durham, vol. i. (1865) p. 14, pl. vii. figs. 9–13. Balta Sound, 5–7 fathoms. Many specimens.

Corophium longicorne (Fabricius). “Some specimens, which we take to be the young of this species, we find in the collection sent to us by the Rev. A. M. Norman, taken in from two to five fathoms, in Outer Skerries Harbour, Shetlands” (B. and W.).

— *crassicorne*, Bruzelius, *the male*, = *Corophium Bonellii*, Bate & Westw. Brit. Sessile-eyed Crust. vol. i. p. 497 (? *Corophium Bonellii*, M.-Edwards), *the female*. Very abundant, in 2–5 fathoms, Out Skerries Harbour. The *C. Bonellii* of Bate and Westwood is unquestionably the female of *C. crassicorne*; the female of *C. longicorne* (which B. and W. thought *C. Bonellii* might be) is quite different.

— *tenuicorne*, n. sp. Two females, dredged in St. Magnus Bay, resembling in general characters the same sex of *longicorne* and *crassicorne*, but distinguished as follows. Superior antennæ slender, longer than the inferior; first joint cylindrical (not expanded), peduncle with two or three spines on inner edge; second joint longer than first, slender, third not half as long as second; filament composed of six long joints, the terminal one bearing a number of long tentaculiform setæ. Inferior antennæ with penultimate joint of peduncle cylindrical (not expanded), inner edge with two or three articulated spines about the centre, and a single long, slender, articulated spine at the distal termination; last joint about two-thirds as long as the penultimate, bearing two spines on the middle of the inner side; filament unusually pediform, consisting of a long, stout articulation (more than half as long as the last joint of the peduncle) and a strong terminal nail. Finger of gnathopods bidentate at the apex. Nail of pereopods longer than carpus and propodos combined. First and second uropods terminating in long slender spines, which are more than half as long as their rami; last uropods having the branch longer than its peduncle, not wide, three times as long as broad, tipped with long setæ, but having no setæ on the inner and outer margins. Length about one-fifth of an inch. The specimens procured are females laden with eggs; the male is unknown to me.

Hyperia galba (Montagu), Bate & West. Brit. Sessile-eyed Crust. vol. ii. p. 12, *the female*, = *Lestrigonus Kinahani*, Bate & Westw. *l. c.* p. 8, *the male*, =? *Lestrigonus exulans*, *l. c.* p. 5, *the young male*, =? *Hyperia medusarum*, Bate, Cat. Amphip. Crust. Brit. Mus. p. 295, pl. xlix. fig. 1, *the young female* (but not *Metoëcus medusarum*, Kröyer). In *Aurelia*, open sea, twenty-five miles N. by W. of Unst.

I believe that the above four so-called species are the different sexes and periods of growth of one. The specific points will be found in the structure of the gnathopods (as accurately described by B. and W. under *Lestrigonus exulans*) and of the uropods, which have the rami of all three

pairs wide in the middle but narrowed at the base, and mucronate at the terminations; the inner margins of the rami of the first pair, and the inner margin of the outer ramus, and both margins of the inner ramus of the last two pairs, are elegantly serrated.

Hyperia oblivia, Kröyer, Grönlands Amphipoder, p. 298, pl. iv. fig. 19 (but not *H. oblivia*, Bate & Westw. vol. ii. p. 16). Filaments of both antennæ consisting of only a single joint. First gnathopods with wrist and hand subequal, the former spined posteriorly, not at all produced distally; hand slightly tapering, palm serrate distally, finger two-thirds as long as hand. Second gnathopods with meros sheath-formed, tipped with spine-like setæ and overlapping carpus; carpus greatly produced distally into a lobe which reaches nearly to the extremity of the hand; finger straight, two-thirds as long as hand. Pereiopoda, last three pair much longer and more slender than in *H. galba*; carpus and propodos both very long, the latter the longer, both with small distant spines on the hinder margin, and the whole hinder edge of the propodos microscopically pectinate. Rami of all the uropods lanceolate (not widening in the middle), gradually tapering to the end (not mucronate as in *H. galba*); the general serrated character of the margins of the rami agrees with *H. galba*, except that the external margin of the inner ramus of the second pair is not serrated. The male differs from the female, as in the last two species, in having the antennæ very long and slender.

A female from an *Aurelia*, and males taken living free in the towing-net. It has also been sent to me by Mr. Edward from Banff; and Mr. G. S. Brady has procured both sexes in some numbers off the mouth of the Tees in the towing-net.

Bate and Westwood's "*H. oblivia*," which has not the propodos of the gnathopods at all produced, cannot be Kröyer's species nor that here described*. Göes takes Kröyer's *Lestrignonus exulans* to be the male of *H. oblivia*; and as far as the description and figures go, it may be the male either of that or of *H. galba*; but the short pereiopoda of *L. exulans* and *L. Kinahani* of Bate will not agree with the male of *H. oblivia*.

Metoëcus medusarum, Kröyer, Grönlands Amphip. p. 288, pl. iii. fig. 15 (not *Hyperia medusarum*, Bate, Cat. Amphip. Crust. Brit. Mus. p. 295). Female antennæ very short; filaments of both pair one-jointed. Both gnathopods nearly alike, short, distinctly chelate, and of peculiar structure; meros produced into a large sleeve-shaped process, postero-distally tipped with setæ, which fits round the basal portion of the carpus; carpus postero-distally produced into a large lobe, which extends as far as the extremity of the propodos, with which and with the finger it forms a regular chelate organ; propodos slightly tapering from the base to the extremity; its inner margin, the inner margin of the small finger, and the inner margin of the thumb-used lobe of the carpus all denticulately serrated; hand and wrist wholly free from hairs or spines. Pereiopods of moderate length; carpus and propodos subequal, their inner margins microscopically pectinate. All the uropods having the inner margin of outer ramus, and both margins of inner ramus serrated. The male differs from the female in having very long antennæ.

A female found in a *Medusa* in Shetland in 1867; and a male has been sent to me by Mr. T. Edward from Banff.

The *Hyperia medusarum* of Bate bears no resemblance to Kröyer's

* I would propose for it the name of *H. gracilipes*.

species, to which it is referred, the gnathopods being of entirely different structure.

Phronima sedentaria (Forskaal). "The only specimen of this species which we have seen as a native of the British coast is one in the British Museum, taken by Dr. Fleming on the 3rd of November, 1809, at Burray, in Zetland, amongst rejectamenta of the sea. Other specimens from the Shetland Islands were obtained by the late Dr. Johnston, and exhibited by him before the Berwickshire Naturalists' Club in 1855. —Proceedings, vol. iii. p. 212." (B. and W.)

Dulichia porrecta, Bate. St. Magnus Bay, 40–60 fathoms.

Proto pedata (Abildgaard). Out Skerries Harbour, 2–5 fathoms; Bressay Sound, among Laminariæ; St. Magnus Bay, very abundant, 40–60 fathoms.

— *Goodseri*, Bate. Out Skerries Harbour and St. Magnus Bay; much scarcer than the last.

Caprella linearis (Linn.). Very abundant in Halse Hellyer, Burrafirth, among *Tubularia indivisa* and sponges.

— *lobata* (Müller). With the last, but scarce.

— *hystrix*, Kröyer. Caves at Burrafirth, 1863.

Order ISOPODA.

Tanais Dulongii, B. & W. St. Magnus Bay, rare.

Paratanais rigidus, Bate & Westw. St. Magnus Bay, 1867.

Anceus maxillaris (Montagu). Frequent.

— *Edwardii*, Bate. 15–20 fathoms; Vidlom Voe.

Phryxus abdominalis (Kröyer). On the abdomen of *Hippolyte Cranchii*, var. *pusiola*.

— *longibranchiatus*, Bate & Westw. "Our specimens of this species were forwarded to us from Shetland by Mr. J. Gwyn Jeffreys" (B. and W.).

— *Galatheæ* (Hesse). Under carapace of *Galathea dispersa*.

Æga monophthalma, Johnston. One fine specimen procured in 1861.

Cirolana spinipes, Bate & Westw. Haddock ground, near Whalsey Skerries, and in St. Magnus Bay; not uncommon.

— *truncata*, n. sp. Head much wider than long; greatest width in the centre, at the projection of the eyes, narrower behind and in front, which is slightly tridentate. Superior antennæ suddenly bent in a remarkable way at a right angle at the junction of first and second joints of the peduncle; third joint of peduncle much narrower and shorter than the second; filament consisting of only about four joints, the first twice as long as last joint of peduncle, and longer than the rest of the filament. Inferior antennæ very long and slender. Telson as broad as long; margins crenulated, distally truncate and denticulate; the two external teeth on each side larger than the intermediate ones. Last uropods having both branches truncate at the extremity.

Dredged in 40–60 fathoms, muddy bottom, in St. Magnus Bay, 1867.

Eurydice pulchra, Leach. St. Magnus Bay.

Jæra albifrons, Leach. Tide-marks, under stones, common.

Leptaspidia brevipes, Bate & Westwood. St. Magnus Bay, 40–60 fathoms; 5–8 miles east of Balta, 40–50 fathoms.

Janira maculosa, Leach. Frequent, between tide-marks, and dredged.

Limnoria lignorum (Rathke). In a piece of wood between tide-marks, near Lerwick, 1861.

- Arcturus longicornis* (Sowerby). Common.
 — *gracilis* (Goodsir). 5–8 miles off Balta, 40–50 fathoms.
Idotea tricuspida, Desmarest.
Sphæroma Prideauxianum, Leach. A single specimen.
Cymodocea truncata (Montagu). Rare; Bressay Sound and St. Magnus Bay.
Ligia oceanica (Linn.).
Oniscus asellus, Linn.
Porcellio scaber, Latreille.

These are the only terrestrial Isopoda which I have noticed; doubtless several others occur, and only require to be looked for.

Order PHYLLOPODA.

- Nebalia bipes* (O. Fabr.). Balta Sound, 5–7 fathoms; 5–8 miles east of Balta, 40–50 fathoms; St. Magnus Bay.

Order CLADOCERA.

- Daphnia pulex* (Linn.).
 — *vetula*, Müller.
 — *reticulata* (Jurine).
Bosmina longirostris (Müller). Small lake near Lerwick.
Acantholeberis curvirostris (Müller). Common, mainland and Unst.
Ilyocryptus sordidus (Liévin). Pond back of Lerwick North Loch (Mr. D. Robertson).
Lynceus harpæ, Baird. Lake near Hillswick (A. M. N.); and near Scalloway (Mr. D. Robertson).
 — *elongatus* (G. O. Sars). Common.
 — *quadrangularis*, Müller. Common.
 — *exiguus*, Lilljeborg. Lake near Lerwick (A. M. N.); and near Scalloway (Mr. D. Robertson).
 — *trigonellus*, Müller. Lake near Hillswick.
 — *nanus* (Baird). Pond near Scalloway (Mr. D. Robertson).
 — *sphæricus*, Müller.
Euryceræus lamellatus (Müller).
Evadne Nordmanni, Lovén. Open sea, surface-net, common.
Pleopis polyphemoides, Leuckart. Less common than the last, and procured under similar circumstances.

Order OSTRACODA.

- Cypris ovum* (Jurine).
 — *compressa*, Baird.
Paracypris polita, G. O. Sars. St. Magnus Bay, 1867.
Pontocypris mytiloides (Norman). Abundant, living among Laminariæ, and down to 100 fathoms.
 — *hispidæ*, G. O. Sars, Oversigt af Norges marine Ostracoder, 1865, p. 16. Very like the last, smaller, and paler in colour, of a light fulvous hue; a little more produced behind, upper margin less prominent in front; ventral margin more concave; seen from above much more tumid, width fully equalling one-third of the length. Surface of valves clothed with close-set long hair; right valve having only five serrations at the infero-posterior angle. Sars also describes the animal as differing in having the nail of first feet very long and slender, exceeding in length the four preceding joints, and greatly curved at the extre-

mity; in the terminations of the postabdominal rami being of equal size, and the eye wholly absent. St. Magnus Bay, in 50 fathoms, 1867. Now first added to our fauna.

Pontocypris trigonella, G. O. Sars. Among Laminariæ, Balta and Bressay Sounds; St. Magnus Bay, 5–50 fathoms.

— *acupunctata*, Brady. A fine living series from St. Magnus Bay, about 60 fathoms.

Bairdia inflata (Norman). St. Magnus Bay, and 5–8 miles off Isle of Balta, in about 50 fathoms, 1867.

— *complanata*, Brady. 5–8 miles east of Balta, 40–50 fathoms.

Macrocypris minna (Baird). “Dredged in from 80–90 fathoms, sand, 20 miles east of the Noss in the Shetland Isles, R. M’Andrew, Esq.” (Baird). The one specimen in my own collection was found by Mr. Waller in sand dredged on the Outer Haaf, in 1861.

Cythere lutea, Müller. Common, alive, rock-pools; dead, 60 fathoms.

— *viridis*, Müller. Among Laminariæ, Balta Sound and Hillswick.

— *pellucida*, Baird. Scarce; off Balta, 73 fathoms.

— *tenera*, Brady. St. Magnus Bay, Outer Haaf, &c.

— *convexa*, Baird. “Lerwick, Mr. Robertson” (Brady).

— *albomaculata*, Baird. Alive, littoral and laminarian zones.

— *tuberculata* (G. O. Sars). Very rare, Unst Haaf.

— *concinna*, Jones (*Cythereis clavata*, Sars). St. Magnus Bay, 50–60 fathoms, 1867.

— *angulata* (G. O. Sars). “Lerwick, Mr. D. Robertson” (G. S. Brady).

— *dubia*, Brady. The type specimen was procured in sand from the Unst Haaf, dredged in 1863; also Unst Haaf, 100 fathoms, 1867.

— *costata*, Brady, Trans. Zool. Soc. vol. v. p. 375, pl. lx. fig. 5. Two valves from the Unst Haaf, 1867, agreeing in every respect with the type specimens from the Hunde Islands. Now first added to the British fauna.

— *villosa* (Sars). Lerwick and St. Magnus Bay.

— *quadridentata*, Baird. 50–100 fathoms, off Island of Balta, and Out Skerries and Unst Haafs, also St. Magnus Bay.

— *emaciata*, Brady. 80–100 fathoms, Unst Haaf, rare.

— *mucronata* (Sars). The only British specimen, in 80–90 fathoms, 20 miles N. by W. from Burrafirth Lighthouse, 1863.

— *antiquata* (Baird). Frequent in deep water down to 100 fathoms.

— *Jonesii* (Baird). 50–100 fathoms, Out Skerries and Unst Haafs.

— *acerosa*, Brady. St. Magnus Bay, in about 60 fathoms, and 5–8 miles east of Balta, in 40–50 fathoms.

— *abyssicola* (G. O. Sars). *Cythereis abyssicola*, G. O. Sars, Oversight of Norges marine Ostracoder, p. 43. “Lateral view of female elongated, subquadrate, much higher in front than behind, the greatest height somewhat greater than half the length; anterior extremity obliquely rounded, posterior truncate: dorsal margin very prominent and angulated over the eyes, in the middle slightly concave, then convex, and sloping towards the hinder extremity; ventral margin distinctly sinuated in the middle. Dorsal aspect of irregular form, showing on each side two somewhat prominent angulated protuberances, separated from each other by a deep sinus, both extremities a little projecting and truncate. Valves very hard, distinctly areolated in the middle, and girt with a broad and much-thickened margin, forming two lips, the innermost of which is finely toothed at each extremity, and beset with long hairs,

especially at the hinder extremity. Hinge-tooth of the left valve absent. Eyes very small, round. Colour pale brownish yellow, the limbs pale yellow. Antennæ rather long, third and fourth joints of the upper pair coalesced, the last joint short; lower pair with the third joint narrower than usual, and the terminal nails long. Branchial appendage of the palp of the mandibles very small, only bearing two setæ, one rudimentary and hamate. Legs slender, second joint of last pair subequal in length to the two succeeding, terminal nail very slender. Copulative organs of male small, the terminal part obtusely triangular." Unst Haaf, 20-25 miles N.N.W. of Burrafirth, 100-140 fathoms. Now first added to our fauna.

Cythere crenulata (G. O. Sars). *Cythereis crenulata*, G. O. Sars, Overs. af Norges mar. Ostrac. p. 39.

"Not unlike *C. emarginata*, but the shell much more ventricose, height and breadth subequal; side view very short, the height much exceeding half the length, obliquely rounded in front, behind subtruncate and slightly emarginate, the lower lobe the more prominent: dorsal margin a little concave behind the eyes, then convex; ventral margin nearly straight, or indistinctly waved in front of the middle. Dorsal view very tumid in the middle, the two extremities slightly prominent and subtruncate. Valves indistinctly areolated, but closely and finely punctate, the front margin and lower part of the hinder margin forming two lips, the innermost of which is crenulated with fine teeth, and fringed with rather long hair; surface uneven, a rounded protuberance before the middle, and two elongated protuberances towards the hinder extremity, one of which is near the dorsal, the other near the ventral margin. Eyes very large." Rare, 20-25 miles N.N.W. of Burrafirth, 100-140 fathoms. New to Britain.

— *emarginata* (G. O. Sars). One young specimen (?) in St. Magnus Bay, about 60 fathoms.

— *leioderma*, n. sp. Carapace very tumid, subquadrate, length to height as about two to one; greatest height anterior: dorsal margin nearly straight; ventral also nearly straight, slightly sinuated in the middle: anterior extremity subtruncate and subobliquely rounded, infero-anteal corner well rounded, commencement of anterior dorsal slope a little angled; posterior extremity truncate, not at all oblique, slightly emarginate in the middle. Valves smooth, not sculptured, having only a very few distant punctured papillæ. Dorsal view long-elliptic, very tumid; breadth equal to one-half of length, of nearly equal width throughout, and remarkably regularly rounded at the broad extremities. Length $\frac{1}{25}$ inch.

This species has much more the aspect of a *Cytheridea* than of a *Cythere*, but the hinge-margin is not toothed. In the genus *Cythere* it should perhaps come next to *C. albomaculata*.

From very deep water, Unst Haaf, 1867.

Cytheridea papillosa, Bosquet. Rare, Unst Haaf, 1867.

— *punctillata*, Brady. Unst Haaf, 100 fathoms.

— *subflavescens*, Brady. One specimen, 5-8 miles off Balta, 50 fathoms, 1867, exactly agreeing with the type; another in St. Magnus Bay.

— *Sorbyana*, Jones. 80-100 fathoms, 20-25 miles N.N.W. from Burrafirth Lighthouse, 1867.

— *Zetlandica*, Brady. The type specimens were found by me among a gathering of shells &c. procured by washing weeds in Shetland, by Mr. Barlee.

- Eucythere declivis* (Norman). Common in deep water, and very fine.
- *Argus* (G. O. Sars). I am indebted to Mr. Robertson for specimens of this species, from off the Isle of Papa Stour, Scalloway.
- Ilyobates Bartonensis* (Jones). St. Magnus Bay, in about 50 fathoms, 1867; very local.
- Loxoconcha impressa* (Baird). Tide-marks, and among Laminariæ, living, Balta and Lerwick.
- *tamarindus* (Jones) (*Cythere lævata*, Norman). Common in deep water down to 100 fathoms.
- *guttata* (Norman). Common in deep water, especially in St. Magnus Bay, muddy ground.
- Xestoleberis aurantia* (Baird). Tide-marks, and among Laminariæ, Balta, &c.; also dredged.
- *depressa*, G. O. Sars. Common in deep water, especially abundant in St. Magnus Bay, in about 50–60 fathoms.
- Cytherura nigrescens* (Baird). Tide-marks, and down to 50 fathoms.
- *angulata*, Brady. “Lerwick, Mr. D. Robertson” (G. S. Brady).
- *striata*, G. O. Sars. 3–60 fathoms, frequent.
- *lineata*, Brady. St. Magnus Bay, 60 fathoms.
- *cuneata*, Brady. “Lerwick, Mr. D. Robertson” (G. S. B.).
- *similis*, G. O. Sars. “Shetland, Mr. D. Robertson” (G. S. B.).
- *undata*, G. O. Sars. St. Magnus Bay, 30–60 fathoms.
- *pumila*, Brady (MS.). Among Laminariæ, Bressay Sound, 1867. Not yet described.
- *producta*, Brady. With the last.
- *cornuta*, Brady. “Shetland, Mr. D. Robertson” (G. S. B.).
- *acuticostata*, G. O. Sars. St. Magnus Bay, 50–60 fathoms, common.
- *clathrata*, G. O. Sars. Ten miles east of Balta, in 73 fathoms, rare.
- *cellulosa* (Norman). St. Magnus Bay, deep water; also ten miles east of Balta, 73 fathoms, and Bressay Sound, 5–7 fathoms.
- *concentrica*, C. B. & R. (MS.). Some very small *Cytheruræ* procured among Laminariæ in 5–7 fathoms, Bressay Sound, are a species which will be described from fossil specimens in the forthcoming ‘Monograph of the British Posttertiary Entomostraca,’ by Messrs. Crosskey, Brady, and Robertson, to be published by the Palæontographical Society.
- *flavescens*, Brady (MS.). One specimen, 20–25 miles N.N.W. of Burra-firth Lighthouse, 100–140 fathoms. Not yet described.
- *quadrata*, n. sp. Carapace viewed laterally subquadrangular, of nearly equal height throughout; height more than half length; rounded in front, the dorsal arch the more gradually sloped; behind produced to a well-developed central process; ventral and dorsal margins straight, the former terminating behind in a right angle; surface-sculpture consisting of pittings more or less circular in shape, arranged for the most part in longitudinal rows; a small keel runs parallel with the ventral margin, and terminates in front in a triangular ala well pronounced but small in size. Length $\frac{1}{60}$ inch.
- C. quadrata* comes very near to *C. striata*, but is shorter and higher, the ventral margin quite straight; the ala is more developed, and the carapace more tumid.
- St. Magnus Bay; also Plymouth.
- *navicula*, n. sp. Carapace having dorsal margin perfectly straight in the central portion, then sloping both before and behind very obliquely, with a well-marked very obtuse angle; ventral margin also straight, the straight portion much longer than that of dorsal margin, with two

small nodulous processes, one just opposite the commencement of each dorsal slope, anteally scarcely rising at all to join the dorsal slope which at that extremity meets the ventral line very much below the centre; posteally sloping upwards obliquely, and meeting the dorsal margin at a rounded point a little below the middle of that extremity; surface perfectly smooth and glabrous. Ventral aspect boat-shaped, the resemblance most striking, centrally depressed at the juncture of the valves; bows moderately sharp, of good breadth of beam, sculptured with raised thread-like concentric lines representing the timbers, while the small nodulous processes (mentioned in describing the lateral view) will stand for the thole-pins; the dorsal and end views bear out the allusion, the former representing a boat viewed from below, with a well-marked keel, and the latter being triangular with gently rounded sides. Length about $\frac{1}{40}$ inch. St. Magnus Bay, 30-60 fathoms, 1867.

Genus SARSIELLA*, n. g.

Carapace subrotund, with a rostrate posterior (?) projection, much compressed; surface of valves very rough, with greatly elevated rib-like sculpture; ventral margin quite flat in its central portion.

These are certainly not satisfactory generic characters, being so incomplete, but having only one good specimen I am unwilling needlessly to run the risk of destroying it in the attempt to separate the valves, and therefore am unable to describe the hinge-structure or animal. The carapace is, however, so remarkable that I cannot place it in any described genus. It is the largest of British *Cytheridæ*.

Sarsiella capsula, n. sp. Carapace nearly circular, with a short rostriform process running out from the extremity; dorsal and ventral margins each nearly semicircular; anterior margin completely and widely rounded; posterior with a rostrate process below the middle, the ventral margin rather angled in its upward slope, but the dorsal perfectly rounded. Surface of valves extraordinarily rugose, with concentric greatly elevated carinæ enclosing a deep hollow in the centre of the valves, and on their exterior side having numerous radiating ribs passing off in all directions to the margin; interstices of these ribs and inner slopes of carinæ sculptured with circular pittings. Ventral aspect very irregular, in the centre a quadrangular flat portion sculptured with circular pittings. Anterior portion with tuberculately convex gradually approximating sides; posterior portion consisting of the rostriform process, which is seen projecting beyond the truncate extremity of the quadrangular portion. End view with flat sides dorsally arched, ventrally truncate. The valves are very much compressed, though appearing more tumid than they really are, on account of the great elevation of the sculptured surface. Length about $\frac{1}{15}$ inch. St. Magnus Bay, 30-60 fathoms.

Cytheropteron latissimum (Norman). St. Magnus Bay, and 10 miles east of Balta, 30-73 fathoms.

— *nodosum*, Brady. In the same localities as the last.

— *punctatum*, Brady. 10 miles east of the Island of Balta, in 73 fathoms.

* Named after Herr G. O. Sars. A genus *Sarsia* is already established in honour of the father, Professor Sars. I have given this genus a diminutive termination in reference to the son, one of the ablest and most accurate of the younger naturalists of the day, whose admirable Monograph on the Scandinavian Marine Ostracoda points to a fitness in associating his name with that order.

- Cytheropteron multiforum* (Norman). Common, 30–140 fathoms.
- *alatum*, G. O. Sars, Overs. af Norges mar. Ostrac. p. 81. “Lateral protuberance very large, triangular, slightly inclined downwards, and running out into a strong mucro, which projects at the sides; its hinder margin furnished with (about twelve) flattened teeth, the two innermost much larger than the rest, and in the form of quadrangular serrated laminae. Lateral aspect of female elongated ovate, the greatest height, which is in the middle, much less than half the length, equally rounded in front, behind projecting into a very large process, which is obliquely truncate at the end; dorsal margin regularly arched, ventral slightly sinuated, the lateral protuberance projecting below in the centre of the ventral margin. Dorsal aspect almost cruciform, the greatest width (between the lateral protuberances) exceeding twice the height, and even somewhat surpassing the length, suddenly attenuated in front, and more gradually behind. The shell of the male scarcely differs from that of the female except in the smaller size. Valves white, pellucid, smooth, finely toothed on the front margin.” A single specimen of this interesting addition to our fauna, in sand dredged 5–8 miles east of the Island of Balta, in 40–50 fathoms. The form is most remarkable, on account of the immense projection of the lateral alae and their dentated edge.
- *rectum*, Brady. The type was “dredged by Mr. D. Robertson, in Lerwick Bay, Shetland, in a depth of 12–14 fathoms” (G. S. Brady). I have procured a second specimen in St. Magnus Bay, in about 60 fathoms.
- Bythocythere simplex* (Norman). St. Magnus Bay, and 10 miles east of Balta, 50–73 fathoms.
- *constricta*, G. O. Sars. Widely distributed in deep water to 100 fathoms.
- *turgida*, G. O. Sars. St. Magnus Bay, and 10 miles off the Island of Balta, 50–73 fathoms.
- *tenuissima*, n. sp. Elongated, doubly fusiform, both extremities acuminate, equally gradually attenuated to sharp central points; greatest height central; length to height as 3–4 to 1: dorsal margin gently convex throughout; ventral slightly flexuous, but slightly arched throughout the greater part of its length; both margins gradually approaching each other towards the extremities: valves very thin and fragile, their surface perfectly smooth and glabrous. Dorsal view remarkably compressed and greatly elongated, widest in the centre, and gradually becoming narrower (it is only possible for them to become in the slightest degree narrower) to the extremities. Length $\frac{1}{20}$ inch.
- St. Magnus Bay, 30–60 fathoms. I place this species provisionally in the genus *Bythocythere*, as it seems more nearly related to *B. simplex* in general structure than to any other Ostracod. The lateral aspect of the carapace finds its nearest counterpart in *Bairdia angusta*, G. O. Sars; but whereas that species is tumid this is exceedingly compressed.
- Pseudocythere caudata*, G. O. Sars. 20–25 miles N.N.W. of Burrafirth, in 100–140 fathoms; 10 miles east of Balta, 50–73 fathoms; and St. Magnus Bay, 30–60 fathoms.
- Sclerochilus contortus* (Norman). Very common at all depths, 1–70 fathoms.
- Paradoxostoma variabile* (Baird). In extraordinary profusion on Laminariæ in Balta and Bressay Sounds; also Out Skerries and Hillswick.
- *Normani*, Brady. Among Laminariæ, Bressay Sound, St. Magnus Bay, and 5–8 miles east of Balta, 5–50 fathoms, alive.
- *abbreviatum*, G. O. Sars. St. Magnus Bay, 50 fathoms.

- Paradoxostoma obliquum*, G. O. Sars. "Shetland, Mr. D. Robertson" (G. S. Brady).
- *ensiforme*, Brady. St. Magnus Bay and Bressay Sound, 5–50 fathoms.
- *flexuosum*, Brady. St. Magnus Bay, abundant.
- *arcuatum*, Brady. A few specimens, 50 fathoms, in St. Magnus Bay; also a much smaller form, closely allied to, but perhaps distinct from, this species, common on Laminariæ in Balta Sound; it is of a green colour.
- Philomedes interpuncta* (Baird) = *Philomedes longicornis*, Lilljeborg. Two or three specimens on the Unst Haaf.
- Cypridina Norvegica*, Baird, Proc. Zool. Soc. 1860, p. 200, pl. lxxi. fig. 4; G. O. Sars, Overs. af Norges mar. Ostrac. p. 104. I have pleasure in announcing this, the grandest of European Ostracoda, as a member of the British fauna, a single specimen having been procured on the Unst Haaf in 1867.
- Cylindroleberis Mariæ* (Baird). Unst and Skerries Haafs, and St. Magnus Bay.
- Bradycinetus Brenda* (Baird) = *Cypridina globosa*, Lilljeborg. "Dredged in 80–90 fathoms, sand, 20 miles east of the Noss, in the Shetland Isles, by R. M'Andrew, Esq." (Baird).
- Conchoëcia obtusata*, G. O. Sars. A single imperfect *Conchoëcia*, believed to belong to this species, was procured from sand dredged on the Unst Haaf, 20 miles N. by E. from Burrafirth, in 1863.
- Polycope orbicularis*, G. O. Sars. 5–8 miles E. of Balta, 20–25 miles N. of Burrafirth Lighthouse, and in St. Magnus Bay, 40–100 fathoms.
- *dentata*, Brady. The type specimen was from 100 fathoms, about 20 miles N.W. by W. from Burrafirth.

Order COPEPODA.

- Cyclops serrulatus*, Fischer. This is the only Shetland species I have as yet determined, but I have seen others.
- *nigricauda*, n. sp. Antennæ shorter than first segment of body, 21-jointed; joints very short, all except first and last two shorter than broad. Lower antennæ stout and strong, two-thirds as long as upper antennæ; third joint with a seta at distal extremity of hinder margin; fourth (last) joint terminating in six long setæ. Last feet 1-branched, well developed, with a strong seta on the middle of the outer margin, and two similar terminal setæ, one at each angle of the extremity, with a very delicate and minute seta in the middle between them. Caudal laminae extremely long and slender, more than equal in length to three preceding segments, of a dark brown colour throughout the greater part of their length.
- A marine species found among Laminariæ in Shetland, and also at Tobermory in the Isle of Mull, abundantly. The black colour of the basal portion of the caudal laminae is a very useful characteristic by which to distinguish the species with a low-power lens when mixed in a mass with other Copepoda.
- In the male the antennæ are only 17-jointed, and the caudal laminae shorter, about equal in length to the two preceding segments.
- *pallidus*, n. sp. Upper antennæ shorter than first segment of body, 11- or 12-jointed (the basal joints not very distinct); last two joints longer than broad, last joint but two broader than long, two joints preceding this long, rest shorter. Caudal laminae scarcely twice as long as broad, and shorter than the preceding segment.

Another marine species found among weeds at Hillswick, Shetland, and also at Tobermory in the Isle of Mull. A much smaller species than the last, and, if it were not for the greater number of joints in the antennæ, not unlike *C. magniceps* of Lilljeborg.

Longipedia coronata, Claus, Die frei lebenden Copepoden, p. 111, pl. xiv. figs. 14–24. Abundant at Hillswick.

Amygone falcata, n. sp. Superior antennæ in female 8-jointed; second joint the longest, fourth shorter than any of preceding; in male second and fourth joints subequal, and twice as long as third. First segment inferiorly much produced, and extending backwards in an acute falcate form. Hand long ovate, palm fringed with long cilia; finger nearly as long as palm, very slender. The coalesced sixth segment has the infero-posteal corner produced backwards into a somewhat hamate spine-formed process. Pereiopods long and slender, extending beyond the body.

In most particulars this species comes near to *A. spherica*, Claus; but the first segment is widely different, being of similar form to that of *A. harpacticoides*, Claus, but still more produced.

Among Laminariæ, Bressay Sound, 1867.

Tisbe furcata (Baird) = *Canthocamptus furcatus*, Baird, Nat. Hist. Brit. Entom. p. 210, pl. xxv. figs. 1, 2, and pl. xxx. figs. 4–6, = *Tisbe furcata*, Lilljeborg, De Crust. Clad. Ostrac. et Cop. in Scaniâ occur. p. 192, pl. xxv. figs. 1–5, 11, 12, and 17; Claus, Die frei lebend. Copep. p. 116, pl. xv. figs. 1–10, = *Tisbe ensifer*, Fischer, Beiträge zur Kenntniss der Entom. p. 24, pl. xxii. figs. 67–70. Common; Lerwick, Balta, Hillswick.

Westwoodia nobilis (Baird) = *Arpacticus nobilis*, Baird, l. c. p. 214, pl. xxviii. fig. 2, = *Westwoodia nobilis*, Claus, l. c. p. 118, pl. xxi. figs. 1–9. Among weeds at Lerwick, 1867.

Canthocamptus staphylinus (Jurine). Ponds, common.

Cleta forcipata, Claus, Die Copepoden-Fauna von Nizza (1866), p. 23, pl. ii. figs. 9–11. Between tide-marks, Balta Sound. The male differs from the female in the structure of the first feet, which are greatly longer, and at the same time more slender in all their parts. New to Britain.

Dactylopus Strömii (Baird) = *Canthocamptus Strömii*, Baird, Brit. Entom. p. 208, pl. xxvii. fig. 3, = *Dactylopus Strömii*, Claus, Frei lebend. Copep. p. 126, pl. xvi. figs. 1–6. Lerwick.

— *tisboides*, Claus, Frei lebend. Copep. p. 127, pl. xvi. figs. 24–28; Die Copep.-Fauna von Nizza, p. 27, pl. iii. figs. 1–7. Bressay Sound.

GENUS TIGRIOPUS*, n. g.

First feet having outer branches 2-jointed, both joints very long, last wide at the extremity, with short recurved claws; inner branch much shorter than the outer, 3-jointed; basal joint very long, two following short. Gnathopod (lower footjaw) of moderate size. Mandible palp 1-branched, 3-jointed.

Tigriopus Lilljeborgii, n. sp. = *Harpacticus chelifer*, Lilljeborg, De Crust. ex ord. tribus Clad. Ost. et Copep. p. 200, pl. xxii. figs. 2–11 (but not *Harpacticus chelifer* of other authors). Lilljeborg's figures of this species are good, and by comparing those of the gnathopod and first and last feet with the drawings given by Claus of the same parts of the true *Harpacticus chelifer*, the chief points of distinction will be at once manifest; the structure of the extremity of the outer branch of the first feet

* Τίγρις, a tiger; ποῦς, a foot.

reminds us strongly of the paw and claws of one of the Felidæ, hence the generic name which I have chosen. Frequent in Shetland, and sometimes occurring in immense numbers in rock-pools which are only reached by the sea at high spring-tides; under such circumstances I have taken it at the Out Skerries, Shetland, and near Marsden, on the coast of Durham. I have dedicated this species to that excellent carcinologist Professor Lilljeborg.

Thalestris longimana, Claus, Die frei lebend. Copep. p. 130, pl. xviii. figs. 1-11.

Among Laminariæ, Bressay Sound.

— *Helgolandica*, Claus, Die frei lebend. Copep. p. 131, pl. xvii. figs. 12-21. Bressay Sound.

— *harpacticoides*, Claus, Die frei lebend. Copep. p. 133, pl. xix. figs. 2-11. Hillswick, among weeds, 1867.

— *Clausii*, n. sp. Rostrum short, blunt, not as long as first joint of antennæ. Gnathopod (lower footjaw) having inner margin of hand straight, smooth, outer strongly arched; finger not quite as long as hand, much curved at the extremity. First feet with the branches shorter and stouter than usual, subequal in length; outer much stouter than inner, its inner margin glabrous, except three or four cilia close to the base, outer margin ciliate; a large lanceolate, ciliated spine on the peduncle; a spine at distal extremity of first, and another near the extremity of second joint, which is only about twice and a half as long as broad; last joint with three terminal spines and a seta, the innermost spine more slender than and about half as long again as the next: inner branch much more slender than outer, 2-jointed; first joint long, margins glabrous, inner with a seta rather nearer to the base than to the extremity; second joint terminating in two claw-spines, not very unequal in length. Last feet with the outer branch obovate, margin ciliated, with six setæ on the more distal portion of the outer margin and the extremity; the innermost seta the longest, and the two following close together, and very much smaller than the others: inner branch rather shorter than outer, five setæ on distal portion of inner margin and at the extremity, ciliated between the setæ, and the seta nearest the base plumose; the setæ not differing greatly in length, but the third rather the longest. Caudal laminae with five setæ, which are peculiarly swollen at the base; the innermost but one the longest, the next half its length, the others very short, spine-like. In the male the abdominal segments have rows of spinules on the sides; the external branch of the last feet is narrow, with seven setæ, of which the innermost but one is much the longest, and the next is minute; the caudal setæ are not swollen at the base. First feet as in the female. Found among Laminariæ in Bressay Sound, 1867; and also at Tobermory, in the Isle of Mull, in 1866. I have named this species after the author of the beautiful work, so often referred to here, on the free-living Copepoda.

Harpacticus chelifera (Müller). Bressay Sound.

Porcellidium dentatum, Claus, Beiträge zur Kenntniss der Entomostraken (1860), p. 8, pl. ii. figs. 19-22; Die frei lebenden Copepoden, p. 140, pl. xvii. figs. 2-5. Among weeds, Hillswick and Lerwick, abundant.

— *fimbriatum*, Claus, Die frei lebenden Copepoden, p. 140, pl. xvii. fig. 1. Hillswick and Lerwick.

— *subrotundum*, n. sp. Short, broad, nearly as broad as long; cephalothorax subtruncate in front; antennæ short, not reaching the sides of cephalothorax. Caudal laminae as broad as long, truncated distally; 1868.

appendages of antepenultimate segment triangular, with small setæ on the external margin towards the extremity. On Laminariæ, Hillswick.

Differing from *P. dentatum* chiefly in the form of the plate attached to the antepenultimate segment, which in that species is as wide, or even wider, at the extremity than at the base, and denticulate, while in *P. subrotundum* it is triangular, narrowing from the base to the extremity, and only furnished with small setæ. It may be mentioned that though the size of this plate in proportion to the other appendages varies greatly according to age, the form is still preserved.

Alteutha bopyroides, Claus, Die frei lebenden Copepoden, p. 143, pl. xxii. figs. 10–17. Abundant in the drift-net, and by washing Laminariæ.

— *purpurocineta*, Norman = *Peltidium purpureum*, White, Popular History of British Crustacea, p. 308, pl. xviii. fig. 4 (but not *Peltidium purpureum*, Philippi). This fine species, which it is necessary to re-name, is abundant on Laminariæ at Hillswick.

Zaus spinosus, Goodsir, Ann. Nat. Hist. vol. xvi. (1845) p. 326, pl. xi. figs. 1–8; Claus, Die frei lebend. Copep. p. 146, pl. xxii. fig. 5, and pl. xxiii. figs. 1–10. Among weeds, tide-marks, Balta Sound.

ASPIDISCUS, n. g.*

Body oval, depressed like that of *Zaus*. Upper antennæ 9-jointed, second and third joints long, last six short (in male third joint short, fourth, fifth, sixth long). Lower antennæ with the secondary branch slender. First feet with the inner branch 3-jointed, the first large and very stout, second and third very short, the last with two membranaceous appendages; outer branch not longer than basal joint of inner branch, 3-jointed, last joint furnished with spines and setæ. Last feet consisting of one falcate, 2-jointed branch.

Aspidiscus fasciatus, n. sp. Cephalothorax ovate, truncate behind; sides of segments produced backwards in curved points. Abdomen much narrower than cephalothorax. Caudal laminae very small, caudal setæ very long. Upper antennæ in female 9-jointed, first joint short, second longer, with numerous setæ on anterior margin, third much longer than second, with a tuft of setæ at the distal extremity of anterior margin, fourth half length of third, last five joints short; in the male the third joint is shorter than the second, fourth twice as long as third, fifth half length of fourth, and shorter than sixth, last three short. First feet having the inner branch with a very massive basal joint, which is hollowed on the inner margin at the base, where there is a rounded lobe attached to the peduncle; beyond this excavation of the margin there is a long seta, second and third joints very short, combined, not so long as the curious appendages of the last, which consist of two lacinia terminating in membranaceous expansions, as in the genus *Scutillidium* (vide Claus, Die Copepoden-Fauna von Nizza, pl. iv. fig. 15); outer branch 3-jointed, much more slender and not longer than the basal joint of inner, the third joint furnished on the side with delicate spines, and at the apex with setæ; basal joint with a plumose seta at the distal extremity of outer margin. Last feet 1-branched, falcate, consisting of two long joints; the last slightly bilobed on the inner margin, ciliated, rounded at the extremity, with only one short terminal seta. Colour pale, with a ruby-coloured fascia on the second and third, or second, third, and fourth segments of the cephalothorax.

* Ἀσπιδίσκος, a little shield.

Abundant on Laminariæ at Hillswick. It comes near to *Scutillidium*, Claus, differing chiefly in the first feet having the inner branch with second and third joints very short, and in the structure of the outer branch; and in the last feet consisting of only a single branch.

Cetochilus septentrionalis, Goodsir = *C. Helgolandicus*, Claus, Die frei lebenden Copepoden, p. 171, pl. xxvi. figs. 2-7. Abundant in the surface-net in the open sea.

Calanus Clausii, G. S. Brady, Nat. Hist. Trans. Northumberland and Durham, vol. i. (1865) p. 33, pl. i. figs. 1-11, 13. In surface-net off Out Skerries, 1861, and Balta Sound, 1867.

Dias longiremis, Lilljeborg, De Crust. ex ord. tribus Clad. Ost. et Cop. (1853) p. 181, pl. xxiv. figs. 1-13; Claus, Die frei lebenden Copepoden, p. 193, pl. xxxiii. figs. 6-14; G. S. Brady, Nat. Hist. Trans. Northumb. and Durham, vol. i. (1865) p. 35, pl. i. fig. 14, and pl. ii. figs. 11-18, = *Calanus Euchaeta*, Lubbock, Ann. Nat. Hist. 2nd ser. vol. xx. (1857) p. 401, pl. x. figs. 1-6. Abundant in the towing-net.

Temora Finmarchica (Gunner). Towing-net, common.

Ichthyophorba hamata, Lilljeborg, De Crust. Clad. Ostrac. et Copep. p. 185, pl. xxi. figs. 1-5, 7-9, and pl. xxii. figs. 9-12, = *Ichthyophorba angustata*, Claus, l. c. p. 199, pl. xxxv. figs. 2, 10-12, = *I. hamata*, G. S. Brady, Nat. Hist. Trans. Northumb. and Durham, vol. i. (1865) p. 39, pl. i. fig. 17, and pl. iv. figs. 7-10, = *Diaptomus Bateanus*, Lubbock, Ann. Nat. Hist. 2nd ser. vol. xx. (1857) p. 404, pl. xi. figs. 1-3. In towing-net, frequent.

— *denticornis*, Claus, l. c. p. 199, pl. xxxv. figs. 1, 3-9; G. S. Brady, Nat. Hist. Trans. Northumb. and Durham, vol. i. (1865) p. 40, pl. iv. figs. 1-6. Towing-net, open sea, occasional.

Diaptomus Westwoodii, Lubbock, Trans. Linn. Soc. vol. xxiv. p. 203, pl. xxxi. figs. 1-6. In lakes near Lerwick, and in Unst.

Anomalocera Patersonii, Templeton. Common in the surface-net.

Pontellina brevicornis, Lubbock, Ann. Nat. Hist. 2nd ser. vol. xx. (1857) p. 407, pl. xi. figs. 4-8. Taken once abundantly in the towing-net between the Fair Isle and Shetland in 1863.

Notodelphys ascidicola, Allmann; Baird, Brit. Entom. p. 238, pl. xxx. figs. 7, 8, = *N. Allmanni*, Thorell, Crust. som lefva a arter af släktet Ascidia, p. 34, pls. i. and ii. fig. 1.

From the branchial sac and water-passages of *Ascidia venosa*. The specimens of this and all the following species of Crustacea parasitic in Ascidiæ have been kindly forwarded to me by Mr. Albany Hancock, who found them during his investigations into the anatomy and physiology of the Tunicata, when dissecting Shetland Ascidiæ, with which Mr. Jeffreys and myself had supplied him. All the seven following species are new to our fauna.

— *cerulea*, Thorell, Crust. som lefva a arter af släktet Ascidia, p. 37, pls. iii. and iv. fig. 4.

From the branchial sac and water-passages of *Ascidia parallelogramma* and *A. venosa*.

— *prasina*, Thorell, Crust. som lefva a arter af släktet Ascidia, p. 41, pl. v. fig. 7. From the water-passages and branchial sac of *Ascidia mentula*.

Doropygus auritus, Thorell, Crust. som lefva a arter af släktet Ascidia, p. 50, pls. vii. & viii. fig. 10. From the branchial sac and water-passages of *Ascidia mentula*.

Botachus cylindratus, Thorell, Crust. som lefva a arter af släktet Ascidia,

p. 55, pl. ix. fig. 12. In the branchial sac and water-passages of *Ascidia mentula*.

Notopterophorus papilio, Hesse, Annales des Sciences Natur. Cinquième Série, Zoologie, vol. i. (1864) p. 338, pl. ii. figs. 1, 2, and vol. iii. (1865) p. 221. This most extraordinary species was found by Mr. Hancock in the branchial sac and water-passages of *Ascidia mentula*. It is a very interesting addition to our fauna.

Entorocola eruca, n. sp. Allied to *Entorocola fulgens*, Van Beneden (Recherches sur la Faune Littorale de Belgique, Crustacés (1861), p. 150, pl. xxvi.), but is apparently distinct. The feet have one branch stout, papillary, not furnished with any claw, the other much more slender, terminating in three minute curved spines. The fifth segment of the body has a cylindrical tubercular process on each side of the back. The abdomen is composed of two (? three) articulations, and terminates in a furca, the branches of which are shorter than broad, and are furnished with a spine at the tip.

Adhering to the intestine of *Ascidia intestinalis*. The type of the genus was found by Van Beneden in two species of *Aplidium*.

Lichomolgus forficula, Thorell, Krustaceer som lefva i arter af slägtet *Ascidia*, p. 73, pls. xii. & xiii. fig. 19. From the water-passages and branchial sac of *Ascidia mentula*.

Ascomyzon echinicola, n. sp. Form of body and of the several segments near to that of *A. Lilljeborgii* (vide Thorell, K. Vet. Akad. Hand. Bd. iii. No. 8 (1859), pl. xiv. fig. 21), but the last thoracic segment rather longer, and the caudal laminae fully twice as long as broad, and longer than preceding segment. Upper antennæ much shorter than in that species, 20-jointed, the eleven basal joints excessively short, the remaining somewhat longer, but none of them (unless it be the seventeenth and eighteenth) as long as they are broad.

Parasitic upon *Echinus esculentus*, Linn.

Caligus rapax, M.-Edwards. Common on fish belonging to the family Gadidæ.

— *curtus*, Müller = *C. Mülleri*, Baird, Brit. Entom. p. 271, pl. xxxii. figs. 4, 5. Common on Cod, Haddock, Ling, &c.

Lepeophtheirus Salmonis, Kröyer, Naturhistorisk Tidsskrift, 2 Bd. (1837) p. 13, (figured): 1 Bd. pl. vi. fig. 7, = *Lepeophtheirus Strömii*, Baird, Brit. Entom. p. 274, pl. xxxii. figs. 8, 9. From "Sea-Trout" taken in the loch near Burrafirth.

— *Hippoglossi*, Kröyer. Not uncommon on *Hippoglossus vulgaris*.

Trebius caudatus, Kröyer. Common on Skate.

Nogagus Lütkeni, n. sp. Upper antennæ with both joints long, the first terminating in a bunch of lanceolate plumose setæ, the second somewhat clavate, three to four times as long as broad; anterior margin plain, posterior with a single spine just beyond the middle; extremity with a tuft of setæ. Cephalothorax much rounded, the posterior lateral processes strongly arched and incurved. Hinder antennæ with the hook long and slender, and the penultimate joint furnished with two very long setæ. Second gnathopods (maxillipeds) with three crenated nodulous processes on the palm. Genital segment subquadrate, rather longer than broad, the sides gently convex. Abdomen consisting of two segments and the caudal laminae; the segments short and broad, the second as long again as the first, the two taken together not exceeding the breadth of the last; the caudal laminae large, as long as the two pre-

ceding segments, terminating in four long plumose laciniaë and two small spines; inner margin of laminaë ciliated.

Kindly procured for me by Dr. Saxby, and found on a Skate. It is very distinct from all the described species known to me. I have named it after my friend Dr. Lütken, of Copenhagen, to whom, in conjunction with Prof. Steenstrup, we are indebted for one of the best monographs on the parasitic Copepoda.

Echthrogaleus coleoptratus (Guérin) = *Dinematura coleoptrata*, Guérin, Icon. Règ. Anim. Crust. pl. xxxv. fig. 6, = *Dinemoura alata*, Baird, Brit. Entom. p. 285, pl. xxxiii. figs. 6, 7, = *Echthrogaleus coleoptratus*, Steenstrup & Lütken, Havs Snyltekrebs og Lernæer (1861), p. 40, pl. viii. fig. 15. On a Shark.

Dinematura producta (Müller) = *Dinemoura Lamnæ*, Baird, Brit. Entom. p. 286, pl. xxxiii. fig. 8, = *Dinematura producta*, Steenstrup & Lütken, Havs Snyltekrebs og Lernæer, p. 34, pl. vii. fig. 13. With the last.

Pandarus bicolor, Leach. On Dogfish.

Chondracanthus Lophii, Johnston = *Lernertoma Lophii*, Baird. In the pouches of the Angler, *Lophius piscatorius*.

Brachiella rostrata, Krøyer, Naturhistorisk Tidsskrift, 1 Bd. (1837) p. 207, pl. ii. fig. 1, and Naturhist. Tidss. Tredie Række, vol. ii. (1864) p. 364, pl. xvii. fig. 8. On the Holibut, *Hippoglossus vulgaris*. New to Britain.

Anchorella uncinata (Müller). Common on various Gadidæ and other fish.

Order THORACICA.

Balanus porcatus, Da Costa. Common in deep water; but I have never seen large specimens in the Shetland seas.

— *Hameri* (Ascanius). 40–50 fathoms; scarce.

— *balanoides* (Linn.). Common.

Verruca Strömia (Müller). Common on shells and stones in deep water.

Scalpellum vulgare, Leach. Down to 60 fathoms, St. Magnus Bay, Whalsey Skerries Haaf; off Balta &c.

Alcippe lampas, A. Hancock, Ann. & Mag. Nat. Hist. 2nd ser. vol. iv. (1849) p. 305, pls. viii. ix. In the shell of *Fusus antiquus*, dredged in 40–50 fathoms, 5–8 miles east of Balta.

Order PYCNOGONOIDEA.

Pycnogonum littorale, Ström. Very common under stones, tide-marks; and also in deep water to 50 fathoms.

Phoxichilidium femoratum (Rathke) = *Phoxichilidium coccineum*, Johnston. Common, tide-marks.

Nymphon giganteum, Johnston. Occasional, deep water.

— *Strömii*, Krøyer, Naturhist. Tidssk. Andet Række (1844), vol. i. p. 111; Gaimard, Voyages en Scandinavie &c. pl. xxxv. fig. 3. A single specimen, the only known British example, dredged in 1861 in 80 fathoms, 40 miles east of Whalsey Skerries.

— *hirtum*, O. Fab. One mile north of Whalsey Skerries Lighthouse, in 40–50 fathoms.

— *mixtum*, Krøyer. St. Magnus Bay, 1867.

Class ARACHNIDA.

Order ACARINA.

Halacarus ctenopus, Gosse, Ann. Nat. Hist. 2nd ser. vol. xvi. (1855) p. 28,

pl. iii. figs. 6-10. Common among seaweeds in littoral and laminarian zones.

Pachygnathus notops, Gosse, Ann. Nat. Hist. 2nd ser. vol. xvi. (1855) p. 304, pl. viii. figs. 1-4. Abundant on weeds in rock-pools, Balta Sound, 1867.

Class TUNICATA.

My entire collection of Tunicata having been placed in Mr. Alder's hands for use in the preparation of the work which, in conjunction with Mr. A. Hancock, he had undertaken for the Ray Society, and which will be shortly published, the nomenclature of the following list may be relied upon. Species of *Botryllus*, *Botrylloides*, and allied genera are numerous in Shetland, but it being impossible to preserve them satisfactorily, and not having works with me, I was unable to identify more than two or three species with any degree of certainty, and have thought it better therefore entirely to omit these genera in the present Report, and leave them for some future investigator to work out.

Pelonaia corrugata, Forbes & Goodsir. A single small specimen off the Island of Balta.

Ascidia intestinalis, Linn. At low water, West Voe, Whalsey Skerries, and Lerwick.

— *venosa*, Müller. Middle Haaf, off Out Skerries, 40-50 fathoms; also Haroldswick Bay.

— *mentula*, Müller. Middle Haaf.

— *rudis*, Alder, Ann. Nat. Hist. 1863, vol. xi. p. 155. The type specimens were taken at low-water mark near the Whalsey Lighthouse, Out Skerries, 1861.

— *obliqua*, Alder, Ann. Nat. Hist. 1863, vol. xi. p. 154. The type specimens were dredged in 40-50 fathoms on the Outer Haaf, due east of Whalsey Lighthouse, in 1861; also several fine examples, in about the same depth of water, between the islands of Whalsey and Balta, 1867.

— *sordida*, Alder & Hancock. 50-80 fathoms, and common. In most extraordinary profusion, on sandy ground, 7-10 miles east of the Isle of Balta, in company with *Tubularia gracilis*, *Eudendrum*, *Zoanthus papillosus*, which all occur in greater quantity in that locality than elsewhere in Shetland. In one spot the dredge came up again and again literally filled with *A. sordida*.

— *virginea*, Müller. "Zetland, R. M'Andrew & E. Forbes" (Forbes & Hanley). It is probable that the last species is meant.

— *parallelogramma*, Müller. Apparently rare, one specimen only, 10 miles east of Balta.

— *depressa*, Alder & Hancock. Low water, Island of Housay, in company with the following species.

— *scabra*, Müller. Island of Housay (Out Skerries), in the West Voe, spring tides, common.

— *elliptica*, Alder & Hancock. Low water, Lerwick, 1861.

— *plebeia*, Alder, Ann. Nat. Hist. 1863, vol. xi. p. 155. Forty miles east of Whalsey Lighthouse, 1861, the type specimens.

Molgula arenosa, Alder & Hancock; Alder, Ann. Nat. Hist. 1863, vol. xi. p. 160; *Molgula tubulosa*, Forbes & Hanley, vol. i. p. 36 (but not *M. tubulosa*, Müller). Common on the Haddock-grounds between Whalsey and Feltar; east of Balta; St. Magnus Bay, &c.

- Molgula citrina*, Alder & Hancock. Low water, Lerwick, 1861.
- Cynthia coriacea*, Alder & Hancock. Dourie Voe, 1863.
- *grossularia*, Van Beneden. Common between tide-marks.
- *echinata*, Linn.; *Ascidia echinata*, Forbes & Hanley, vol. i. p. 35, pl. C. fig. 4. 5–40 fathoms, Middle Haaf and Bressay Sound, 1863. Parasitic on *Ascidia sordida*, 5–8 miles east of Balta, 40–50 fathoms, 1867.
- Clavelina lepadiformis*, Müller. One mile north of Whalsey Lighthouse, 1861.
- Polyclinum aurantium*, M.-Edwards. 3–5 fathoms, Out Skerries Harbour.
- *succineum*, Alder, Ann. Nat. Hist. 1863, vol. xi. p. 169. The type specimen was dredged in 1861, in 50 fathoms, on the Haddock-ground, 6 miles north of Whalsey Lighthouse.
- Amarœcium albicans*, M.-Edwards, Observ. sur les Ascidies Composées, p. 287, pl. i. fig. 3 b. Low water, Lerwick.
- —? An undetermined species, tide-marks, Balta Sound, 1863.
- Botryllus* and *Botrylloides*. About ten species observed, but not determined satisfactorily.
- Leptoclinum durum*, M.-Edwards = *Leptoclinum aureum* (misprint), Forbes & Hanley, vol. i. p. 17. Tide-marks, West Voe, Out Skerries, 1861.
- *punctatum*, Forbes. With the last.
- Didemnum gelatinosum*, M.-Edwards, Obs. Ascid. Compos. p. 295, pl. vii. fig. 5. Low water, spring tides, West Voe, Out Skerries; and in Out Skerries Harbour, on roots of Laminariæ.
- Parascidia Flemingii*, Alder, Ann. Nat. Hist. 1863, vol. xi. p. 172. *Sidnyum turbinatum*, Fleming. Low water, Lerwick. In Mr. Alder's opinion this is not the *Sidnyum turbinatum* of Savigny (Mém. Anim. sans Vertèbres, vol. ii. p. 238), nor the *Sidnyum turbinatum* of Forbes and Hanley, which he also considers distinct from Savigny's species, and proposes to name *Parascidia Forbesii*.
- Salpa runcinata*, Chamisso. Both sexual and asexual forms in vast numbers, in company with *Diphyes* and *Physophora*, 30–35 miles, N.N.W. of Burrafirth Lighthouse, July 17 and 18, 1867.
- Appendicularia flagellum*, Huxley. Some *Appendiculariæ* were taken by me in the towing-net in Balta Sound in 1863, which I believe belonged to this species; but the bottle in which they were preserved was unfortunately lost (I conclude left behind in Shetland), and thus also the accurate determination of the species.

Class POLYZOA.

For this class I have adopted, as far as it goes, the general arrangement of Mr. Busk, in 'A Monograph of the Fossil Polyzoa of the Crag, 1859.' This work having been published subsequently to the 'Catalogue of Marine Polyzoa in the collection of the British Museum, 1852,' gives us the author's maturer views. With respect to the species, if no reference to other works is given, they will be found described in the 'Catalogue;' but, as will be seen by the following Report, our knowledge of the animals of this class has been very materially extended since 1852. Herr F. A. Smitt has just published a valuable series of papers on the Polyzoa of the Scandinavian seas, entitled "Kritisk förteckning öfver Skandinaviens Hafs-Bryozoer" (Öfvers. af K. Vet.-Akad. Förhandl. 1865–67), but I am not prepared to acquiesce in his views as to the amount of variation to be observed in species of the class.

Suborder CHEILOSTOMATA.

- Scrupocellaria scruposa* (Linn.). Attached to old shells of Mollusca and *Ditrupa*, and on *Celleporæ*, from 40–80 fathoms.
- *inermis*, Norman, Report Brit. Assoc. 1866 (1867), p. 203; Quart. Journ. Mic. Sci. vol. viii. N. S. p. 215, pl. v. figs. 1–3. Rare, 5–8 miles off Balta, in 40–50 fathoms.
- Cellularia Peachii*, Busk. Haddock-grounds and Outer Haaf, frequent.
- Menipea ternata* (Ellis & Sol.). On *Tubularia indivisa*, dredged in 70 fathoms.
- *Jeffreysii*, Norman, Quart. Journ. Mic. Sci. N. S. vol. viii. (1868), p. 213, pl. v. figs. 3–5. Only small fragments of this species, found among dredged sand, have as yet been observed, 1864.
- Canda reptans* (Pallas). “On coral, from 100 fathoms, Outer Haaf, Unst” (Peach, 1864).
- Salicornaria farciminoidea* (Ellis & Sol.). 40–70 fathoms.
- *sinuosa*, Hassall, Busk, Mon. Crag Polyzoa, p. 23, pl. xxi. fig. 5; Alder, Cat. Zooph. Northumberland and Durham, p. 61. In similar localities to the last.
- *Johnsoni*, Busk = *Nellia Johnsoni*, Busk, Quart. Journ. Mic. Sci. N. S. vol. vi. (1858) p. 125, pl. xix. fig. 2, = *Cellaria Johnsoni*, id. ibid. vol. vii. (1859) p. 65, pl. xxiii. figs. 4–5, = *Salicornaria Johnsoni*, id. ibid. vol. viii. (1860) p. 280. Middle Haaf, a much more delicate species than the last two.
- Caberea Ellisii* (Fleming). *Caberea Hookeri*, Busk, Cat. Marine Polyz. p. 39, pl. xxxvii. fig. 2, = *Caberea Ellisii*, Norman, Quart. Journ. Mic. Science, N. S. vol. viii. (1868) p. 217. Abundant, 40–70 fathoms.
- Bicellaria ciliata* (Linn.). “Very rare, 45 fathoms, Haddock-ground, Out Skerries” (Peach, 1864).
- *Alderii*, Busk, Quart. Journ. Mic. Science, N. S. vol. viii. (1860) p. 213, pl. xxviii. figs. 1–3; Smitt, Öfversigt af K. Vet.-Akad. Förh. 1867, p. 289, pl. xviii. figs. 4–8; Norman, Quart. Journ. Mic. Sci. vol. viii. (1868) p. 218, = *Bicellaria unispinosa*, M. Sars. Dredged in 40–100 fathoms, off Unst and Out Skerries. The locality in which I met with it most frequently was 5–10 miles east of Balta, in 40–70 fathoms, in company with amazing numbers of *Ascidia sordida*, with which the dredge came up time after time completely filled. It generally lives attached to Hydrozoa (*Tubularia*, &c.).
- Bugula avicularia* (Pallas). Not common.
- *purpurotineta*, Norman, Quart. Journ. Mic. Sci. N. S. vol. viii. (1868) p. 219, = *B. fastigiata*, Alder, Cat. Zoophytes Northumberland and Durham, p. 59. Scarce, 5–7 miles east of Balta, 40–50 fathoms.
- *Murrayana* (Bean).
- *flabellata* (J. V. Thompson). “15–50 fathoms, Dourie Voe and Haddock-ground, Out Skerries and Unst” (Peach, 1864). I do not remember myself having seen the species.
- Flustra foliacea*, Linn.
- *truncata*, Linn.
- *Barleei*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 123, pl. xxv. fig. 4, = *Flustra membranaceo-truncata*, Smitt, Öfvers. af K. Vet.-Akad. Förh. 1867, p. 358, pl. xx. figs. 1–5.
- Very local, between Whalsey and Balta, and off Unst, in about 50 fathoms,

Carbasea papyrea (Pallas). From fishing-boats, Middle Haaf.

Gemellaria loriculata (Linn.). Occasionally met with.

Ætea sica (Couch). *Hippochoa sica*, Couch, Corn. Fauna, iii. p. 102, pl. xix. fig. 8, = *Ætea recta*, Hincks, Cat. Zoophytes Devon and Cornwall, p. 35, pl. vii. fig. 3.

40-80 fathoms, on shells and stones, frequent.

Hippochoa catenularia (Jameson). Common on stones in 40-170 fathoms.

— *divaricata*, Lamx. 40-90 fathoms on shells, more rarely on stones.

— *expansa*, Norman, Quart. Journ. Mic. Sci. vol. viii. (1868) p. 216, pl. vi. figs. 1, 2. The type, and only known specimen, dredged in 100 fathoms off Unst in 1864.

Membranipora membranacea (Linn.).

— *pilosa* (Linn.).

— *coriacea* (Esper.). On underside of stones between tide-marks.

— *lineata* (Linn.), Alder, Cat. Zooph. Northumberland and Durham, p. 53, pl. viii. fig. 1. On roots of Fuci and Laminariæ.

— *spinifera* (Johnston), Alder, Cat. Zooph. Northumberland and Durham, p. 53, pl. viii. fig. 2. On stones, tide-marks.

— *Flemingii*, Busk. 15-100 fathoms.

— *craticula*, Alder, Catal. Zooph. Northumberland and Durham, p. 54, pl. viii. fig. 3. On a stone from shallow water, Hillswick, and roots of Laminariæ, Bressay Sound.

— *Dumerillii* (Audouin) = *Flustra Dumerillii*, Audouin, Savigny, Hist. l'Égypt, pl. x. fig. 12, = *Membranipora Pouilletii*, Alder, Cat. Zooph. Northumberland and Durham, p. 56, pl. viii. fig. 5; Quart. Journ. Mic. Sci. N. S. vol. v. (1857) p. 248 (but not *Flustra Pouilletii*, Audouin, Savigny Hist. l'Égypt, pl. ix. fig. 12). Occasional on *Cellepora cervicornis* and shells. A curious mistake has been made by Alder and Busk respecting this species, which is clearly that represented by Savigny's pl. x. fig. 12, viz. *Flustra Dumerillii*, instead of which the name of pl. ix. fig. 12 has been quoted *Flustra Pouilletii*, which bears not the slightest resemblance to the present form, being a *Lepralia* allied to *L. innominata*.

— *unicornis* (Fleming), Alder, Cat. Zooph. Northumberland and Durham, p. 56, pl. viii. fig. 6. "Tide-marks, Balta Sound" (Peach, 1864).

— *cornigera*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. 1860, p. 124, p. xxv. fig. 2. A very interesting and very rare species; 100 fathoms, Outer Haaf.

— *imbellis*, Hincks, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 275, pl. xxx. fig. 1. Rare, 40-50 fathoms, 5-7 miles east of Balta.

— *rhynchota*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 125, pl. xxv. fig. 1 (called *M. minax* in text); Crag Polyzoa, p. 33, pl. iii. fig. 7. In 40-170 fathoms, common; the most abundant species in deep water, it encircles the dead shells of *Dentalium* and *Ditrupea* with its polyzoary.

— *Rossellii* (Audouin). On stones, Outer Haaf, 80-140 fathoms.

— *sacculata*, Norman, Ann. Nat. Hist. 3rd ser. vol. xiii. (1864) p. 88, pl. xi. fig. 3. Common, 40-170 fathoms, on stones and shells.

— *vulnerata*, Busk, Quart. Journ. Mic. Science, N. S. vol. viii. (1860) p. 124, pl. xxv. fig. 3. In 80-110 fathoms. This very distinct little species has a very peculiar habit; it is never found on any but the smallest stones. I do not remember to have ever seen it on a pebble larger than the little finger-nail; more generally it selects those that are not more than a fourth of that size.

Alysidota Alderi, Busk, Quart. Journ. Mic. Science, N. S. vol. iv. (1856) p. 311, pl. ix. figs. 6, 7, = *Lepralia Barleei*, id. ibid. vol. viii. (1860) p. 143, pl. xxvi. figs. 1, 2. Common, 50–170 fathoms. In its chain-like form it is the *Alysidota Alderi*, and when living in groups Busk's *Lepralia Barleei*. The two varieties are occasionally found passing into each other. The type specimens of both are in my collection.

Lepralia Brongniartii (Aud.). 40–100 fathoms, frequent.

— *reticulata*, Macg. Rare, 80 fathoms.

— *crystallina*, Norman, Report Brit. Assoc. 1866 (1867), p. 204. On shells and stones, 80–140 fathoms.

— *auriculata*, Hassall. To 100 fathoms.

— *concinna*, Busk. 40–170 fathoms.

— *bella*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 144, pl. xxvii. fig. 2. A fine species, abundant on large stones on the Outer Haaf, to 170 fathoms.

— *sinuosa*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 125, pl. xxiv. figs. 2 & 3. On stone and shell, Outer Haaf.

— *verrucosa* (Esper.). Tide-marks and shallow water.

— *cruenta*, Norman, Ann. Nat. Hist. 3rd ser. vol. xiii. 1864, p. 88. Rare, 80–100 fathoms.

— *spinifera*, Johnst., Busk, Cat. Marine Polyzoa, p. 69, pl. lxxvi. figs. 2, 3 (but not the other figures referred to at p. 69). On stones and roots of *Laminariæ*, tide-marks and shallow water, Balta Sound, Hillswick, and Lerwick.

— *unicornis*, Johnst., = *L. ansata*, Busk, Crag Polyzoa, p. 45, pl. vii. fig. 2. Mr. Busk appears to me to have transposed the names of this and the following species. What I consider to be the true *unicornis* is the species evidently referred to by that name in the 'Catalogues' of Alder and Hincks. It is common between tide-marks.

— *ansata*, Johnston, = *L. unicornis*, Busk, Crag Polyzoa, p. 45, pl. v. fig. 4. This species is distinguished from the last by its short and very broad cells, and by the much smaller size of its ovicells. It is a deep-water form, and is extremely abundant in the Shetland seas, in 40–170 fathoms. Whether this is really a distinct species from *L. unicornis* is perhaps doubtful.

— *trispinosa*, Johnston. Found down to 170 fathoms. A pretty variety coating a *Ditrupa*, has the punctures round the margin more conspicuous than usual, an avicularium on the front of the cell in the centre, with its mandible pointing directly downwards, and the ovicell cleft with wedge-shaped openings, which radiate from the sides towards the centre.

— *coccinea*, Abildgaard. Abundant between tide-marks and in shallow water.

— *Ballii*, Johnston. On shells, 30–50 fathoms.

— *linearis*, Hassall. Common down to 170 fathoms.

Var. 1. *hastata*, Hincks, Cat. Zoophytes Devon and Cornwall, pp. 46 and 63, pl. xii. fig. 4. On *Cellepora cervicornis*, off the Island of Balta.

Var. 2. *crucifera*. With the usual avicularia on each side of the cells, and with a central, suboral process rising from the cell in the form of a very long, gradually tapering, rugose, perpendicular spine, which is more than equal the length of the entire cell, and in its most perfect state gives off a branch at nearly right angles at rather more than half its height, so that the whole process is in the form of a cross or trident.

On a shell dredged in 40-50 fathoms off Unst. A very remarkable form.

- Lepralia ciliata* (Linn.). Tide-marks to 90 fathoms.
 — *Hyndmanni*, Johnst. 80-110 fathoms.
 — *Woodiana*, Busk, Crag Polyzoa, p. 42, pl. vii. figs. 1 & 3; Hincks, Cat. Zoophytes Devon and Cornwall, p. 42. Very abundant in deep water, 80-170 fathoms.
 — *discoidea*, Busk, Quart. Journ. Mic. Sci. N. S. vol. vii. (1859) p. 66, pl. xxii. figs. 7, 8; id. *ibid.* vol. viii. (1860) p. 144, pl. xxvii. figs. 4, 5; Hincks, *ibid.* vol. viii. p. 276, pl. xxx. fig. 4. "Shetland, Barlee" (Busk).
 — *nitida* (Fabr.). Tide-marks and shallow water.
 — *annulata* (Fabr.). Roots of Laminariæ and stones, shallow water.
 — *Peachii*, Johnst. To 170 fathoms.
 — *ventricosa*, Hassall. 15-170 fathoms.
 — *laqueata*, Norman, Ann. Nat. Hist. 3rd ser. vol. xiii. (1864) p. 85, pl. x. fig. 5. 80-170 fathoms, frequent.
 — *abyssicola*, n. sp. Polyzoary irregular, in patches of considerable size. Cells irregularly arranged, pointing this way and that, not in quincunx, widest in the middle, tapering thence above and below, moderately convex; surface dull, minutely granular, no raised lines or rows of perforations separating the cells: mouth small, terminal; lower lip advanced, encroaching on the mouth, convex, pouting, a denticle within the mouth, wide, little raised, and so deeply seated that it cannot be seen unless carefully looked for; upper lip free, bearing two spines (which, however, are very rarely present). Ovicell globose, tumid, wider in the centre than the top of the cell, with a little transverse rib (caused by the upper lip) just over the mouth; surface minutely granular as the cells; these minute granulations appear to be centrally punctate. The form of the ovicells and mouth in the fertile cells remind one forcibly of a helmet with the vizor raised. An inhabitant of the deepest water, having been only found in 140-170 fathoms to the N.N.W. of Unst.
 This species comes very near to *L. microstoma*, but is, I think distinct. The cells are very much larger, the mouth less tubular and raised, the ovicells less thrown back off the mouth; and there is a deeply seated denticle in the mouth, which does not seem to be the case in *L. microstoma*.
 — *polita*, Norman, Ann. Nat. Hist. 3rd ser. vol. xiii. (1864) p. 87, pl. xi. fig. 1. 70-170 fathoms.
 — *microstoma*, Norman, Ann. Nat. Hist. 3rd ser. vol. xiii. (1864) p. 87, pl. xi. fig. 2. 20-25 miles N. and N. by W. of Unst. 80-140 fathoms.
 — *innominata*, Couch. Scarce, down to 170 fathoms.
 — *punctata*, Hassall. Tide-marks, common.
 — *ringens*, Busk, Quart. Journ. Mic. Sci. N. S. vol. iv. (1856) p. 308, pl. ix. figs. 3-5. 80-170 fathoms.
 — *bispinosa*, Johnst. On stones and shells, 50-170 fathoms. Differing from Guernsey specimens in the much larger size of the cells.
 — *umbonata*, Busk, Quart. Journ. Mic. Sc. N. S. vol. viii. (1860) p. 143, pl. xxvii. fig. 1. "On stone, Shetland, Barlee" (Busk).
 — *collaris*, Norman, Report Brit. Assoc. 1866 (1867), p. 204. Scarce, 80-100 fathoms.
 — *Pallasiana* (Möll.) = *L. canthariformis*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 143, pl. xxvi. figs. 3, 4. Common between tide-

marks. *L. canthariformis*, Busk, seems to be nothing else than this species with the cells a little more erect than usual.

Lepralia pertusa (Esper). On shells, especially *Ditrupæ*, and stones, 40–100 fathoms.

— *labrosa*, Busk. Scarce, 40 fathoms.

— *simplex*, Johnst. “45 fathoms, Haddock-ground, Unst, Peach, 1864” (*vide* Alder in litt.).

— *Malusii* (Audouin). Tide-marks to 50 fathoms.

— *minuta*, n. sp. Cells minute, arranged in remarkably regular lines, diverging from a centre; the parts about the mouth raised in a pustular manner; mouth horseshoe-shaped, the central portion of the lower lip encroaching on the aperture, sometimes in a rounded, at others in a more denticulate and bifid form; surface granulated, margins between cells areolated; ovicells subimmersed, granular, imperforate. In very small roundish patches on stone. Shetland, very rare, and Guernsey (A. M. N.); Wick (Mr. Peach).

— *tubulosa*, n. sp. Cells shortly ovate, hyaline, smooth, glistening, punctate; mouth produced into a very long tube, which stands upright from the polyzoary, aperture round, peristome thin and simple; on the cell just below the origin of the tube a conspicuous pore. A remarkable form, wholly unlike any other species; found on a stone dredged in a few fathoms water at Hillswick.

— *monodon*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 213, pl. xxix. figs. 3, 4. Common, in 80–170 fathoms.

— *granifera*, Johnst. Underside of stones, tide-marks.

Celleporella hyalina (Linn.), Gray, List of British Radiated Animals in Brit. Mus. pp. 128 & 149. On rocks and weeds.

— *lepralioides*, Norman, Quart. Journ. Mic. Sci. vol. viii. (1868) p. 222, pl. vii. figs. 4, 5. On stones, 80–140 fathoms.

— *pygmæa*, n. sp. Cells cylindrical, semierect, immersed through a considerable part of their height; peristome raised, simple, unattached all round, more elevated at the sides of the cylindrical aperture; surface nearly smooth and imperforate. Ovicells galeate, depressed in front, imperforate. No avicularia. A minute species, presenting very little character, but manifestly distinct from its allies. Occurs in little round patches, which are seldom more than a tenth of an inch in diameter; the largest patch seen not a fifth of an inch; on stones from very deep water, in 80–170 fathoms, where it is not uncommon.

Cellepora pumicosa, Linn.

— *avicularia*, Hincks, Cat. Zooph. Devon and Cornwall, p. 48, pl. xii. fig. 6. In “nodulous rolls” on Tubularia, Sertulariæ, &c.

— *Hassallii* (Johnst.). Rocks, and roots of Laminariæ.

— *ramulosa*, Linn. 40–170 fathoms.

— *dichotoma*, Hincks, Cat. Zooph. Devon and Cornwall, p. 49, pl. xii. figs. 7, 8; Alder, Quart. Journ. Mic. Sci. vol. iv. (1864) p. 96, pl. ii. figs. 2–4. Living attached to Sertularian Hydrozoa, in 40–70 fathoms.

— *attenuata*, Alder, Quart. Journ. Mic. Sci. vol. iv. p. 97 (1864), pl. ii. figs. 5–8. Local, 80–110 fathoms, 20–25 miles N.N.E. of Unst.

— *cervicornis* (Ellis and Sol.). 40–170 fathoms. The Shetland forms are much less massive than that of the Devon and Cornish coast. Sometimes they are a great deal branched, the branches interlacing and crossing each other in all directions, and more or less flattened. A rarer form has but few branches, and those very long, simple (*i. e.* not dichotomous).

tomously dividing), and round. Placed side by side with Cornish specimens this looks very different, but the microscopic characters appear to be identical.

Palmicellaria elegans, Alder, Quart. Journ. Mic. Sci. vol. iv. (1864) p. 100, pl. ii. figs. 1-4. A beautiful little species, 80-110 fathoms, eighteen to twenty-five miles N. and N.N.W. of Burrafirth Lighthouse.

Tessaradoma gracile (Sars) = *Pustulipora gracilis*, Sars, Reise Lof. Finm. 1850, p. 26, = *Quadricellaria gracilis*, Sars, Beskr. Norske Polyz. p. 15; Alder, Quart. Journ. Mic. Sci. vol. iv. (1864) p. 101, pl. ii. figs. 9-12, = *Onchopora borealis*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 213, pl. xxviii. figs. 6, 7, = *Anarthropora borealis*, Smitt, Öfvers. af K. Vet.-Akad. Förh. 1867, Bihang, p. 8, pl. xxiv. figs. 25-29. Rather local, but not rare on the Outer Haaf. It is necessary that the generic name *Quadricellaria*, which is preoccupied, should be changed. Smitt has instituted a genus *Anarthropora* to receive *Lepralia monodon* and the present species! Such a union, in my opinion, cannot stand. Leaving, therefore, *L. monodon* as the type of Smitt's genus, I propose the name *Tessaradoma*, the characters of which will be those given by Alder, *l. c.* I have not adopted the genus *Anarthropora* for *L. monodon* in this Report, because an entire rearrangement of the Membraniporidae is required, and until that entire rearrangement is carried out (and this I hope shortly to do), I have thought it better not to partially dismember the genus *Lepralia*.

Hemeschara struma, Norman, Quart. Journ. Mic. Sci. vol. viii. (1868) p. 221, pl. vii. figs. 6-8. In 100 fathoms, about twenty-five miles north of Unst, attaching itself to stones and the branches of *C. cervicornis*, and running out into free expansions.

Eschara Landsborovii (Johnst.), Alder, Quart. Journ. Mic. Sci. vol. iv. (1864) p. 105, pl. iv. figs. 1-3. Very rare; the Lepralian state on a stone from 170 fathoms.

—— *lævis* (Fleming), Alder, Quart. Journ. Mic. Sci. vol. iv. (1864) p. 102, pl. iii. figs. 8-11. Scarce, in about 100-170 fathoms, 20-25 miles N. and N.N.E. of Unst.

—— *Skenei* (Ellis and Sol.) = *Cellepora Skenei*, Busk, Marine Polyzoa, p. 88, pl. cxxii. 40-70 fathoms, 5-10 miles east of Balta; also Out Skerries Haaf.

—— *lorea*, Alder, Quart. Journ. Mic. Sci. vol. iv. (1864) p. 104, pl. iii. figs. 5-7. 80-100 fathoms, 20-25 miles north of Burrafirth Lighthouse. Certainly distinct from the last, with which it is united by Smitt.

Retipora Beaniana, King. Occasionally on the Unst Haaf, down to 170 fathoms; abundant on the Out Skerries Haaf, but not so large as on the Northumberland coast.

Suborder CYCLOSTOMATA.

Crisia eburnea (Linn.). On Hydrozoa on haddock-grounds.

Var. *producta*, Smitt, Öfvers. af K. Vet.-Akad. Förh. 1865, p. 116, pl. xvi. figs. 4-6. On stones, 100-170 fathoms.

—— *denticulata* (Lamk.). On Zoophytes, Haddock-ground.

—— *aculeata*, Hassall. "Tide-marks to Haddock-ground" (Peach, 1864); "Shetland, Barlee" (*vide* Alder in litt.).

Crisidia cornuta (Linn.). On rocks between tide-marks.

Hornera borealis, Busk, Alder, Quart. Journ. Mic. Sci. vol. iv. (1864) p. 108, pl. iv. figs. 1-6. 80-170 fathoms, Outer Haaf.

Hornera violacea, Sars, Geol. og Zool. Jagtt. Reise Trondhj. St. Somm. 1862 (1863), p. 30; Smitt, Öfvers. af K. Vet.-Akad. Förh. 1866, p. 404, pl. vi. figs. 2-9.

In general form like the last, but the back, instead of being striated, is granulated; the branches at their extremities with a rib-like elevation down the centre, the front having the cells more crowded and much more produced than in *borealis*; ovicells elongated, in the axils of the branches, generally (in my specimens) with one part on the front, but coming round the branch, the greater part lies on the back of the polyzoary, with a very slight longitudinal riblet, otherwise smooth, and closely punctate. Colour white with a violet tinge. In about 50 fathoms, about seven miles E.S.E. from Balta, rare. Now first added to our fauna.

Idmonea Atlantica, Forbes. Outer Haaf, 70-140 fathoms.

— *serpens* (Linn.) = *Tubulipora serpens*, Johnst. On Sertulariæ, &c., common.

Pustulipora deflexa (Couch). "Shetland, Peach, 1864" (*vide* Alder in litt.).

— *orchadensis*, Busk, Quart. Journ. Mic. Sci. N. S. vol. viii. (1860) p. 214, pl. xxix. figs. 1, 2. "Shetland, Barlee" (Busk). The collection of the late Mr. Barlee, which was bequeathed by him to myself, does not contain any Polyzoan which I can identify as the type of this species described by Busk.

Tubulipora lobulata, Hassall. On stones, 30-70 fathoms.

— *flabellaris*, Johnst. "Shetland, Peach, 1864" (*vide* Alder in litt.).

Alecto granulata, M.-Edwards. Dourie Voe and Haddock-grounds; also Outer Haaf to 170 fathoms.

— *major*, Johnst. Common to 170 fathoms.

— *dilatans*, Johnst. 80-140 fathoms. Compared with the types in B. M.

— *compacta*, Norman, Report Brit. Assoc. 1866 (1867), p. 204. On stones, Outer Haaf, Unst, and Out Skerries, in 80-170 fathoms. It is, I believe, the *Alecto dilatans*, var., Johnston, p. 282, pl. xlix. figs. 7, 8.

— *diastoporides*, n. sp. Polyzoary lobulate, the branches diverging from a common centre, and rapidly widening into fan-formed terminations, appressed very flatly to stones or shells, closely punctate, but a transparent looking line (the appearance caused by absence of punctures) marking the course of each side of each concealed tube in a similar way to the transparent lines in *D. obelia*; cells scattered irregularly, many being present on the expanded terminations; mouth but little raised above the crust, opening vertically.

This is the largest *Alecto* in our seas, and a very marked species. It is found on shell and stone, in 70-110 fathoms.

Mr. Peach has also sent me the species from Wick, including a specimen nestling in a sheltered spot of the inside of a valve of *Tapes virginica*, which has the cell-tubes erect and long; in all other specimens which I have seen they are very short.

Diastopora obelia (Fleming). Down to 170 fathoms, common.

Patinella patina (Lamk.). Common to 170 fathoms.

Var. *prolifera*, Busk, Crag Polyzoa, p. 114, pl. xix. fig. 1, and pl. xx. fig. 3. Frequent on *Cellepora cervicornis* and *Eschara laevis*.

Discoporella hispida (Fleming). Common to 170 fathoms.

Defrancia truncata (Jameson). Not uncommon on the Outer Haaf, in 70-170 fathoms.

Suborder CTENOSTOMATA.

- Alcyonidium gelatinosum* (Pallas). 40–50 fathoms, 5–8 miles east of Balta, sandy bottom, with immense quantities of Hydrozoa and Tunicata; also 40 fathoms, six miles north of Whalsey Lighthouse.
- *hirsutum* (Fleming). On *Fuci*, tide-marks, Balta Sound, and Out Skerries, abundant.
- ? A third species was found by me in 1861 between tide-marks, West Voe, Out Skerries. Mr. Alder, who examined it for me, gave me the MS. name for it, "*Alcyonidium radiatum*."
- Arachnidia hippothoides*, Hincks, Cat. Zoophytes Devon and Cornwall, p. 57, pl. xvi. fig. 2. Creeping over the test of *Ascidia sordida*; dredged 5–8 miles off Balta.
- Flustrella hispida* (Fabr.) = *Flustra hispida*, Johnst. Brit. Zooph. p. 263, pl. lxvi. fig. 5, = *Flustrella hispida*, Gray, Brit. Radiated Anim. Brit. Mus. p. 108; Redfern, Quart. Journ. Mic. Sci. N. S. vol. vi. 1858, p. 96, pl. iv., = *Alcyonidium hispidum*, Smitt, Öfvers. af K. Vet.-Akad. Förh. 1866, p. 499, pl. xii. figs. 22–27. On *Fuci*, *Chondrus*, and other seaweeds; common.
- Vesicularia spinosa* (Linn.). "Shetland, 1858, Barlee" (*vide* Alder in litt.).
- Buskia nitens*, Alder, Cat. Zooph. Northumb. and Durham, p. 66, pl. v. figs. 1, 2; Quart. Journ. Mic. Sci. N. S. vol. v. 1857, p. 24, pl. xiii. figs. 1, 2. "On *Halecium labrosum*, procured by Mr. Barlee" (Alder in litt.).
- Valkeria cuscuta* (Linn.). Procured in 1861.
- Bowèrbankia imbricata* (Adams). Tide-marks, common.
- Avenella fusca*, Dalyell, Rare and Rem. Anim. Scot. vol. ii. p. 65; vol. i. pl. xii. fig. 11; Alder, Cat. Zooph. Northumb. and Durham, p. 69, = *Farrella fusca*, Busk, Quart. Journ. Mic. Sci. vol. vi. fig. 3, = *Farrella dilatata*, Hincks, Quart. Journ. Mic. Sci. vol. viii. p. 279, pl. xxx. fig. 7; Cat. Zooph. Devon and Cornwall, p. 30. Parasitic on the tests of Ascidians from deep water.

Suborder PEDICELLINEA.

- Pedicellina Belgica*, Van Ben. Recognized by Mr. Alder on some Shetland Hydrozoa sent to him in 1861.
- *gracilis*, Sars. On *Sertularia*, 1863; rare.
- *echinata*, Sars. "In Dourie Voe, 15 fathoms, 1864" (*vide* Peach).

Suborder LOPHOPEA.

I have pleasure in announcing the discovery in the Shetland seas of a species of this interesting tribe, which up to the present time has been supposed to embrace only freshwater forms. *Rhabdopleura* was dredged by me in the Outer Haaf, and being unable to recognize it, I sent it to Professor Allman for his opinion, and the extract from a letter received from him, given below, will show the result of his examination.

Rhabdopleura Normani, Allman, nov. gen. et sp. "Now with regard to the new genus. Expecting nothing but hydroids in your bottles, and being satisfied on a rapid glance that the contents of one bottle were something very different from any known hydroid, I at once set the specimen down in my mind as that of a new genus of Campanularians. I now find that it is no hydroid, but a very curious and new genus of Polyzoa. So interesting a form is it that I thought it worth while spending some

time over its thorough investigation . . . ; and so by the help of acetic and chromic acids and liquor potassæ, I have succeeded in very fairly unravelling the structure of your Polyzoon. It is a true Hippocrepian form, as entirely and typically so as *Plumatella*—a fact which gave facility to my examination, as I had already made the Hippocrepian Polyzoa a special subject of study. One of its most remarkable features is a rigid rod which runs through the cœnocœcium, and to which the polypides are attached, each by a funiculus. This rod was the only thing at first visible besides the polypides and their tubes of insertion; but I afterwards found that the whole of the rod and its attached polypides were contained in a most delicate and colourless cœnocœcium, into which the free tubes of insertion were continued. The remarkable internal rod will well suggest a generic name, and I have accordingly thought of *Rhabdopleura* as sufficiently significant and distinctive.”
—Allman in litt. Outer Haaf off Unst, in 93 fathoms.

Class ECHINODERMATA.

The *Crinoidea*, *Ophiuroidea*, and *Asteroidea* in the following notes are arranged in accordance with my paper “On the Genera and Species of British Echinodermata” in the ‘Annals of Nat. Hist.’ for February 1865. With respect to the *Echinoidea* and *Holothuroidea*, I give references where the nomenclature of Forbes’s ‘British Starfishes’ is not sufficient to indicate the species.

Order CRINOIDEA.

- Antedon rosaceus* (Linck). In the Voes and thence down to 40 fathoms, not uncommon, and attaining an unusually large size. Very abundant on Laminariæ, in Bressay Sound, off Lerwick.
— *Sarsii* (Düben & Koren). 80–100 fathoms, 40 miles east of Whalsey Lighthouse; very local, but gregarious where found.

Order OPHIUROIDEA.

- Astrophyton Linckii*, Müll. & Trosch = *A. scutatum*, Forbes. Off the west coast, in very deep water (*vide* Forbes, British Starfishes). It has not been procured during the recent dredgings off the east and north coasts, nor do the fishermen on those sides of the island appear to be acquainted with the species.
Ophiothrix fragilis (Müller) = *Ophiocoma rosula* and *minuta*, Forbes. Having a very great range in depth, living between tide-marks and thence down to 170 fathoms, the deepest water dredged.
Amphiura filiformis (Müller). 3 fathoms, Balta Sound; Out Skerries Haddock-ground, and in St. Magnus Bay, 30–60 fathoms.
— *Chiajii*, Forbes. Off Balta; on the Haddock-ground near the Out Skerries, and in St. Magnus Bay.
— *elegans* (Leach) = *Ophiocoma neglecta*, Forbes. Tide-marks, to 40 fathoms.
— *Ballii* (Thompson) = *Ophiocoma Ballii* and *Goodsiri*, Forbes. Common on hard ground in deep water, delighting to nestle in crevices of stones, shells, and corals.
Ophiopeltis securigera, Düb. & Koren. Added to the British fauna in 1861, when a single specimen was dredged on the Haddock-ground, about 5 miles north of Whalsey Lighthouse, in 40 fathoms.
Ophiocoma nigra (Müller) = *Ophiocoma granulata*, Forbes.

- Ophiopholis aculeata* (Müller) = *Ophiocoma bellis*, Forbes. Low water to 170 fathoms.
- Ophiura lacertosa* (Pennant) = *Ophiura texturata*, Forbes.
- *Sarsii*, Lütken. In 80–100 fathoms, 40 miles east of Whalsey Skerries, in 1861, and subsequently procured 20–25 miles north of Unst.
- *albida*, Forbes. Very common. A slender variety in St. Magnus Bay.
- *affinis*, Lütken, = *Ophiura Normani*, Hodge. Haddock-ground to the north of Whalsey Skerries; 5–10 miles east of Balta, and very abundant in company with *Ophiura lacertosa*, *albida*, *squamosa*, *Amphiura filiformis*, *Chiajii*, &c., on soft mud, in 30–60 fathoms, St Magnus Bay.
- *squamosa*, Lütken. Two fine specimens, dredged 1867, in about 60 fathoms, St. Magnus Bay.

Order ASTEROIDEA.

- Astropecten irregularis* (Pennant) = *Asterias aurantiaca*, Forbes.
- *acicularis*, Norman. Living gregariously on the Out Skerries Outer Haaf, in 80–100 fathoms.
- Luidia Savignii* (Audouin) = *Luidia fragilissima*, Forbes. Fishing-boats from Middle Haaf, Out Skerries, 1861; also St. Magnus Bay, 1867.
- *Sarsii*, Düben & Koren. This smaller five-armed species would appear for the most part to be an inhabitant of deeper water than its congener, and is much more common in the Shetland seas.
- Archaster Parelîi* (Düb. & Koren). The first British specimen procured in 1864, in 100 fathoms, to the north of Unst; a second from near the same ground in 1867, in 170 fathoms.
- Palmipes placenta* (Pennant). A southern species which attains its northern limit in Shetland, where it seems widely diffused, though numerically scarce; 15–100 fathoms.
- Solaster papposus* (Linn.).
- *endeca* (Linn.).
- Porania pulvillus* (Müller) = *Goniaster Templetoni*, Forbes. Scarce.
- Goniaster phrygianus* (Parelius) = *G. equestris*, Forbes. Not uncommon in deep water.
- Var. *aculeatum* = *Astrogonium aculeatum*, Barrett, Ann. Nat. Hist. 2nd ser. vol. xx. p. 47, pl. iv. fig. 4. Two specimens of this well-marked variety, in which the tubercles of the upper marginal plates are nearly or quite obsolete, were found in 75–100 fathoms, off Unst, in 1864.
- Cribrella sanguinolenta* (Müller). Very common, and besides the ordinary form there are found two very distinct varieties.
- Var. *curta*, which has the rays much shorter, broader, and flatter than in the type, and their texture much less firm. It is of a pale yellow colour, and rarely exceeds 2 inches in diameter. Found between tide-marks in Balta Sound.
- Var. *abyssicola*. Has the rays produced, very slender, well rounded, and very firm. The paxillæ, especially those of the under surface, are most distinct and more separated from each other than usual, and the individual spines have their apices more distinctly and deeply trifold. Colour a rich saffron-yellow; greatest diameter $2\frac{1}{2}$ inches. Dredged in very deep water.
- Stichaster roseus* (Müller). Deep water, rather local. 1868.

- Asterias glacialis*, Linn. Often brought up on the hooks of the long lines, from the Middle Haaf, Out Skerries.
- *Mülleri* (Sars). Added to the British fauna in 1861, when this pretty species was dredged off the Whalsey Skerries. It is very local.
- *rubens*, Linn.
- *violacea*, Müller.
- *hispida*, Pennant. I am inclined to think that this and the two preceding must be united. *A. hispida* was taken under stones between tide-marks at the Out Skerries.

Order ECHINOIDEA.

Echinus esculentus, Linn. = *E. sphaera*, Forbes. Between tide-marks and in the laminarian and coralline zones.

Var. *tenuispina*. An *Echinus* was found in 1863 which must be regarded, I think, as a remarkable deep-water variety of *esculentus*. In form it is very high in proportion to its breadth, and the diameter is not at all greater below than above. The whole outline is perfectly free from any appearance of angularity in any part, and the spines are remarkably slender and delicate. It was brought up from a hard bottom 25–30 miles north of Unst, in 110 fathoms, and has a totally different appearance from the shallow-water forms of the species.

- *Flemingii*, Ball. Outer Haaf, frequent; but the specimens smaller and also wider in proportion to the height than those from the south. One of the largest Shetland specimens measures three inches high and four wide.
- *miliaris*, Leske. Common, tide-marks and Voes, and also in deep water.
- *norvegicus*, Düben & Koren, Öfversigt af Skandinav. Echinodermer, p. 268, pl. ix. figs. 33–39. Gregariously abundant; in immense profusion on the Outer Skerries Haaf, 40 miles east of Whalsey Lighthouse; comparatively scarce on the Unst Haaf; St. Magnus Bay frequent. The bulk of specimens procured do not exceed three-fifths of an inch in diameter; one specimen, however, measures $1\frac{3}{10}$ inch. The spines are generally more or less of a green colour; but a beautiful variety also occurs in which they are vermilion-red, tipped with white.
- Toxopneustes Dröbachiensis* (Müller) = *Echinus Dröbachiensis*, Müller, Zool. Dan. Prodröm. p. 235, = *Echinus neglectus*, Forbes, Brit. Starfishes, p. 172. Not common, dredged at the northern entrance to Bressay Sound.

- *pictus*, n. sp. Ambulacral pores in 4 or 5 pairs; ambulacral plates with one primary and many very small tubercles. Interambulacral plates also with only a single primary and numerous very small tubercles. Spines banded red and white. Diameter of a large specimen $1\frac{1}{2}$ inch. In deep water, Shetland Haaf, scarce, and dredged in 40 fathoms, near the Ferne Islands, on the Northumberland coast. It is also among the Echinodermata dredged by Messrs. Carpenter and Thomson in the 'Lightning' expedition during the past autumn in lat. $60^{\circ} 28' N.$ long. $6^{\circ} 54' W.$ in 500 fathoms, stones and mud, and a temperature of 32° .

Distinguished at a glance from *Dröbachiensis* by its more slender spines and their coloration, which in the latter species is green or purple, or a mixture of those two colours and white. When the spines are cleared off, the shell is found to differ in having only one primary tubercle to each interambulacral plate, while in *Dröbachiensis* there are

three or four tubercles much larger than the rest, the central one being only slightly larger than the lateral.

Brissopsis lyrifera (Forbes) = *Brissus lyrifer*, Forbes, British Starfishes, p. 187, = *Brissopsis lyrifera*, Sars, Oversigt af Norges Echinodermer, p. 96. On the Unst and Whalsey Skerries Haafs; also in St. Magnus Bay.

Echinocardium cordatum (Pennant) = *Amphidotus cordatus*, Forbes, British Starfishes, p. 190, = *Echinocardium cordatum*, Gray, List Brit. Anim. in Brit. Mus. Radiated Animals, p. 6. Only two or three specimens observed, probably because our dredging was almost wholly confined to deep water.

— *pennatifidum*, Norman, = *Amphidotus gibbosus*, Barrett, Ann. Nat. Hist. 2nd ser. vol. xix. (1857), p. 33, pl. vii. fig. 2 (but not *A. gibbosus* of Agassiz).

This species is certainly not *A. gibbosus* of Agassiz. It is widely different from *E. cordatum*, but closely allied to *A. ovatum*, than which it is much larger and different in many particulars. The name I propose for it is in allusion to the beautiful pennatifid pedicellariæ with which it is furnished, and which are wholly unlike those of *E. ovatum*. The specimen procured by Barrett was "dredged in 25 fathoms on the south side of Bressay Island, Shetland, on a coarse sandy bottom." I have myself seen three specimens of the species from as many different localities, one dredged by myself in 1867 in St. Magnus Bay, Shetland, another procured by Mr. D. Robertson in the Clyde district, and the third obtained by Mr. Hodge off the Northumberland coast.

— *ovatum* (Leske) = *Amphidotus roseus*, Forbes, British Starfishes, p. 196. Very common in deep water, 40–140 fathoms.

Spatangus purpureus (Müller). Common in deep water, down to 100 fathoms.

— *meridionalis*, Risso, Hist. Nat. de l'Europe Méridionale, vol. v. (1826) p. 280; Sars, Middlehavets Littoral Fauna (1857), p. 118.

Very near to *S. purpureus*, but the shell much higher and more tumid dorsally, and the hinder portion more produced and narrower in comparison with the anterior extremity. The colour is much deeper, being of a very deep purple hue in every part; the larger spines of the interambulacral areas are not conspicuously larger and longer than the rest; the ambulacral fascioles are very narrowly lanceolate, four and a half to six times as long as broad, and thus much longer in proportion to their breadth than in *S. purpureus*, in which they are from twice and a half to thrice and a half or, very rarely, four times as long as broad*. The following give the respective dimensions of the parts in two specimens of the same length:—

	Long.	Wide.	High.	Fasciole long.	Fasciole wide.
	inches.	inches.	inches.	inch.	inch.
<i>S. meridionalis</i>	$3\frac{3}{4}$	$3\frac{4}{10}$	$2\frac{1}{10}$	$1\frac{7}{20}$	$\frac{5}{20}$
<i>S. purpureus</i>	$3\frac{3}{4}$	$3\frac{3}{10}$	$1\frac{8}{10}$	$1\frac{3}{20}$	$\frac{7}{20}$

The specimens measured were selected at random from a number, merely as being of exactly the same length, and thus calculated to give a fair idea of the specific differences.

* These measurements are taken from one of the anterior fascioles, and give the extreme breadth and height to the outside edge of the pores.

The discovery of this species in the Shetland sea is of very high interest. It is one of several instances of large conspicuous Mediterranean species turning up in the great depths of these northern waters, and which as yet are unknown at intermediate localities. *S. meridionalis* was dredged in 100–140 fathoms, 25–35 miles N.N.W. of Burracraig Lighthouse, in company with *Cidaris papillata*, *Archaster Porelii*, *Normania crassa*, *Isodictya laciniosa*, *Raphioderma coacervata*, &c.

Echinocyamus angulosus, Leske, = *Echinocyamus pusillus*, Forbes, British Starfishes, p. 175. Common.

Echinarachnius placenta, Gmelin; Fleming, British Animals, p. 479; Forbes, British Starfishes, p. 178. “Isle of Foulah, very rare, Professor Jameson” (Fleming).

Order HOLOTHUROIDEA.

Psolus phantapus (Linn.). Frequent. The young of this species has been mistaken by British naturalists for *P. squamatus* of Scandinavian authors, a species which, though several times recorded, has not yet been found in the British seas.

Psolinus brevis, Forbes & Goodsir. “Discovered by Mr. Goodsir and myself in the Shetland seas, adhering to the stems of Laminariæ” (E. Forbes). I believe this genus and species to be founded on the young of a *Cucumaria*.

Cucumaria frondosa (Gunner). Occurs in marvellous abundance in one particular part of Bressay Sound. “Peter,” who was Forbes’s dredger, was indeed true to his word when he stated to me no man knew as he did where the “Puddings” were. The contents of the dredge on the very first haul was a sight not soon to be forgotten. It was literally filled with *C. frondosa*. There rolled out upon the deck thirty or more of these huge, deep purple, smooth, slimy Holothurians, measuring from 10 to 18 inches long, in every state of expansion and contraction, evidently greatly discomposed at their novel situation, and in their hurry to withdraw their much-branched tentacles and make things as snug as they could, squirting out streams of water from their capacious maws.

— *fucicola* (Forbes & Goodsir). The type specimens were found not uncommonly “in Bressay Sound, Shetland, in 7 fathoms water, adhering to the stems of Laminariæ,” and thus in the same locality with *C. frondosa*. Von Düben and Koren (Öfversigt af Skandinav. Echinod. p. 294) referred this species to the young of *C. frondosa*, and their synonymy has been copied by all subsequent writers without inquiry. But the young of *C. frondosa* is like the adult, in that “corpus, collum et pedum latera teguntur granulis calcareis, irregularibus, difformibus, nunquam perforatis,” which is not the case with *C. fucicola*. Specimens of this species, procured by myself in the typical locality, have the skin supplied with calcareous plates, which are very irregular in form and size, but when fully developed are nearly round, rather longer, however, than broad, and perforated with as many as 30–40 holes. The sides of the feet are likewise furnished with the irregular-shaped, elongated, perforated plates common in this position in the different species of the genus; but these *feet-spicules* I have also observed sparingly present in the young of *C. frondosa*, though in the passage above quoted Düben and Koren deny their existence.

— *fusiformis* (Forbes & Goodsir). Forbes, British Starfishes, p. 219, = *Cucumaria elongata*, Von Düben & Koren, Öfversigt af Skandinav.

Echinod. p. 301, pl. xi. fig. 56 b, and pl. iv. figs 14 A & 14 B; Sars, Middlehavets Littoral Fauna, p. 132, pl. ii. figs. 44-48; Oversigt af Norges Echinodermer, p. 101; Alder, Trans. Tyneside Nat. Field Club, vol. iv. p. 43, pl. ii. figs. 3, 4. Common, more particularly so in St. Magnus Bay.

Cucumaria Hyndmanni (Thompson). Common in deep water.

— *lactea* (Forbes & Goodsir) = *Ocnus lacteus*, Forbes, British Starfishes, p. 231, = *Cucumaria lactea*, Von Düben & Koren, Öfversigt af Skandinav. Echinod. p. 297, pl. xi. fig. 55, and pl. iv. figs. 3-7. Common.

Thyonidium commune (Forbes & Goodsir) = *Cucumaria commune*, Forbes, British Starfishes, p. 217 (but not *Thyonidium commune*, Von Düben & Koren, Öfversigt af Skandinav. Echinod. p. 305, pl. xi. fig. 51, and pl. iv. figs. 18-23).

A single specimen in St. Magnus Bay, 1867. In this species there are spicules present in the skin, and those of the tentacles are of entirely different structure from those described and figured by Von Düben and Koren in the Scandinavian species, for which I would propose the name *Thyonidium Dübeni*. In *T. commune* the skin is covered with table-formed spicules, which have the lid round, or nearly round, with an unusually even rim, and the perforations numerous, very small and round; the legs are four, connected at the foot, and each there divided. The tentacles, instead of being covered with spicula of considerable size, as in *T. Dübeni*, have only very small spicules imbedded in their substance, of the same character and nearly the same form as those of *Thyone fusus*, but of still smaller size.

— *hyalinum* (Forbes) = *Cucumaria hyalina*, Forbes, British Starfishes, p. 221, = *Thyonidium pellucidum*, Von Düben & Koren, Öfversigt af Skandinav. Echinod. p. 303, pl. xi. fig. 57, and pl. iv. figs. 15-17 (but not *Holothuria pellucida*, Vahl, Zool. Dan. pl. cxxxv., which is *Chirodota pellucida*, Sars, Oversigt af Norges Echinod. p. 124, pls. xiv.-xvi., = *Chirodota lævis*, Lütken, Grönl. Echinod. p. 16). Not rare on the Haaf; also in St. Magnus Bay, and the Whalsey Haddock-ground.

Thyone fusus (Müller) = *Holothuria fusus*, Müller, Zool. Dan. pl. x. figs. 5, 6, = *Holothuria papillosa*, Abildgaard, Zool. Dan. pl. cviii. fig. 5, = *Thyone papillosa*, Forbes, British Starfishes, p. 233, = *Thyone fusus*, Von Düben & Koren, Öfversigt af Skandinav. Echinod. p. 308, pl. xi. fig. 52, and pl. v. figs. 42-48.

Far from common; Whalsey Skerries Haddock-ground, and St. Magnus Bay.

— *raphanus*, Von Düben & Koren, Öfversigt af Skandinav. Echinod. p. 311, pl. xi. figs. 58, 59, and pl. v. figs. 49-55; Sars, Oversigt af Norges Echinod. p. 112.

Common in deep water.

— *elegans*, n. sp. Length 1-2 inches. Body smooth; skin thin, very delicate, totally devoid of all calcareous imbedded spicula; feet numerous, but not crowded, scattered all over the body, their sides without spicula, but a large round spiculum at the extremity. This spiculum has round perforations in the centre, exterior to these a circle of large radiating wedge-shaped openings, the spaces between them very narrow; and exterior to these again, and close within the edge, a few small perforations, the length of which is in the opposite direction to that of the radiating openings, each of them forming a minute segment of a semi-circle. Tentacula 10 (8 long and 2 very short), completely clothed in a

scaly investiture of irregular-shaped cribriform calcareous plates. Found in St. Magnus Bay, and also on the Balta Haddock-ground.

Synapta digitata (Montagu) = *Chirodota digitata*, Forbes, British Starfishes, p. 239.

A vinous-purple *Synapta*, which was taken in 1861 in 40 fathoms, about 5 miles north of the Whalsey Lighthouse, and also on the Out Skerries Outer Haaf, I cannot distinguish by any other character except colour from *S. digitata*, to which, therefore, I assign it as a variety.

— *inhærens* (Müller) = *Holothuria inhærens*, Müller, Zool. Dan. pl. xxxi. figs. 1–7; Von Düben & Koren, Öfversigt af Skand. Echinod. p. 322, pl. v. figs. 56–62; Woodward & Barrett, Proc. Zool. Soc. 1858, p. 363. St. Magnus Bay, 1867; two or three specimens.

Class ACTINOZOA.

In the Zoantharia the arrangement of Gosse's 'History of British Sea Anemones and Corals' is followed, and in the Alcyonaria Johnston's 'British Zoophytes.'

Order ZOANTHARIA.

Actinoloba dianthus (Ellis). In extraordinary profusion in the caves at Burrafirth; also under rocks between tide-marks.

Sagartia troglodytes (Johnston). In crevices of rocks between tide-marks to the south of Lerwick.

— *viduata* (Müller). "Common, low water to 15 fathoms, Out Skerries, Unst, and Dourie Voe, 1864" (*vide* Peach in litt.).

Adamsia palliata (Bohadsch). Haddock-grounds, common.

Actinia mesembryanthemum, Ellis & Sol.

— *intestinalis*, Fleming. An obscure species. Fleming says of it, "It adheres to rocks at low-water mark, Zetland" (Johnston, Brit. Zooph. p. 219).

— *vermicularis*, Forbes. "Dredged in 50 fathoms by Mr. M'Andrew and myself between Sombro' Head (Zetland) and Fair Island; also in 80 fathoms, west of Zetland," Professor E. Forbes (Johnston, Brit. Zooph. p. 222, pl. xxxviii. figs. 2–5).

Bulocera Tuediæ (Johnston). A very fine specimen on the Haddock-ground to the north of the Out Skerries in 40–50 fathoms, and another off Unst. The detached tentacles are much more frequently met with.

— *eques*, Gosse. A magnificent specimen dredged in 1863 in 80 fathoms to the north of Unst, and again obtained by Mr. Peach in 1864 near the same place, in 100 fathoms.

Tealia digitata (Müller). Very abundant on the Outer Skerries Haaf, attached to shells of the rarest univalve Mollusca, *Fusus Islandicus* (true), *F. Berniciensis*, *F. Norvegicus*, *Buccinopsis Dalei*, as well as to those of the more common *Fusi*, and of the deep-water form of *Buccinum undatum*.

— *crassicornis*, Müller.

Stomphia Churchiæ, Gosse. In 110 fathoms, sandy ground, on the Outer Haaf off Unst, 1864 (*vide* Peach), and St. Magnus Bay, 1867.

Arachnactis albida, Sars. "Abundantly in the towing-net, 1862" (Allman in litt.).

Corynactis viridis, Allman. Very local, on the spot between tide-marks, Out Skerries, and in about 10 fathoms. Mr. Peach tells me he found it in 1864 on a stone dredged in 100 fathoms off Unst.

Zoanthus incrustatus (Düben & Koren) = *Dysidea papillosa*, Johnston, Brit. Zooph. p. 190 partly and woodcut (not pl. xvi. figs. 6, 7), = *Epizoanthus papillosus*, Gray, Proc. Zool. Soc. 1867, p. 237, = *Zoanthus Couchii*, var. *diffusa*, Gosse, Brit. Sea Anem. p. 298, pl. ix. fig. 10, = *Zoanthus Couchii* (partly), Holdsworth, Ann. Nat. Hist. 3rd ser. vol. iv. 1859, p. 153, = *Mammillifera incrustata*, Düben & Koren, Öfversigt af K. Vet. Akad. Forh. 1844, p. 115; Sars, Reise i Lofot. og Finm. p. 142; and Forh. ved Skand. Naturf. Möde i Kjöbenh. 1860, p. 691, = *Zoanthus incrustatus*, Sars, Bemærk. over norske Cœlenterater (Videnskabs Forhandl. Christ. 1860), p. 2.

This species is well described by Sars, and is certainly, I think, distinct from *Z. Couchii*. Johnston described it as a sponge, including with it the form which he subsequently redescribed as an Actinozoon under the name *Zoanthus Couchii*. Both these names, therefore, cannot be retained, and that of Düben and Koren must be adopted for the present species. It is found in immense profusion 5–8 miles east of Balta in 40–50 fathoms, inhabited by *Pagurus lævis*; also in St. Magnus Bay.

— *anguicoma*, n. sp. Cœnœcium coating sponges, on which it creeps in strip-like bands, from which at various intervals (generally very short) arise the polyps; column 3–5 times as high as broad, slightly expanded above, external surface of summit with about 18 radiating corrugations. Tentacles in two rows, about 34, very long and extensile, more than equal diameter of disk when fully expanded, gradually attenuating to very slender points. Cuticle with sand imbedded in the surface, but not very firm. Colour pinkish white.

Living on the Sponges, *Phakellia ventilabrum* and *robusta*, *Normania crassa*, *Oceanapia Jeffreysii*, &c., in very deep water, 110–170 fathoms, 20–25 miles N.N.W. of Burrafirih Lighthouse.

Certainly distinct from the last, which has the tentacles very short and rarely extended beyond the mouth; indeed I question if they ever are. I have watched the species alive, but have never seen them protruded to any extent; and Sars says of them, “Pars protractilis polyperum tentaculis munita 36–40 biserialibus, alternantibus, elongatoconicis, acuminatis, lævibus (haud verrucosis) superioribus longitudine dimidiam partem diametri disci oralis æquantibus, inferioribus brevioribus.” In *Zoanthus anguicoma*, on the contrary, they are long, slender, and very extensile, and a colony of the species with the polyps expanded is a very pretty sight.

Sidisia Barleei, Gray, Proc. Zool. Soc. 1858, p. 532, pl. x. fig. 6, and id. ibid. 1867, p. 237.

Taken abundantly in company with *Zoanthus incrustatus*, of which I was at one time inclined to consider it a variety; but more careful examination and dissection has convinced me that there are certain distinctions between the two besides the fact of *Sidisia* being a free-living, unattached form. Whether those distinctions are specific or *sexual* (which, I think, may be the case), a careful examination of the living animal must hereafter determine.

Caryophyllea Smithii (Stokes). The variety *borealis*, Fleming (Brit. Anim. p. 509; Johnst. Brit. Zooph. p. 195), occurs in many places in extraordinary abundance on the Shetland Haaf. It ordinarily attaches itself to the shells of *Ditrupa*, but sometimes on stones, and then the base is generally broader, and the coral approaches more closely to the ordinary littoral form. Although I have traced this species over some hundred

square miles of sea-bottom, the great mass of the specimens procured are dead; but on one occasion, about 10 miles east of Balta, in 70 fathoms, the dredge came up containing literally thousands of living Caryophyllæ.

Paracyathus thulensis, Gosse. The type specimen was "dredged by Dr. Howden off Ord Head, in Bressay Sound, Shetland, in 30-40 fathoms, on a bottom of small stones, to one of which it was attached" (Gosse).

Ulocyathus arcticus, Sars. Forty miles east of Whalsey Lighthouse, in 80-100 fathoms, sandy ground, 1861; and one specimen 70-100 fathoms, Unst Haaf, 1864.

Lophohelia prolifera (Linn.). Besides the specimen in the Newcastle Museum (Johnst. Brit. Zooph. p. 251) a second fine Shetland example is now in the British Museum, which was procured some years ago by Dr. Edmonston from the Unst fishermen, and by him given to Mr. Jeffreys, who presented it to the British Museum.

Order ALCYONARIA.

Vennatula phosphorea, Linn. In great profusion, in 30-60 fathoms, in St. Magnus Bay, on a very muddy bottom; an occasional specimen now and then taken elsewhere.

Virgularia mirabilis (Linn.). On Haddock-grounds, frequent.

Gorgonia pinnata, Linn. A specimen in British Museum. "Zetland, E. Forbes, Esq. Presented by G. Johnston, M.D." (Cat. Brit. Radiated Anim. p. 56).

Primnoa lepadifera (Linn.). "Coasts of Shetland, Jameson" (Johnston, Brit. Zooph. p. 171).

Alcyonium digitatum, Linn.

— *glomeratum*, Hassall. An orange *Alcyonium* from a cave at Hillswick seems to be referable to this. "Rocks, Out Skerries and Balta Sound" (Peach in litt.).

Rhizoxenia catenata (Forbes). Dourie Voe, and 1 mile N.E. of Whalsey Lighthouse; also off Balta. This is the *Sarcodictyon catenata* of Johnston.

Order CTENOPHORA.

Idyia cucumis (Fabr.). Frequent, towing-net.

Class HYDROZOA.

All existing British works are now so far in arrear that I could not with any degree of satisfaction follow the arrangement given in them. At my request, therefore, Mr. Hincks has kindly supplied me with a MS. copy of the classification which he will propose in his forthcoming work on the Hydroids, and this I have adopted in the following Report.

Order LUCERNARIADA.

Aurelia aurita (Müller).

Cyanea capillata (Lamk.).

Lucernaria quadricornis (Müller). On Fuci at low water, Bressay Sound, and Unst.

— *auricula*, O. Fabr. "Tide-marks, on weeds, Out Skerries, found by Miss Jeffreys" (Peach in litt.).

Carduella cyathiformis (Sars). Professor Allman tells me that he found this species in 1862.

Order GYMNOCHROA.

Hydra viridis, Linn. In ponds and weedy lakes.

Order THECAPHORA.

Hydrallmania falcata (Linn.).

Plumularia pinnata (Linn.).

— *helecioides*, Alder. Found by Mr. Barlee in 1858 (*vide* Alder, Ann. Nat. Hist. Feb. 1860, in note under *Camp. fastigiata*).

— *setacea* (Ellis). Not common.

— *Catharina*, Johnston. In great abundance, 40–73 fathoms, 5–10 miles east of Balta; also Dourie Voe, &c.

— *frutescens* (Ellis & Sol.). Frequent, but the specimens usually small, Middle and Outer Haafs, 40–80 fathoms.

Aglaophenia myriophyllum (Linn.). Not uncommon, and often very fine.

Antennularia antennina (Linn.). Rare in Shetland, while the next is common.

— *ramosa* (Lamx.).

Thuiaria thuia (Linn.). Frequent in about 40–50 fathoms.

— *articulata* (Pallas). Rare, Middle Haaf.

Sertularia Gayi, Lamx. Common, Middle Haaf.

— *polyzonias* (Linn.). Common.

— *tenella* (Alder). Parasitic on *Tubularia indivisa*.

— *rugosa* (Linn.). Creeping on sponges, tide-marks, abundant in Halse Hellyer, Burrafirth.

Diphasia rosacea (Linn.). Off Balta Sound, and in the Burrafirth caves.

— *alata*, Hincks. Dredged one mile north of Whalsey Lighthouse, 40 fathoms, and also to the north of Unst.

— *pinaster* (Ellis & Sol.) ♂ = *S. Margareta*, Hassall ♀. Common in 40–80 fathoms.

— *tamarisca* (Linn.). Frequent, 40–90 fathoms.

— *fallax* (Johnston). Rare, 1861.

Sertularia pumila, Linn. At low water, common on *Fuci*.

— *abietina*, Linn.

— *filicula*, Ellis & Sol. “Barlee, 1858” (*vide* Alder in litt.); “50–100 fathoms, rare, Out Skerries and Unst, 1864” (Peach in litt.).

— *gracilis*, Hassall. Found in 1861, the exact habitat forgotten.

— *operculata*, Linn.

— *argentea*, Ellis & Sol. Lerwick Sound, and off Balta.

— *cupressina*, Linn. Balta Sound and Burrafirth caves, not common, and small.

Halecium halecinum (Linn.).

— *Beanii*, Johnston. Frequent.

— *labrosum*, Alder. A fine specimen procured by Mr. Barlee in 1858, and again taken by myself in 1861, in deep water, to the north of Unst.

— *muricatum* (Ellis & Sol.). A fragment procured by me in 1861 off Unst, and submitted to Mr. Alder, was thought by him to be referable to this species, although, as it did not bear any gonophores, some doubt attaches to the identification.

Salacia abietina (M. Sars) = *Grammaria ramosa*, Alder. The genus *Salacia*, Lamx., takes precedence of *Grammaria*, Stimpson.

Frequent, 40 fathoms, Middle Haaf, and a little to the north of Whalsey Lighthouse.

Filellum serpens (Hassall) = *Reticularia serpens*. The generic title *Reticularia* being preoccupied, Mr. Hincks substitutes *Filellum* for it. Creeping on the stems of Sertulariæ, &c., in the Burrafirth caves.

Lafoëa dumosa (Fleming).

— *fruticosa*, Sars = *Campanularia gracillima*, Alder. Rare, Outer Haaf, off Whalsey Skerries, and 5–8 miles off Balta, 40–50 fathoms.

Calycella syringa (Linn.). “Shetland, 1858, Barlee” (*vide* Alder in litt.).

— *fastigiata*, Alder, Ann. Nat. Hist. 3rd ser. vol. v. 1860, Feb. pl. v. fig. 1. Described from specimens procured by Mr. Barlee in 1858; again found by myself in 1863 and 1867, creeping on the stems of the larger Hydrozoa.

Cuspidella humilis, Hincks, Ann. Nat. Hist. Oct. 1866, p. 298. Found by Mr. Hincks and myself on stems of Zoophytes.

— *grandis*, Hincks. “A new species which has occurred in some dredgings from Connemara of G. S. Brady’s, and in Shetland, *teste* Mr. Alder. I do not know the history of the specimens, but you know the accuracy his labellings” (Hincks in litt.).

Campanularia flexuosa (Hincks) = *Laomedea flexuosa*. Common, between tide-marks, on *Fuci*.

— *neglecta* (Alder). Rare, Unst.

— *volubilis* (Linn.). On Laminariæ, in Bressay Sound, in 3–5 fathoms.

— *integra* (Macg.). Parasitic on *Tubularia indivisa*, at extreme low water, in the Burrafirth caves.

— *verticillata* (Linn.) Rare, found in 1861.

— *Hincksii*, Alder. Identified by Mr. Alder among the Zoophytes procured by Mr. Barlee in 1858.

Clytia Johnstoni (Alder). Bressay Sound and Unst.

Obelia longissima (Pallas). 5–10 miles east of Balta, in 40–73 fathoms.

— *geniculata* (Linn.). I insert this species with doubt. In the MS. list of species procured in 1861, I entered “*Laomedea geniculata*, var.” as common on Laminariæ in Bressay Sound. I have not specimens preserved, and they may perhaps have belonged to one of the forms lately elevated to specific rank.

— *gelatinosa* (Pallas). The specimen from which Johnston’s plate xxvii. was drawn was procured by Dr. Coldstream in Shetland (*vide* p. 105).

— *plicata*, Hincks. “One of the new species I met with in the large bottle of Shetland Hydrozoa sent me by Mr. Jeffreys. The precise place was not marked on it. This *Obelia* is a very splendid one” (Hincks in litt.).

Gonothyræa Loveni, Allman. Once found, 1861.

— *hyalina*, Hincks, Ann. Nat. Hist. Oct. 1866, p. 297. “Profusely investing *Tubularia*, *Halecium*, &c., from Shetland. I am indebted to J. Gwyn Jeffreys, Esq., for my specimens” (Hincks, *l. c.*).

Order ATHECATA.

Clava multicornis (Forsk^ol). Abundant between tide-marks, Lerwick, on *Fuci*; also at Balta Sound.

— *squamata* (Müller). With the last at Balta Sound, 1867. Determined for me by Professor Allman.

— *cornea*, S. Wright. With *C. multicornis*, at Lerwick, in 1861. Examined and named by Mr. Alder. I have not the specimens at hand to reexamine; and as the members of this genus have been much mis-

understood, it is probable that the specimens here called *cornea* are referable to *squamata*.

Clava diffusa, Allman, Ann. Nat. Hist. 3rd ser. vol. xi. 1863, p. 8; Brit. Assoc. Rep. 1862 (1863), p. 101. "Rock-pools, at low spring tides, Out Skerries" (Allman).

Tubiclava cornucopiæ, Norman, Ann. Nat. Hist. 3rd ser. vol. xiii. p. 82, pl. ix. figs. 4, 5, = *Merona cornucopiæ*, id. ibid. 3rd ser. vol. xv. p. 262. On *Astarte sulcata* and *Dentalium entale*, 20 miles north of Unst, in 80-100 fathoms, 1863; St. Magnus Bay, and 5-8 miles east of Balta, in 40-50 fathoms on *Dentalium*, 1867.

Hydractinia echinata (Fleming).

Podocoryne areolata (Alder) = *Hydractinia areolata*, Alder, Trans. Tyn. Nat. Field Club, vol. v. p. 225. pl. ix. figs. 1-4, = *Rhizocline areolata*, Allman, Ann. Nat. Hist. 3rd ser. vol. xiii. (May, 1864). A specimen investing the shell of *Natica Groenlandica* found in 1863, 10 miles east of Balta, in 73 fathoms.

Coryne pusilla, Gærtner = *Sarsia tubulosa*, Forbes, Naked-eyed Medusæ (the gonosome), *fide* L. Agassiz.

Tide-marks, Balta Sound, 1867; the ordinary form, and also a slender variety of the species.

"— *nutans*, Allman, n. sp. *Trophosome*—Hydrocaulus attaining a height of about 4 lines, much branched; branches subalternately disposed, deeply and distinctly annulated, the annulations of hydrocaulus becoming less distinctly marked towards the base. Polypites depressed on one side of the stalk, so as to assume a nutant posture, ovate, with about 15 tentacula. *Gonosome* unknown.

"Our ignorance of the gonosome renders the allocation of the present hydroid in the genus *Coryne* a merely provisional one Its trophosome resembles that of *Coryne pusilla*, but is smaller, while the hydranths droop upon their stalks in a characteristic way not noticeable in *C. pusilla*" (Allman in litt.). Found in 1863 in the caves at Burracuth, especially in Halse Hellyer, where it lives abundantly, with the base of the hydrocaulus immersed in sponges which coat the sides of the cave from extreme low-water mark to about half-tide.

— *vermicularis*, Hincks, Ann. Nat. Hist. Oct. 1866, p. 296. "Shetland, from deep water" (Hincks).

— *ramosa*, Ehrenberg. Procured in 1863; the specimen identified by Mr. Alder.

Syncoryne eximia (Allman). "Shetland, 1864, Peach" (*fide* Alder in litt.).

Eudendrium rameum (Pallas).

— *ramosum* (Linn.).

— *annulatum*, Norman, Ann. Nat. Hist. 3rd ser. vol. xiii. p. 83, pl. ix. figs. 1-3. The type specimens procured in 1863 in "Buness Hall," one of the caves of Burracuth, at extreme low water, spring tides.

— *vaginatum*, Allman, Ann. Nat. Hist. 3rd ser. vol. xi. (1863) p. 10; Brit. Assoc. Rep. 1862 (1863), p. 102. "Rock-pools, extreme low water, spring tides, Shetland" (Allman); also 40-50 fathoms off Balta, 1867 (A. M. N.), the specimen determined by Prof. Allman.

Coppinia arcta, Dalyell, or *Sertularia abietina*, *Halecium halecinum*, &c. In a paper read this year (1868) at the Brit. Assoc. Meeting, Prof. Allman showed that *Coppinia* is a Tubularian and not a Campanularian.

Perigonimus minutus, Allman, Ann. Nat. Hist. 3rd ser. vol. xi. (1863) p. 11; Brit. Assoc. Rep. 1862 (1863), p. 102. "Forming a fringe round the

Norman (A's)
suggested
A.H.

edge of the operculum of *Turritella communis*, dredged in Basta Voe, Shetland. Out of between twenty and thirty specimens of living *Turritella* examined, not one was free from this remarkable little Zoophyte" (Allman). Mr. Hincks tells me that he has identified this species with *Perigonimus repens*, Allman, but that Prof. Allman dissents. This being so, I think it better to retain here the name of *minutus* given to the Shetland specimen.

Garveia nutans, S. Wright = *Eudendrium* (*Corythamnium*) *bacciferum*, Allman. "Very fine, amongst a number of Zoophytes from Shetland, sent me by Mr. Busk. In the bottle containing it was also the *Coryne vermicularis*, Hincks, and *Zoanthus incrustatus*, which I am glad to see you recognize as a distinct species. I have taken the same view in my Devon Catalogue, in a note on *Cellepora edax*. I do not know the precise locality in which these things were found" (Hincks in litt.).

Dicoryne conferta, Alder. Abundant on shells, especially of *Aporrhais pes-pelecani*, dredged in 40–50 fathoms 5–7 miles off Balta, and in St. Magnus Bay.

Tubularia indivisa, Linn. In great abundance at low water, spring tides, in the Burrafirth caves, also dredged in 50–60 fathoms.

— *bellis*, Allman, Ann. Nat. Hist. 3rd ser. vol. xi. 1863, p. 12; Brit. Assoc. Rep. 1862 (1863), p. 103. "Bottom of rock-pools at extreme low water, spring tides, Shetland" (Allman).

— *attenuata*, Allman, Ann. Nat. Hist. 3rd ser. vol. xiv. p. 60. "Dredged from about 50 fathoms in the Shetland seas" (Allman). In 1867 I procured a *Tubularia* in some quantity 5–8 miles to the east of Balta, which, not being able to recognize, I sent to Prof. Allman to examine. He refers it to the present species, and writes: "It has certain distinctive features it is true, but nothing which I regard as sufficient to separate it from *T. attenuata*. The specimens on which I founded this species were male, while your specimens are female; and I believe that the difference in the gonosome between the two forms may be sufficiently explained by referring them to a difference of sex."

— *coronata*, Van Ben., = *T. gracilis*, Harvey. Haddock-ground, Out Skerries and Unst.

— *larynx*, Ellis & Sol. Caves at Burrafirth, spring tides, and 5–7 miles east of Balta, in 40–50 fathoms, on *Tubularia indivisa*.

Corymorpha nutans, Forbes & Goodsir. 5–7 fathoms in Balta Sound.

Order CALYCOPHORIDA.

Diphyes (? *appendiculata*, Eschscholtz). A beautiful *Diphyes*, the nectosacs of which were of a delicate rose-colour, occurred in profusion in the open sea, about 30 miles N.N.W. of Unst, in July 1867. Unfortunately, as I had no works with me at the time, I am unable to identify the species. The rapidity in its growth was most extraordinary; the cœnosarc of a specimen kept alive was developed nearly 3 inches in a single night.

Order PHYSOPHORIDA.

Physophora (? *borealis*, Sars, Bemærkninger over norske Cœlenterater [Videnskabs Forh. i Christiania, 1860], p. 8). Found on the same occasion with the preceding; I much regret being unable to determine the species of the first member of this very interesting order that has been observed in our seas. On the only occasion on which I saw the *Physophora*, the

sight, looking over the yacht's side, was a thing never to be forgotten. The sea was swarming with myriads of the *Physophora*, *Diphyes*, *Cydippe*, and allies, *Cyanea*, *Aurelia*, &c., and long chains of *Salpa runcinata*. Among the animals observed that evening was a Medusa (using that word in a *class* sense) which was quite unlike any genus that I am acquainted with,—a little flat plate, about the size of a threepenny piece, with very numerous long tentacles round its edge, the whole animal perfectly transparent and colourless.

NAKED-EYED MEDUSÆ.

Although the following species ought to be incorporated with and inserted in their proper places among the preceding Hydrozoa, yet our knowledge being at present confined to the gonosome, it is not possible to allocate them with any degree of precision. I have thought it better therefore to keep them together here, leaving future discoverers, who shall become acquainted with the trophosomes, to assign them their respective places. My own time in Shetland was too much taken up with other animals to allow me to study these Medusoids. The following list contains the species observed in Shetland by Forbes, as recorded in his 'British Naked-eyed Medusæ;' but I have arranged them more in accordance with our present state of knowledge, throwing them into the families and genera to which they are referred by Prof. L. Agassiz in his 'Contributions to the Natural History of the United States,' vol. iv. 1862, and by his son, Alexander Agassiz, in his 'Illustrated Catalogue of North American Acalephæ,' 1865.

Order THECAPHORA, Hincks.

Fam. OCEANIDÆ, Esch.

Genus PLATYPYXIS.

- Thaumantias æronautica*, Forbes. "Off Bressay, and in Hamna Voe in Papa" (Forbes).
 — *maculata*, Forbes. "Sound of Bressay, but not plentiful" (Forbes). Not hitherto observed elsewhere.
 — *globosa*, Forbes. "Very abundant in the harbours on both sides of the Shetland Isles" (Forbes). Not as yet noticed elsewhere.
 — *melanops*, Forbes. "Has hitherto occurred only in the Zetland seas, and is not very common there" (Forbes).

L. Agassiz considers the above four species to be referable to *Platypyxis*, L. Agass., or the closely allied genera *Clytia*, Lamx., or *Wrightia*, L. Agass.; but the younger Agassiz subsequently writes (Cat. North Amer. Acalephæ, p. 103), "may not the *T. gibbosa* of Forbes be a young *Halopsis*? They resemble the young of this species (*Halopsis cruciata*, A. Agass.); also *T. globosa*, and perhaps *T. pilosella*."

Genus OCEANIA, Pér. & Les. (restricted).

- Thaumantias hemisphærica*, Forbes. "Zetland, where they abound in the bays and harbours" (E. F.). This species is considered by L. A. to be synonymous with *Oceania phosphorica*, Péron & Les. and the *T. inconspicua*, *T. lineata*, *T. punctata*, *T. pileata*, and *T. Sarnica* are said to be probably different stages of growth only of *T. hemisphærica*.
 — *lineata*, Forbes. "Taken in the Zetland seas in 1846, but not found common" (E. F.).
 — *convexa*, Forbes. "A very common species in the Zetland seas" (E. F.). "May be a distinct species" (L. A.).

Fam. EUCOPIIDÆ, Gegenb. (restricted).

Genus EUCOPE, L. Agass.

Eucope lucifera (Forbes), = *Thaumantias lucifera*, Forbes. "Zetland" (E. F.).
 " *Laomedea geniculata*, Gosse, Devon, pl. iv., and *Campanularia gelatinosa*,
 Van Ben. pl. i. & ii., may be the young of this species" (L. Agass.).

Fam. LAODICEIDÆ, L. Agass.

Genus LAODICEA, Lesson.

Laodicea stauroglypha (Pér. & Les.) = *Thaumantias (Cosmetira) pilosella*,
 Forbes. "Very abundant in the bays and harbours of Zetland, espe-
 cially in the Sound of Bressay, where it is the most common species of
 the genus" (E. F.).

Fam. TRACHYNEMIDÆ, Gegenb.

Genus TRACHYNEMA, Gegenb. (*vide* A. Agass. Cat. p. 54).

Trachynema rosea (Forbes) = *Circe rosea*, Forbes; the generic name *Circe* pre-
 occupied for a genus of Acephalous Mollusca. "The first specimen was
 taken by Mr. M'Andrew and myself in the Zetland seas, in August
 1845, off Vella, 7 miles from land. We afterwards met with several in
 Bressay Sound, on the opposite coast of the mainland" (E. F.).

Order ATHECATA, Hincks.

Fam. NUCLEIFERÆ, Lesson.

Genus STOMATOCA, L. Agass.

Stomatoca dinema (Forbes) = *Saphenia dinema*, Forbes (but not Esch.), =
Saphenia Titania, Gosse, Devon, pl. xxvi. figs. 7-9. "Near Hillswick,
 on the western coast of Zetland, in 1845" (E. F.).

Genus PANDEA, Less. (restricted, L. A. p. 347).

Pandea globulosa (Forbes) = *Oceania globulosa*, Forbes. "I procured two
 specimens of this singular *Oceania* in the Sound of Bressay, in 1835"
 (E. F.).

Genus TIARA, Lesson.

Tiara octona (Fleming) = *Oceania octona*, Forbes. "In the seas near the
 east coast of Zetland" (E. F.). "*Oceania saltatoria*, Sars, *O. turrita*,
 and *O. episcopalis*, Forbes, Nak. Med. pl. ii. figs. 2 & 3, are probably
 different stages of growth of this species" (L. Agassiz, p. 347).

— *turrita* (Forbes) = *Oceania turrita*, Forbes. "Taken in the Zetland
 seas in 1845" (E. F.).

— *episcopalis* (Forbes) = *Oceania episcopalis*, Forbes. "This beautiful
 Medusa was taken in the neighbourhood of the western line of bank,
 40 miles from the mainland of Zetland, in the autumn of 1845" (E. F.).

Turris digitalis, Forbes. Procured by E. Forbes "in the autumn of 1845,
 in the Sound of Bressay." It is not, according to A. Agassiz (Cat. North
 Amer. Acal. p. 59), the *Medusa digitalis* of O. Fab. to which Forbes
 refers it. Fabricius's species is the *Trachynema digitale* of A. Agassiz.
 The trophosome of this genus is *Clavula* of S. Wright.

Fam. BOUGAINVILLIADÆ, Lütken.

Lizzia octopunctata (Sars). "Swarms in the bays of the eastern and western
 coasts of Zetland. I have not met with it elsewhere" (E. F.).

Lizzia blondina, Forbes. "First met with in the Sound of Bressay, and afterwards off Fitful Head" (E. F.).

Genus MARGELIS, Steenstrup.

Margelis ramosa (Dalyell) = *Tubularia ramosa*, Dalyell, and *Medusa ocilia*, Dalyell, pl. xi., = *Bougainvillia Brittanica*, Forbes. "Zetland" (E. F.).
 — *nigritella* (Forbes) = *Bougainvillia nigritella*, Forbes. "Discovered by Mr. M'Andrew and myself in the Sound of Bressay, Zetland, during the autumn of 1845" (E. F.). (*Vide* also for remarks on this genus, A. Agass. Cat. p. 157, and Allman, Ann. Nat. Hist. 3rd ser. vol. xiii. May 1864).

Fam. TUBULARIADÆ, Johnston (restricted).

Sarsia gemmifera, Forbes. "Several specimens in the Zetland seas, by Mr. M'Andrew and myself in 1845" (E. F.). "*Sarsia gemmifera*, Forbes, Nak. Med. pl. vii. fig. 2, and *Sarsia prolifera*, Forbes, Nak. Med. pl. vii. fig. 3, may belong to this genus (i. e. *Hybocodon*, L. Agass.), or form another distinct group" (L. A.).

Euphysa aurata, Forbes. "A very beautiful little Medusa, taken in 1835 in Bressay Sound" (E. F.).

Steenstrupia rubra, Forbes. "Hundreds of specimens secured in the bays of both sides of Zetland" (E. F.).

Genus ECTOPLEURA, L. Agass.

Ectopleura pulchella, Forbes = *Sarsia pulchella*, Forbes. "Several specimens in Bressay Sound, Zetland, in 1845" (E. F.).

As already stated under *Coryne pusilla*, Forbes's *Sarsia tubulosa*, procured in Shetland, is the gonosome of that species according to L. Agassiz; Hincks writes to me on it, "*Sarsia tubulosa*, zooid of *Syn-coryne*, perhaps *S. gravata*." (*Vide* also Allman, Ann. Nat. Hist. 3rd ser. vol. xiii. 1864, May.)

Class PORIFERA.

Dr. Bowerbank's 'Monograph of the British Spongiadæ' is used as the text-book for this Class; and the whole of my collections having been continually placed at that author's service during the preparation of his work, the species in the following list have in every case, where there was the remotest doubt, been sent for examination and determined by him, a large number of them being types of his species. In the year 1864, when I was prevented accompanying the Dredging Committee, Mr. Peach, who was of the party, paid special attention to the preservation of the sponges, and was instrumental in adding a considerable number of species to our fauna.

Order CALCAREA.

Grantia compressa (Fabr.). Common between tide-marks. The finest specimens I have ever seen taken in one limited spot at the Out Skerries. A small and very curious variety between tide-marks in Halse Hellyer, Burrafirth.

— *ciliata* (Fabr.). On *Fuci* frequent, tide-marks. It is much to be regretted that Bowerbank in his work has transgressed the law of the British Association rules of nomenclature, strictly observed by all naturalists (except certain French writers), of affixing that author's name who first described the species. Thus he assigns this and the foregoing species to Fleming, whereas they were both characteristically described by O. Fa-

bricius in his 'Fauna Grönlandica' forty-eight years before, and similarly the next species appears as *Leucosolenia botryoides*, Bowerbank, though Ellis and Solander were the describers of the species under the name *Spongia botryoides*. A curious aggregated form occurs in company with the var. *G. compressa* in Halse Hellyer.

Leucosolenia botryoides (Ellis & Sol.). Common under stones and attached to seaweeds. Specimens of gigantic growth found in the same spot with the very large *Grantia compressa*, living attached to the underside of stones.

—— *lacunosa* (Johnston). "Shetland, 1864" (Peach, *vide* Bowerbank).

—— *coriacea* (Montagu). Common under stones, and on the sides of caves in various parts of Shetland. Abundant in Halse Hellyer, Burrafirth, where lemon-yellow and white varieties live side by side.

Leuconia nivea (Grant). "Shetland, 1864" (Bowerbank in litt.). The specimens in this and other cases thus quoted Dr. Bowerbank informs me were sent to him by Messrs. Jeffreys and Peach.

—— *fistulosa* (Johnston). Dredged in St. Magnus Bay, 30-60 fathoms.

Order SILICEA.

Geodia Zetlandica, Johnston. "Island of Foulah and Unst" (Jameson).

Pachymatisma Johnstonia, Bow. A single specimen, procured after great difficulty, and not without some danger, at the extremity of 'Will Hellyer,' Burrafirth, a cave of difficult access, except under most favourable conditions of weather.

Genus NORMANIA, Bowerbank, n. g.

"Skeleton composed at the external surfaces of short fasciculi of siliceous spicula; in the interior, of an irregular siliceo-spicular network. Dermis furnished with ternate connecting spicula. Ovaria membranous, aspiculous.

"Type, *Normania crassa*.

"The general structure of the skeleton of the type specimen of this genus is very like that of *Pachymatisma*, but it is readily distinguished from that genus by the total absence of siliceous ovaria, and by its thin and delicate dermal system.

"The radial structure of its skeleton near the surface of the sponge, and its dermal connecting spicula, bring it somewhat into alliance with *Ecionemia*, but the total absence of a central axial column readily distinguishes it from that genus. I have named this genus after my friend the Rev. Alfred Merle Norman, the ardent and accomplished naturalist to whom I am indebted for numerous new and valuable species of British sponges."

"A genus *Normania* was established by Mr. G. S. Brady in 1866, for a section of Crustacea Ostracoda (*vide* Trans. Zool. Soc. vol. v. p. 382), but that title cannot be adopted, as the *Normania* of Brady is identical with *Loxoconcha* of G. O. Sars, which was founded a few months previously (*vide* G. O. Sars, Oversigt af Norges marine Ostracoder, 1865, and G. S. Brady, Trans. Linn. Soc. vol. xxvi. 1868, p. 432).

"*Normania crassa*, Bowerbank, n. sp. Sponge cup-shaped, sessile?; parietes stout and thick. Surfaces smooth, outer one minutely reticulated. Oscula on inner surface simple, variable in size, very numerous. Dermis thin, pellucid; outer surface furnished with a stout polyspiculous irregular reticulation; on the inner one with numerous dispersed tension-spicula large and small; spicula subfusiformi-acerate; and also with numerous large and small attenuato-stellate retentive spicula. Con-

necting spicula expando-ternate; radii attenuated, very long, shafts very short. Skeleton—fasciculi and reticulations stout and polyspiculous; rete open and irregular; spicula subfusiformi-acerate, long and large. Interstitial membranes pellucid, furnished abundantly with small subfusiformi-acerate tension-spicula, and with numerous large and small attenuato-stellate retentive spicula. Gemmules membranous, aspiculous. Colour in the dried state light grey. Habitat. Shetland, 110 fathoms (Rev. A. M. Norman). Examined in the dried state.”

To this description of Dr. Bowerbank I may add that the “subfusiformi-acerate tension-spicula” are incipiently and entirely spined, and are, moreover, very frequently furnished with a central umbo.

Ecionemia compressa, Bow. Rare, in very deep water, Unst Haaf, in 1864 and 1868.

Genus QUASILLINA*, Norman, n. g.

Sponge consisting of a single clavate hollow body, widening upwards from the base, and rising at once from the surface of the stone to which it is attached, without any expanded basal mass. Skeleton beautifully reticulate, primary fasciculi ascending in parallel straight lines from the base, and in diverging radiating lines from a central mammæform projection at the summit of the sponge; secondary fasciculi at right angles to the primary ones. Spicula fusiformi-acuate.

Quasillina brevis (Bow.) = *Polymastia brevis*, Bow. Brit. Spongiadæ, vol. ii. p. 64. Frequent on pebbles in from 40 to 170 fathoms. It is necessary to separate this species from the genus *Polymastia*; for whereas in the latter genus several (often very numerous) fistular cloacæ arise from an expanded basal mass, which is, in fact, the body of the sponge, in *Quasillina* the entire sponge consists of a single hollow cylinder, which widens from the base upwards, and is most expanded near the summit. When compressed, a rupture always takes place between the summit of the column and the cap-formed top, which separates as a kind of lid. This lid, with its central mammæform point, its radiating primary lines of bundles of spicules, and its transverse secondary lines, reminds us strongly of the top of a basket. In all these respects the genus approaches very closely to the genus *Euplectella*, much more so than do the species of the genus *Polymastia*. The spicula are needle-shaped (acuate), swollen in the central part, and attenuated towards the “head” as well as towards the point; but they are not “acerate” as described by Dr. Bowerbank, the head end being blunt and rounded. The smaller spicules sometimes assume a slightly pin-shaped (“spinulate”) form.

Polymastia bulbosa, Bow. The type specimen. “Shetland, Mr. C. W. Peach, 1864.”

— *spinula*, Bow. In 50–110 fathoms, on stones and shells. In a specimen which has but one fistula, though its basal mass is only $\frac{1}{4}$ of an inch in diameter, the fistula is no less than $1\frac{1}{4}$ inch long, but only $\frac{1}{20}$ of an inch wide. Other specimens have as many as five and six fistulæ.

— *radiosa*, Bow. The type-specimen. “Shetland, Mr. C. W. Peach” (Bowerbank).

— *mammillaris* (Müller). A single specimen in 1868, also procured by Mr. Barlee.

Tethea cranium (Müller). Common on the Outer Haaf, sometimes attached

* *Quasillus*, a little basket.

to stones, but more commonly growing parasitic on other sponges, especially on *Phakellia ventilabrum*.

Tethea lynceurium (Linn.). "Shetland, 1864" (Bowerbank in litt.).

— *spinularis*, Bow. The type specimens found on stones from 70–80 fathoms, Out Skerries Haaf.

Halicnemis patera, Bow. A very rare and remarkably interesting little sponge, found 1863 and 1864.

Dictyocylindrus virgultosus, Bow. The type specimen found in 1861 in deep water off Out Skerries.

— *stuposus* (Ellis & Sol.). Very fine specimens found in 1867.

— *hispidus* (Montagu). Dredged to the east of the Island of Balta, 1867.

— *rugosus*, Bow. A fine species, very local, but, where found, abundant. Out Skerries, Outer Haaf, 70–90 fathoms, 40 miles E.S.E. of Whalsey Lighthouse.

Phakellia robusta, Bow. In 100–170 fathoms, 20–25 miles N.N.W. of Burra-firth Lighthouse. My finest specimen measures $5\frac{1}{2}$ inches long and 6 in diameter, and is fan-shaped, but doubled back upon itself so as almost to form a cup. It is one of our finest species.

— *ventilabrum* (Linn.). Very common in deep water in 50–170 fathoms, though rarely at the former depth. Unquestionably the grandest British sponge. There are two magnificent specimens in my collection. One, which spreads out at once from the base, so that the cup is hardly developed at all, and the sponge is nearly flat, measuring 13 inches long and 9 wide, but is only 3 inches high. The other takes the shape of a very deep well-formed cup, composed of many lobes, cut almost to the base of the sponge, but together forming a regular circle; this sponge is 10 inches high and as much in diameter at the summit. Proliferous specimens often occur in which many small sponges grow from the inner face of the parent.

Microciona laevis, Bow. "Shetland, Mr. Barlee" (Bowerbank). The only known specimen.

— *armata*, Bow. "Shetland, 1864" (Bowerbank in litt.).

— *spinulenta*, Bow. "Shetland, 1864" (Bowerbank in litt.).

— *ambigua*, Bow. Found in 1861.

— *atrosanguinea*. "Shetland, 1864" (Bowerbank in litt.).

" — *simplicissima*, Bowerbank, n. sp. Sponge coating, surface irregular. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, spiculous; spicula cylindrical, long, slender, and very flexuous; rarely acerate, irregularly dispersed, numerous. Basal membrane stout, abundantly spiculous; spicula like those of the dermal membrane, very numerous and closely matted together. Skeleton—columns short and stout; spicula acute, not more than half the length of those of the dermal and basal membranes, but rather stouter. Colour milk-white in the dried state. Habitat. Shetland, 96 fathoms (Rev. A. M. Norman). Examined in the dried state." (Bowerbank MS.)

Hymeraphia vermiculata, Bow. On stones, Shetland, deep water, not uncommon.

— *clavata*, Bow. On stones, deep water (Mr. Barlee and A. M. N.).

— *stellifera*, Bow. Outer Haaf, on stones, 1861; on shell off Balta, 40–50 fathoms, 1863.

" — *coronula*, Bowerbank, n. sp. Sponge coating, thin. Surface uneven; both strongly and minutely hispid. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane spiculous; tension-spicula

acerate, very long and slender, flexuous, dispersed singly, or fasciculated, fasciculi frequently polyspiculous: external defensive spicula—the larger ones arising from the projection of the distal extremities of the skeleton spicula through the dermal membrane; the smaller ones attenuato-spinulate, entirely spined, basal bulb often coronulated spinously. Skeleton—spicula spinulate, very long and large, distal end usually projected through the dermal membrane. Basal membrane pellucid; tension-spicula same as those of the dermis, dispersed singly, few in number; internal defensive spicula same as those of the dermal membrane. Sarcode abundant. Colour, dried, light grey. Habitat. Shetland (Rev. A. M. Norman). Examined in the dried state.”

Hymedesmia radiata, Bow. The type specimen found in 1864; again procured in 1867.

— *Zetlandica*, Bow. The type found by Mr. Barlee, and taken by myself on stones from the Haaf, 1863.

“ — *occulta*, Bowerbank, n. sp. Sponge parasitical, coating. Surface irregular, abundantly hispid. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane abundantly spiculous; tension-spicula acerate, large and long, dispersed; retentive spicula bidentate equi-anchorate, large and stout, numerous, dispersed. Skeleton fasciculi multispiculous; spicula very numerous, same as those of the dermal membrane with an admixture of stout fusiformi-acerate ones. External defensive spicula attenuato-acuate, size various; large ones basally spined; smaller ones entirely spined. Colour milk-white. Habitat. Shetland, 96 fathoms (Rev. A. M. Norman). Examined in the dried state.”

Hymeniacidon reticulatus, Bow. “Stroma, Shetland, Mr. C. W. Peach” (Bowerbank).

— *perarmatus*, Bow. The type specimen procured 40 miles east of the Outer Skerries in 1861.

— *membrana*, Bow. The type specimens on the underside of stones between tide-marks, near Lerwick, 1861.

— *mammeatus*, Bow. Two specimens in 1868.

— *viridans*, Bow. “Shetland, 1864” (Bowerbank in litt.).

— *lingua*, Bow. A very large species procured in very deep water, Out Skerries and Unst, in 1864 and 1867.

— *florens*, Bow. On roots of a *Fucus*, extreme low water, spring tides, Out Skerries, 1861.

— *subereus* (Montagu). Not so common as *M. ficus*, to which it is very closely allied.

— *carnosus* (Johnston). Large short-stalked specimens, of the size of a large apple, in Dourie Voe. Small specimens with the head about $\frac{1}{3}$ of an inch in diameter, elevated on a slender footstalk about an inch long, but at other times almost sessile, in 40–50 fathoms, 5–8 miles east of the Isle of Balta.

— *ficus* (Esper.). Common, coating univalve shells, and generally inhabited by hermit-crabs, in moderately deep water.

[*Hymeniacidon gelatinosus*, Bow. Dr. Bowerbank gives the locality of the type specimens of this species as “Dourie Voe, Shetland.” This is a mistake; they were from under a stone between tide-marks at Cullercoats, Northumberland. The error doubtless arose from the circumstance that at the same time there were sent to him with this species specimens of *Hymeniacidon carnosus*, which were from Dourie Voe.]

- Hymeniacidon sulphureus*, Bow. "Shetland, 1864" (Bowerbank in litt.).
- *paupertas*, Bow. Parasitical on zoophytes from deep water in 1861, off Out Skerries.
- Cliona celata*, Grant. Common in shells.
- Halichondria panicea* (Pallas). The encrusting forms very abundant in caves and on stones between tide-marks. A giant specimen, in the form of a roll wrapped round the stem of a *Laminaria*, measures 13 inches long and 3 inches in diameter.
- *coalita* (Grant). "Shetland, 1864" (Bowerbank in litt.).
- *forceps*, Bow. On the Outer Haaf, off Unst, in 1864 and 1868. The "forcepiform" spicula in this species are very remarkable, and at once distinguish the species. They resemble very slender hair-pins, the bow very narrow, the pins very long, finely spinulous, and approaching each other at the points.
- *simplex*, Bow. "Shetland, Mr. C. W. Peach" (Bowerbank).
- *incrustans* (Esper). Abundant, coating the sides of Halse Hellyer, Burrafirth, growing side by side with *H. panicea* and *Isodictya fucorum*, the three species intermingling with each other.
- *Dickiei*, Bow. On *Cellepora cervicornis*, dredged in deep water, 1863.
- *Patersonii*, Bow. Rare, one specimen found in 1867.
- " — *falcula*, Bowerbank, n. sp. Sponge massive, sessile. Surface uneven, minutely spinous and reticulated. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, furnished with a stout irregular polyspiculous network. Skeleton—rete polyspiculous, very irregular and diffused; spicula fusiformi-acuate, slender and long. Interstitial membranes—tension-spicula same as those of the skeleton but smaller, few in number. Retentive spicula trenchant, contort, biharmate, stout and large, very few in number. Gemmules membranous, aspiculous. Colour in the dried state cream-white. Habitat. Shetland. Rev. A. M. Norman. Examined in the dried state."
- " — *mutulus*, Bowerbank, n. sp. Sponge sessile, massive. Surface openly reticulated. Oscula simple, very numerous. Pores inconspicuous. Dermal membrane spiculous; tension-spicula acuate, slender, very nearly as long as those of the skeleton, few in number; also tricurvato-acerate, very long and slender, nearly straight, sometimes flexuous; central curve abruptly angulated or looped, rather numerous; retentive spicula dentato-palmate, equianchorate, very minute and symmetrical, few in number. Skeleton equably reticulate; rete stout and polyspiculous; spicula subattenuato-acerate, stout and strong, moderately long. Interstitial membranes pellucid, furnished with the same forms of spicula as the dermal membrane but more sparingly. Colour in the dried state light brown. Habitat. Shetland, 96 fathoms (Rev. A. M. Norman). Examined in the dried state."
- *scandens*, Bow. The type specimen, dredged in 1861 in deep water off the Out Skerries. It is a minute species, which encrusts the stems of Sertularian Zoophytes.
- *Batei*, Bow. "Shetland?, Mr. Spence Bate" (Bowerbank).
- *Hyndmanni*, Bow. "Shetland, 1864" (Bowerbank in litt.).
- *albula*, Bow. "Shetland, deep water, Barlee" (Bowerbank).
- *inornata*, Bow. "Shetland, Mr. C. W. Peach" (Bowerbank).
- Isodictya varians*, Bow. "Shetland, Mr. Barlee" (Bowerbank).
- *jugosa*, Bow. The type specimen, found in deep water off the Out Skerries,

Isodictya palmata (Ellis & Sol.). Shetland (Fleming and Jameson), and more recently in 1864 (*vide* Bowerbank).

— *infundibuliformis* (Linn.). Common on the Haaf in 50–170 fathoms. My largest specimen measures $9\frac{1}{2}$ inches in diameter across the cup, and is about 6 inches high.

“ — *laciniosa*, Bowerbank, n. sp. Sponge sessile, fan-shaped, thin. Surface uneven, laciniöse, minutely hispid. Oscula and pores inconspicuous. Dermal membrane pellucid, spiculous; spicula acuate, long and slender, not very numerous; retentive spicula dentato-palmate, equianchorate, palm rather exceeding one-third the length of the spiculum, tooth terminally truncated, numerous, very minute; and also bicalcarated bihamate, hami terminations truncated, numerous, very minute. Skeleton—rete very diffuse and open, primary lines with from three to five or six spicula in thickness; secondary lines irregular, mostly unispiculous, occasionally containing two or three spicula. Spicula acuate, stout and large. Internal defensive spicula attenuato-acuate, incipiently spinous, minute, few in number. Interstitial membranes spiculous; tension and retentive spicula same as those of the dermal membrane. Colour in the dried state light ochreous yellow. Habitat. Shetland, 170 fathoms (J. G. Jeffreys, Esq., and Rev. A. M. Norman). Examined in the dry state.”

The type-specimen is fan-shaped, with several pliciform projections. It measures 7 inches in height and 10 inches across. The structure is so unusually open that the sponge is translucent in every part. It is a large and remarkably elegant species, on account of its open net-like structure. It was dredged 20–25 miles N. by W. of Burrafirth Lighthouse in 1867.

— *fucorum* (Johnston). Abundant between tide-marks on the side of Halse Hellyer, Burrafirth.

— *Barleei*, Bow. “Haaf Banks, Shetland, Mr. Barlee and Mr. Humphreys” (Bowerbank).

— *fimbriata*, Bow. Abundant in one spot some 40 miles east of Whalsey Skerries, 1861, also to the north of Unst, 1868.

Genus RAPHIODERMA, Bowerbank, n. g.

“Skeleton without fibres, composed of an irregular network of polyspiculous fagot-like bundles, the spicula of which are compactly cemented together at the middle, but are radiating at their terminations.”

“ *Raphioderma coacervata*, Bowerbank, n. sp. Sponge sessile, fan-shaped, thick. Surface even, irregularly areolated. Oscula simple, minute, numerous. Pores inconspicuous. Dermis reticulate; rete polyspiculous, irregular, very strong and wide. Dermal membrane pellucid, abundantly spiculous; tension-spicula attenuato-acerate, long and very slender, dispersed or loosely fasciculated; retentive spicula contort bihamate, minute and slender, exceedingly numerous, and dentato-palmate equianchorate, variable in size, few in number, dispersed or congregated in circular groups. Skeleton irregular and very coarse; rete polyspiculous; spicula subfusiformi-acerate, rather stout and long. Interstitial membrane spicula same as those of the dermal membrane; dentato-palmate, variable in size, equally dispersed, largest ones occasionally congregated in circular groups. Gemmules subspherical, membranous, aspiculous. Colour in the dried state cream-white. Habitat. Shetland, 170 fathoms, J. G. Jeffreys, Esq. and Rev. A. M. Norman.” (Bowerbank, MS.)

Taken in company with *Isodictya laciniosa* in 170 fathoms, 20–25 miles N. by W. of Burrafirth Lighthouse, in 1867, and again in 1868. A very large and thick species, growing in flat lobate masses. The largest piece in my collection measures 11 inches long by $6\frac{1}{2}$ in its greatest breadth.

GENUS OCEANAPIA*, Norman, n. g.

Sponge consisting of a hollow sphere filled with sarcode, surrounded by a hard spongy crust of a very close and compact nature. From the opposite poles of the axis of the spherical or ovate body of the sponge there spring more or less numerous simple or branched fistulæ of great size and length; these fistulæ are also furnished at their base with prolongations, which, passing inwards into the central cavity of the sponge in the form of cylindrical branching tubes, are bathed in the great sarcodous mass. Skeleton spiculo-fibrous, irregularly reticulated; fibres polyspiculous, the primary lines, especially of the fistulæ, of great size. Spicula acerate, stout (Bowerbank, pl. i. fig. 2) and very minute, in the form of half a ring, "simple bihamate" (Bowerbank, pl. v. fig. 109). Dermal membrane reticulate; rete for the most part unispiculous; spicula of the same two kinds as those of the skeleton.

Oceanapia Jeffreysii (Bow.) = *Desmacidon Jeffreysii*, Bow. Brit. Spongiadæ, vol. ii. p. 347, = *Isodictya robusta*, ib. id. p. 304.

In 1861 I dredged a portion of the spherical crust of this sponge, from which the fistulæ had been abraded. This having been placed in Dr. Bowerbank's hands, was considered by him to belong to the genus *Isodictya*, and is described in his work under the name *I. robusta*. In subsequent expeditions to Shetland I obtained many detached fistulæ, and also portions of the crust, which convinced me that the entire sponge, when found, would prove to be something very different from what had been imagined by Dr. Bowerbank from the type specimen. In 1864 some of the fistulæ were forwarded by Mr. Peach to Dr. Bowerbank, who regarded them as a new species of *Desmacidon* (*D. Jeffreysii*). At length, during the past summer, several perfect specimens of the sponge have been dredged, and it is thus proved to be a remarkable species, perhaps the most interesting, as it is also one of the largest of British Porifera.

In form and size the adult sponge most strikingly reminds us of a full-grown swede turnip. Imagine such a turnip to be going to seed, and to have sent up several shoots. Now break these shoots off 4 or 5 inches from the bulb, strip off the leaves as well as the smaller fibrous portions of the roots, and scoop out all the interior of the turnip, leaving only the rind, and you will have a very fair idea of *Oceanapia*. The rind represents the spongy crust; the hollow interior is a cup filled with sarcode; the broken off stems are the cloacæ, which are of about the size and shape of a finger, the smaller specimens having sometimes only one, but the larger as many as a dozen such cloacal fistulæ of various sizes, which are generally simple, more rarely branched. The roots of the turnip represent other fistular appendages of smaller size than those which spring from the crown, and of more solid and stringy texture. These appear literally to take the place of roots, since in one instance they grasp a pebble with their extremities, and in other cases

* *Oceanus* and *napus*, a turnip.

show evident signs of having been partially imbedded among sand. My largest specimen contained nearly a pint of sarcode in the interior. This sarcode is of deeper colour than usual among the sponges, and when the dried *Oceanapia* is cut open the sarcode will be found lying on that side which has been downwards when drying, shrunk into a solid deep brown or almost black mass, having somewhat the appearance and consistency of cobbler's wax.

- Desmacidon fruticosus* (Montagu). "Shetland, 1864" (Bowerbank in litt.).
 — *Peachii*, Bow. The type specimen. "Shetland, Mr. C. W. Peach" (Bowerbank).
 — *constrictus*, Bow. The type specimen. "Shetland, Mr. C. W. Peach" (Bowerbank).
 2/ *Raphysus Griffithsiae*, Bow. "Shetland, Capt. Thomas and Mr. M'Andrew" (Bowerbank).
Diplodemia vesicula. "Shetland, Mr. Barlee" (Bowerbank).

Order KERATOSA.

- Spongionella pulchella* (Sowerby). "A young specimen coating part of a small bouldered granite pebble dredged by Mr. Jeffreys off the Outer Skerries, Shetland, in May 1864, from 50-80 fathoms depth" (Bowerbank).
Chalina oculata (Pallas). "Shetland, 1864" (Bowerbank in litt.). I have never myself seen this common species of our southern coasts in the extreme north.
 — *gracilentata*, Bow. "Shetland, 1864" (Bowerbank in litt.).
Verongia Zetlandica, Bow. Occasional, and widely distributed, but numerically scarce on the Outer and Middle Haaf.
Dysidea fragilis (Montagu). Rare, only two or three specimens observed.

POSTSCRIPT.

Since the Report on the Crustacea has been in print I have received the last part of Bate and Westwood's 'British Sessile-Eyed Crustacea,' which contains the appendix to that work. Among the species there described are several on which, as being connected with the present Report, it is necessary that I should say a few words.

"*Opis leptochela*, n. sp." This I find to be the species described by me under the name *Euonyx chelatus* (Brit. Assoc. Report, 1866 (1867), p. 202). My specimen differs from that described by B. & W. in having the second gnathopods larger and stronger than the first, and the hand furnished with a strong nail. This difference is perhaps one of sex. The species cannot, I think, be placed in the genus *Opis*.

"*Ampelisca laevigata*." Most unquestionably not the true *A. laevigata*, but the *A. tenuicornis* of Lilljeborg and of this Report. The characters given by B. & W. are the *exact reverse* of those which belong to the true *A. laevigata*.

"*Haploops tubicola*." B. & W. give "Shetland" on my authority, but I have never taken the species there. For "Shetland" read Hebrides*.

"*Lepidepecreum*." A new genus is characterized under this name to receive

* In the 'Zoological Record' for 1866, Mr. Bate, in referring to my Hebridean Report (Brit. Assoc. Report, 1866, p. 193), in every instance, by some *lapsus*, misquotes the habitat as "Shetland."

the *Anonyx longicornis*, which differs from *Anonyx* in having no secondary appendage to the upper antennæ.

“*Unciola leucopes*, Kröyer.” B. & W. consider my *U. planipes* as “probably identical” with this species. It may be so, but there are points of difference which made me think it wiser to keep them apart until the examination of Greenland specimens should settle the question definitely.

“*Hyperia tauriformis*, n. sp.” This is the *Metoëcus medusarum* of Kröyer and of this Report. B. & W.’s specimens were from Banff, forwarded by Mr. Edward, to whom I am also myself indebted for specimens.

In the ‘Annals and Mag. Nat. Hist.’ for January 1869, p. 49, pl. viii. figs. 13–15, will be found a description of *Cytherura flavescens*, by Mr. G. S. Brady; and in the ‘Quart. Journ. Micros. Science,’ January 1869, a full account by Prof. Allman of *Rhabdopleura Normani*.

Report on the Annelids dredged off the Shetland Islands by Mr. Gwyn Jeffreys, 1867–68. By W. C. M’INTOSH, M.D., F.L.S.

MR. GWYN JEFFREYS, in his dredging-expedition to the Shetland Islands last year, kindly selected, chiefly with the assistance of Mr. Sturges Dodd and the Rev. A. M. Norman, a large number of Annelids, which he most courteously placed at my disposal; and, as they were properly preserved in vessels and fluid sent for the purpose, their subsequent examination proved very satisfactory. The same was done in 1868; but owing to the unfavourable state of the weather, the collection was very much smaller than that of the previous year.

The majority of the Annelids come from St. Magnus Bay, or, rather, from the deep water (80–100 fathoms) beyond this, not because they so disproportionately abound there (although the muddy sand is eminently favourable for their increase), but probably because the dredging was most frequently carried on in that neighbourhood. The other localities, in the order of the respective collections, are off Balta, North Unst, Bressay Sound, Outer Haaf (Skerries), Fetlar, and a small shore collection made by Mr. Dodd at Hills-wick.

The Annelids found in the deep water off North Unst form a collection very rich in new or rare forms; for, out of thirteen species, three at least are new to science, and four not hitherto found in Britain. The collection from the Outer Haaf (Skerries) has also several rare forms; out of eight, four are new to Britain and one to science. Out of sixty found in St. Magnus Bay, four are new to science and eighteen to Britain. These figures contain the entire new or rare forms in the individual collections, without reference to their occurrence in others, as will be apparent when I mention that, out of a total of about ninety-two Annelids at present identified, five or six, so far as I can at present make out, are new to science, and about twenty-two to Britain. As before stated, this is one of the best collections of the kind ever made in Britain, whether in regard to the excellent condition of the preparations or the number of new forms. As might be expected, many of the additions to our fauna are Scandinavian in type; but others are not so, at least they do not occur in the valuable catalogue (*Annulata Polychæta Spetsbergiæ, &c.*) recently published by Dr. A. J. Malmgren, the enterprising naturalist of Helsingfors.

I have described some of the supposed new forms elsewhere, and therefore shall refer to them very briefly at present. They are as follows:—*Hipponoë Jeffreysii*, n. sp., a small Amphinomacean with a simple subulate antenna on the smooth elevation of the dorsum of the head. There is no caruncle. The branchiæ consist of tufts of simple processes, or they are bifid or somewhat fasciculated. The bristles of the superior lobe of the foot are for the most part shorter and stouter than the inferior, and of a characteristic shape. It is allied to the *Eurythoë borealis* of Sars. *Eunoa* —, the second species of the genus found in Britain, the first being *E. nodosa*, Sars, also found in the Shetland seas by Mr. Jeffreys, and described by Mr. Lankester as a new form, under the name of *Antinoë zetlandica* (Linn. Trans. vol. xxv.); in the present species the scales are quite smooth, often bordered with a dark pigment-belt, and the inferior bristles of the feet have an entire clawed tip. *Sigalion Buskii*, n. sp., a form having the aspect of *S. boa* rather than that of *S. Mathildæ*, to which the scales are most nearly allied in structure; but the bristles are larger than in either case and characteristically different. *Notocirrus scoticus*, n. sp., a Lumbrinereian, with a dorsal branchial lobule to each foot, and found abundantly in comparatively shallow water in the Hebrides, where the bottom is clayey mud. *Eumenia Jeffreysii*, n. sp., a form first dredged by Mr. Jeffreys in the Hebrides, but too much decomposed to be minutely described: it is allied to *E. crassa*; but there are no traces of the branchial filaments in any specimen. A double row of isolated papillæ runs along each side from the snout to the tail, the summit of each giving exit to a bundle of forked and simple bristles. *Praxilla artica* (? Malmgren), a species that very probably is *P. artica* of that author; but as he has only mentioned that it is similar to *P. prætermissa* (differing in the hooks having six teeth), we are left quite in doubt as to his form. The teeth of the funnel are in general more filiform and distinct than in *P. prætermissa*. *Polycirrus* (?) *tribullata*, n. sp., a species having the snout and tentacles of a *Polycirrus*, but without the bristles or hooks in the anterior region, which is furnished with three circular and somewhat flattened papillæ on each side.

Of the forms new to Britain are—*Lætmonice filicornis*, Kinberg, which, however, is Dr. Baird's *L. Kinbergi*. *Harmothoë longisetis*, Grube, a widely distributed species, described by Mr. Lankester as *H. Malmgreni* (*op. cit.*), and therefore previously found in Britain. *Panthalis Ærstedii*, Kinberg, a fine species with the habit of a *Sigalion*. *Sigalion limicola*, Ehlers, a form found by its discoverer in the Adriatic. It is rather abundant in the Shetland seas, but, so far as known, has not yet been found on any other part of the British coast. The anterior scales are furnished towards the outer margin with peculiar ragged processes. It has four eyes, and not two, as stated by Dr. Ehlers. *Nephtys ciliata*, Müller. *Genetyllis lutea*, Malmgren. *Anaitis kosteriensis* (?), Malmgren. *Lumbrinereis fragilis*, Müller, a species which probably includes *L. tricolor* and some others, and therefore has been found previously on the British coast. It ranges from the Channel Islands to the north of the Shetlands, and large specimens occur at both extremities. *Onaphis sicula*, De Quatrefages, a curious species (inhabiting a tube composed of shell-fragments, stones, and sand), allied to *Hyalinæcia tubicola*, but differing entirely in the structure of certain of its bristles and hooks, and in the absence of the small brush-like bristles. It is not uncommon on the south coast of England, as well as in the Mediterranean. *Eone Nordmanni*, Malmgren, a species having the aspect of *Goniada maculata*, but differing amongst other particulars in the structure of the bristles of the dorsal lobe, which end in a somewhat blunt tip, furnished with a translucent conical apical pro-

cess. *Scoloplos armiger*, Müller, a very common inhabitant of our western and northern sandy shores. *Naidonereis quadricuspidata* (Fabr.), Örsted, also abundant in the same localities. *Trophonia glauca*, Malmgren, characterized by having bristles instead of hooks on the inferior division of the segments. *Chætopterus norvegicus*, Sars, a species which apparently comprehends *C. insignis*, Baird. *Scolecolepis cirrata*, Sars, not rare in the Shetland seas. *Rhodine Loveni*, Malmgren, which has its uncini placed in a double row as *Terebella*. It is one of the *Maldanidæ*. *Axiothea catenata*, Malmgren. This has an infundibuliform anal funnel with alternate longer and shorter filaments, and the base of the cup is marked exteriorly on the ventral surface by a continuation of the median line. The hooks have usually about six teeth on the summit above the great fang, though the anterior ones have fewer, and the posterior a larger number. *Praxilla prætermissa*, Malmgren, a form common on our western and northern shores, in a depth of 4 to 8 fathoms. *Praxilla gracilis*, Sars. *Clymene ebiensis*, Aud. & Ed., of which only a single incomplete example occurred. The hooks are less curved than in the foregoing species, and the crown somewhat flattened. The type was found on the coast of Brittany. *Ampharete artica*, Malmgren. *Sabellides sexcirrata*, Sars. *Grymæa Bairdi*, Malmgren, a species very closely allied to *Thelepus (Venusia) circinnatus*. *Lysilla Loveni*, Malmgren, which has six pairs of foot-papillæ in front, each with a submerged tuft of simple bristles. The dorsum is densely tuberculated, and the cephalic lobe furnished with clavate grooves and filiform tentacles. *Euchone analis*, Krøyer. *Chone infundibuliformis*, Krøyer.

The following is a list of the Zetlandic Annelids dredged in 1867 and 1868:—

Name of species.	Range.	Remarks.
	fathoms.	
<i>Euphrosine foliosa</i> , Aud. & Ed. ....	.....	Hebridean seas.
<i>Hipponoë Jeffreysii</i> , n. sp.	100	St. Magnus Bay.
<i>Aphrodita aculeata</i> , Linn.....	.....	Only small specimens.
<i>Lætmonice filicornis</i> , Kbg.	90-100	Very abundant in the N. Hebridean and Zetlandic seas.
<i>Lepidonotus squamatus</i> , Linn.....	0-60	
<i>Nychia cirrosa</i> , Pallas ....	.....
<i>E. inoa</i> —, n. sp.	90	Found attached to <i>Spatangus purpureus</i> in one instance.
<i>Harmothoë imbricata</i> , Linn.....	0-90	
— <i>longisetis</i> , Grube	0-90	North Unst &c.
<i>Lepidonotus pellucidus</i> , Ehlers	80	Rare.
<i>Polynoë scolopendrina</i> , Sav.....	0-15	Rare. It is abundant on the shores of the Hebrides between tide-marks.
<i>Halosydna gelatinosa</i> , Sars	0-8	
<i>Panthalis Örstedii</i> , Knbg.....	78	Rare. 35 miles off Out Skerries.
<i>Sigalion boa</i> , Johnst.	0	
— <i>Buskii</i> , n. sp.....	90-96	North Unst.
— <i>limicola</i> , Ehlers	80-96	Very abundant.
<i>Pholoë minuta</i> , Fabr.	0-100	
<i>Nephtys ciliata</i> , Müll.	100	
— <i>cæca</i> , Fabr.	0-50	
<i>Genetyllis lutea</i> , Mgrn.	100	St. Magnus Bay.
<i>Anaitis kosteriensis</i> ?, Mgrn.....	100	
<i>Phyllodoce grænlandica</i> , Erst.	100	
<i>Eumida sanguinea</i> , Erst.	0-50	

Name of species.	Range.	Remarks.
	fathoms.	
<i>Eulalia viridis</i> , Müll.	0	
<i>Eteone pusilla</i> , Erst.....	100	
<i>Ophiodromus vittatus</i> , Sars	0-100	Most abundant in the Hebridean seas.
<i>Castalia punctata</i> , Müll.	0-100	
<i>Syllis armillaris</i> , Müll.	0-100	
— <i>artica</i> , Mgrn.	100	
— <i>cornuta</i> , Rathke	50	
<i>Nereis pelagica</i> , Linn.	0-100	
<i>Hediste diversicolor</i> , Müll.	0-100	
<i>Nereilepas fucata</i> , Sav.	100	
<i>Heteronereis fucicola</i> , Erst.....	.....
<i>Lumbrinereis fragilis</i> , Müll.	0-100	
<i>Notocirrus scoticus</i> , n. sp.	5-100	
<i>Leodice norvegica</i> , Linn.	50	25 miles N.N.E. of North Unst, Balta, &c.
<i>Nothria conchylega</i> , Sars	90-100	Abundant in the Hebridean seas.
<i>Hyalinæcia tubicola</i> , Müll.	50-100	
<i>Onuphis sicula</i> , Quatref.	90	Off North Unst.
<i>Goniada maculata</i> , Erst.	80-100	
<i>Eone Nordmanni</i> , Mgrn.	90-96	St. Magnus Bay and N. Unst.
<i>Glycera capitata</i> , Erst.....	4-100	
<i>Aricia Cuvieri</i> , Aud. & Ed.	4-80	
<i>Scoloplos armiger</i> , Müll.	50	
<i>Naidonereis quadricuspidata</i> , Erst.....	70-80	
<i>Ammotrypane aulogaster</i> , Rathke	5-100	
<i>Ophelia limacina</i> , Rathke	50	
<i>Eumenia Jeffreysii</i> , n. sp.	50-100	
<i>Scalibregma inflatum</i> , Rathke	0-50	
<i>Arenicola marina</i> , Linn. ....	.....
<i>Ephesia gracilis</i> , Rathke	70	<i>Sphærodorum peripatus</i> , Johnst.
<i>Trophonia plumosa</i> , Müll.	6-8	
— <i>glauca</i> , Mgrn.	70-100	
<i>Chaetopterus norvegicus</i> , Sars .....	.....
<i>Scolecolepis cirrata</i> , Sars	80-100	
<i>Cirratulus cirratus</i> , Müll.	0-100	
<i>Capitella capitata</i> , Fabr.	50-90	
<i>Rhodine Loveni</i> , Mgrn.	40	Fragmentary. N. Hebridean seas.
<i>Nichomache lumbricalis</i> , Fabr.	0-100	
<i>Axiothea catenata</i> , Mgrn.	100	
<i>Praxilla prætermissa</i> , Mgrn.	70-80	
— <i>gracilis</i> , Sars	100	
— <i>artica</i> (? Malmgren)	70-90	
<i>Clymene ebiensis</i> , Aud. & Ed.	70-100	Fragmentary. Outer Haaf, Skerries.
<i>Ammochares ottonis</i> , Grube	4-100	Common.
<i>Sabellaria alveolata</i> , Linn.....	.....	Tubes only.
<i>Pectinaria belgica</i> , Pallas	50-100	
<i>Amphictene auricoma</i> , Müll.	100	
<i>Ampharete artica</i> , Mgrn.	80-100	
<i>Amphicteis Gunneri</i> , Sars	80-100	
<i>Sabellides sexcirrata</i> , Sars.....	80-100	
<i>Terebella nebulosa</i> , Mont.....	0-5	
— <i>littoralis</i> , Mont. ? .....	.....
— <i>figulus</i> , Dalyell .....	.....
<i>Nicolea zostericola</i> , Erst.....	50	
<i>Pista cristata</i> , Müll.	70-80	Not uncommon.
<i>Thelepus circinnatus</i> , Fabr.	50-120	
<i>Grymæa Bairdi</i> , Mgrn.....	70-80	
<i>Polycirrus aurantiacus</i> , Grube	70-80	

Name of species.	Range.	Remarks.
	fathoms.	
<i>Polycirrus</i> (?) <i>tribullata</i> , n. sp. ....	.....
<i>Lysilla</i> <i>Loveni</i> , <i>Mgrn.</i>	100	Fragmentary.
<i>Trichobranchus</i> <i>glacialis</i> , <i>Mgrn.</i>	100	
<i>Terebellides</i> <i>Strœmii</i> , <i>Sars</i>	5-100	Not uncommon.
<i>Sabella</i> <i>pavonia</i> , <i>Sav.</i>.....	.....
<i>Euchone</i> <i>analys</i> , <i>Krøyer</i>	80-100	
<i>Chone</i> <i>infundibuliformis</i> , <i>Krøyer</i>	80-100	
<i>Protula</i> <i>protensa</i> , <i>Grube et cœt.</i>	100	
<i>Filigrana</i> <i>implexa</i> , <i>Berkeley</i> .....	.....
<i>Serpula</i> <i>vermicularis</i> , <i>Linn.</i> .....	.....
— <i>reversa</i> , <i>Mont.</i>	90	
<i>Placostegus</i> <i>tridentatus</i> , <i>Fabr.</i>	85	
<i>Ditrypa</i> <i>arietina</i> , <i>Müll.</i>	80-100	Abundant.
<i>Tetrastemma</i> <i>variegatum</i>	4-5	
<i>Ommatoplea</i> <i>purpurea</i>	6-8	
— <i>pulchra</i> .....	.....
<i>Lineus</i> <i>longissimus</i>	0	
<i>Meckelia</i> <i>annulata</i> .....	.....
<i>Cerebratulus</i> <i>tænia</i>.....	.....
<i>Entobdella</i> <i>hippoglossi</i> .....	.....	Parasitic on the Holibut.
<i>Aulostoma</i> <i>gulo</i> .....	.....	Fresh water.
<i>Clitellio</i> <i>arenarius</i> .....	.....

Besides the foregoing, there are several whose examination, partly from their fragmentary state, has not been completed, and which are at any rate in the category of those new to Britain, viz. a *Sigalion*, a *Syllis*, an *Amage*, and a *Polycirrus*.

I may also remark, in passing, with reference to the other known forms in this collection, that the *Halosydna Jeffreysii*, Lankester (*op. cit.*), is *H. gelatinosa*, Sars, as mentioned in Dr. Günther's Zoological Record for 1866; and that I have not yet been able to make out a specific difference between *Leodice norvegica*, Linn., and *Eunice Harassii*, Aud. & Ed.

In addition to the foregoing, there was a very remarkable Nemertean allied to *Borlasia*, with a bifid proboscis, a complex structure of the muscular wall of the body; and a boring *Sipunculus*, lodged in its cavity inside a fragment of shell.

Report on the Shetland Foraminifera for 1868. By EDWARD WALLER.

THE almost unexampled stormy character of the summer in the Shetland Islands this year necessarily prevented dredging in the depths of 200 and more fathoms, which your Committee hoped to attain, and from which they reasonably expected additions to the British fauna in various departments.

The disappointment has, of course, affected the increase in the number of Foraminifera as of other orders. Notwithstanding this drawback, the examination of some of the fine siftings of our dredged stuff, even in a very cursory way, has brought to view some interesting forms hitherto unknown on our coasts. Amongst them a genus new to Britain, *Flabellina*, the observed species being very similar to the *Flabellina rugosa*, D'Orb., as found in the Lias of Somersetshire, and figured by Mr. H. B. Brady in the 'Proceedings

of the Somersetshire Archæological and Natural History Society,' vol. xiii. 1865-66. There are also some forms of *Lagena*, *Cristellaria*, *Uvigerina*, and *Bigenerina*, which seem sufficiently distinct from previously recorded British ones to be described under separate names; but I believe in no other order is there so much difficulty in defining the limits of species and varieties, and consequently so much danger of confusion in nomenclature. A more complete investigation of the dredgings will, I have no doubt, afford additional novelties.

In the list and remarks appended to my former Report (1867), I endeavoured to give as complete a view of the Shetland Foraminifera as our present knowledge permitted, so that a comparison can be made of their relation to those of the whole kingdom and of some neighbouring countries.

Addenda to the REV. A. M. NORMAN'S Report.

Cidaris papillata, Leske. I find that by some accident I have omitted to notice this species in the enumeration of species. It appears to be absent to the east and north-east of Shetland, as during our dredging in those directions we never saw any trace of it, and the fishermen at the Out Skerries were unacquainted with it. The specimens which have been procured through fishermen have been all from the western coast; and we had the pleasure of dredging the Piper in some numbers, 25-35 miles N.N.W off Unst in 110-170 fathoms in company with *Spatangus meridionalis* and other rarities. They appear to be very sluggish in their movements, as though kept alive for some time in a large tub of water, they showed very little inclination to change their position; of course, however, they found themselves placed in very unusual and probably very uncongenial conditions.

Amphiura tenuispina, Ljungman, "Tillägg till kännedomen af Skandinaviens Ophiurider," Öfvers. af k. Vet.-Akad. Förh. 1863, p. 360, pl. xv. fig. 1 = *Amphipholis elegans* var. *tenuispina*, Ljungman, "Ophiuroidea Viventia huc usque cognita," Öfvers. af k. Vet.-Akad. Förh. 1866, p. 312. The specimens of "*Amphiura elegans*" recorded in the foregoing Report from "40 fathoms, St. Magnus Bay," belong to *A. tenuispina*, Ljungman. That author at first described this form as a species, but in his more recent memoir considers it to be a deep-water form of *A. elegans*. On the other hand I at first regarded it in the latter light, but now think it may be a distinct species. For its characters I must refer the reader to Ljungman's paper. I find specimens of this Ophiuridan among the Echinodermata procured in the 'Lightning' expedition, and sent to me for examination by Messrs. Carpenter and Thomson; and dredged lat. 59° 40' N., long. 7° 20' W., on a bottom of fine mud in 530 fathoms and a temperature of 47° Fahr.

Pocillipora interstincta, Fleming, Brit. Anim. p. 511; Johnston's British Zoophytes, p. 194. This coral, found by Dr. Hibbert in the Shetland sea, has been an obscure species of which we have been able to make out nothing hitherto. I have recently, however, seen specimens of a highly interesting coral procured by Messrs. Carpenter and Thomson in the 'Lightning' expedition off Cape Wrath, lat. 59° 5' N., long. 7° 29' W.,

in 189 fathoms, and also a fragment sent to me to examine by Mr. D. Robertson, who procured it from Faroe, which exactly correspond with Fleming's brief description; and as the specimens which I have seen are from the north and from the south of Shetland, there is every likelihood of its having been found at the intermediate locality. A description of the species will be given by me in the Report of the Invertebrata procured in the 'Lightning' expedition.

Report on the Chemical Nature of Cast Iron.—Part I. Account of some Experiments made to obtain Iron free from Sulphur. By A. MATTHIESSEN, F.R.S., and S. PRUS SZCZEPANOWSKI.

FOLLOWING out the plan indicated in the preliminary report presented to the Association in the year 1866, we have been endeavouring to prepare pure iron, but have encountered greater difficulties than we expected, owing to the great affinity which iron has for sulphur. Although we have not been able as yet to prepare iron absolutely free from sulphur, yet the results, as far as they have been obtained, may be of interest to the Association, and a brief account of them is given in the following pages.

In the endeavour to prepare pure iron, we always found sulphuretted hydrogen on dissolving the metal in dilute hydrochloric acid. The small quantity of sulphur contained in the iron did not proceed from the hydrogen or from the platinum-tube in which the oxide was reduced. The manner of preparing the pure hydrogen and the precautions taken with the platinum-tube will be described hereafter.

The first series of experiments were made by precipitating the hot, concentrated, clear solution of protosulphate of iron by oxalate of ammonium, washing the precipitate till the wash-waters no longer indicated sulphuric acid with chloride of barium, heating the dried oxalate of iron to redness in a platinum-dish, and reducing the oxide thus obtained in a platinum-tube. The reduced iron contained sulphur. In all the experiments we describe sulphur was tested in the following manner. The iron was placed in a test-tube with some dilute pure hydrochloric acid, and the gases were allowed to pass through a small tube fitted into a cork in the test-tube, and to impinge on a paper moistened with acetate of lead. The evolution of sulphuretted hydrogen, after a very little experience, moreover is just as easily detected by the smell.

Experiments were also made with the oxalate of iron by redissolving it in hydrochloric acid and reprecipitating with ammonia, or by dissolving the oxide obtained by heating the oxalate of iron in hydrochloric acid, and reprecipitating again by oxalate of ammonium. In all these cases the reduced iron contained sulphur.

The second series of experiments were with iron obtained from the crystalline oxide. It is well known that when protosulphate of iron is fused with chloride of sodium, a crystalline oxide is obtained. For our experiments it was of course necessary to perform this operation in a platinum crucible, but it was found that the iron thus obtained contained a small quantity of platinum. We therefore employed instead of chloride of sodium the sulphate of sodium, and obtained an oxide which, after being thoroughly washed and reduced, gave an iron containing no platinum but still traces of sulphur. Experiments were then made by dissolving the crystalline oxide in pure