Graah, and other authorities. The geological details are by myself, as narrated in the text. Only those parts are coloured geologically of which the general lithology is known. In most cases, the limits of the formations can only be given approximately. It must be understood that where miocene and cretaceous formations are marked as existing, that there are also, as described, outbursts of trap, &c.; but the trap, for the sake of clearness of detail, is marked as existing *behind* the sedimentary rocks.

VII.—Notes *on the recent* Ostracoda *and* Foraminifera *of the* Firth of Clyde, *with some remarks on the Distribution of Mollusca.* By David Robertson, F.G.S.

[Read 16th April, 1874.]

A paper on recent Ostracoda and Foraminifera may seem rather out of place before a Geological Society, as communications of this kind usually find their way into other channels specially prepared for them. But when we consider the close relation of the present with the past, we perceive that much light may be thrown on the fossil fauna by a knowledge of the life-habits of existing forms; and no classes of animals are better fitted for this purpose than our minute Ostracoda and Foraminifera, extending as they do through all geological formations, and abounding in all seas and at all depths.

Keeping in view the geological bearing of the facts, I propose to bring forward some particulars with regard to the variations in the groupings of species in different habitats and different localities, taking into account the depth of water and the character of the sea-bottom, together with the occurrence of species in one place compared with another, and their relative abundance or rarity.

In drawing conclusions from the condition of the sea-bottom, we must remember that different groupings may be met with in mud, sand, or gravel of similar appearance, and often at no great distance from each other. Apparently slight differences in the constituents, chemical condition, &c., of the sea-bottom will account, in a great measure, for the absence or sparseness of a given species in one locality, and its abundance in another.

FORAMINIFERA.

× Massé rare.
" " " moderately common.
× × × abundant.

| Species. | Station. | Depth in Fathoms. | Nature of Bottom. | Station. | Depth in Fathoms. | Nature of Bottom. | Station. | Depth in Fathoms. | Nature of Bottom

× Means rare.
×× ,, moderately common.
××× ,, abundant.

Nos. / SPECIES.	1 Loch Ryan, Wigtownshire. 6 to 7 fa.	2 Off Girvan, Ayrshire. 12 to 15 fa.	3 Campbeltown Loch, Argyleshire. 3 to 9 fa.	4 East Tarbert Loch, Argyleshire. 4 fa.	5 Ardrishaig. 6 fa.	6 Off Inveraray, Lochfyne. 25 fa.	7 Glen Sannox Bay, Arran. 20 fa.	8 Lamlash Bay, Arran. 14 fa.	9 Off Horse Island, Ardrossan. 20 fa.	10 Between Portincross and Ardrossan. 30 fa.	11 St. Ninian's Bay, Bute. 6 to 8 fa.	12 Loch Ridden, Kyles of Bute. 16 fa.	13 Colintraive Bay, Kyles of Bute. 10 to 12 fa.	14 Loch Striven. 25 fa.	15 Rothesay Bay, Bute. 15 to 18 fa.	16 Kilchattan Bay, Bute. 20 to 25 fa.	17 Callum's Bay, Bute. 10 fa.	18 Castle Bay, L. Cumbrae. 3 to 5 fa.	19 Muggle Pt., L. Cumbrae. 16 fa.	20 Tan, Cumbrae. 10 to 12 fa.	21 Clach, Cumbrae. 5 to 8 fa.	22 Kames Bay, Cumbrae. At low water.	23 Off Portley, Cumbrae. 10 to 12 fa.	24 Off Fairland Pt., Cumbrae. 19 fa.	25 Off De'el's Dyke, Cumbrae. 10 to 15 fa.	26 Off Lion, Cumbrae. 20 fa.	27 Off Fairley Perch. 10 fa.	28 Off Ferry House, Cumbrae. 6 fa.	29 Off Largs. 20 fa.	30 Off White Bay, Cumbrae. 20 fa.	31 Off White Bay, Cumbrae. 7 fa.	32 Off Figgetoch Glen, Cumbrae. 22 fa.	33 Off Fintry Bay, Cumbrae. 22 fa.	34 Inverkip Bay. 12 fa.	35 Loch Long. 15 fa.	36 Rosneath Bay. 18 fa.	37 Off Greenock Pier. 4 to 6 fa.	38 Off Port Glasgow and Langbank. 1 fa.	39 Lochgoil. 30 fa.	40 Gareloch. 15 fa.
Potamocypris fulva, Brady.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	×	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	×	...	...
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,, *acuticostata*, Sars.	...	××	...	×	...	××	...	×	...	...	××	...	...	...	××	...	××	×	×	××	××	...	...	××	××	×	×	...	...	...	...	...	...	...	×	...	...	...	...	...
,, *clathrata*, Sars.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	×	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, *cellulosa*, Norman.	...	...	××	××	...	××	...	×	...	...	...	...	×	××	...	×	××	×	×	×	×××	××	×××	×	×	××	××	××	...	×	×	...	×	×	×	...	...	...	××	×
,, *flavescens*, Brady.	×	...	××	...	...	×	××	...	××	×	...	...	×	...	×	...	...	××	...	...	...	××	...	...	...	...	××	...	...	...	××	...	...	×	...	...	...	...	...	×
Cytheropteron latissimum, Norman.	...	...	...	...	...	××	...	...	×	×××	...	××	××	××	...	××	××	...	××	×	×	...	××	××	××	×××	××	×××	×	××	...	×××	××	×××	×××	...	...	...	××	×××
,, *nodosum*, Brady.	...	...	...	...	...	...	...	...	×	××	...	...	...	×	×	×	...	×	...	×	...	...	...	...	××	×××	...	...	...	××	...	×	××	××	...	×	...	...	...	...
,, *punctatum*, Brady.	...	××	...	...	...	...	...	...	...	...	...	×	...	...	...	...	××	...	...	...	...	...	...	××	...	×	...	...	...	...	×	...	...	×	...	...	...	...	...	...
,, *alatum*, Sars.	...	...	...	...	...	×	...	...	...	××	...	...	...	××	××	××	...	...	...	...	...	...	...	...	...	×	...	...	×	...	...	××	××	...	××	××	...	...	×××	...
,, *angulatum*, B. & R.	...	...	...	...	...	...	...	...	...	×	...	...	...	...	...	×	...	...	...	...	...	...	...	...	...	×	...	...	...	...	...	...	×	...	...	××	...	...	...	...
Bythocythere simplex, Norman.	...	...	...	...	...	...	...	...	...	×××	...	××	××	××	××	××	...	...	...	...	...	...	...	×	...	×	...	...	××	×	...	××	×	...	××	××	...	...	×××	×××
,, *constricta*, Sars.	...	...	...	...	...	××	...	...	...	...	...	...	...	...	...	...	××	...	...	...	...	...	...	××	××	××	×	...	...	××	...	...	...	...	××	×	...	...	...	×
,, *turgida*, Sars.	...	...	...	...	...	...	...	...	...	...	...	...	××	××	××	××	...	...	...	...	...	...	...	...	...	×	...	...	...	...	...	×	××	×	...	×	...	...	×××	...
Pseudocythere caudata, Sars.	...	...	...	...	×	×	...	...	...	...	...	...	...	×	...	×	××	...	...	××	...	...	...	××	×××	××	...	...	...	...	...	×	...	...	...	...	...	...	...	...
Cytherideis subulata, Brady.	...	...	...	...	...	...	...	...	×	×	...	...	...	...	...	×	...	...	...	...	×	...	×××	×××	...	×	××	...	...	...	...	×	...	...	...	...	...	...	...	...
Sclerochilus contortus, Norman.	×	××	...	...	...	...	...	×	...	×	×	×	...	×	××	××	××	×	×	××	×	...	×	××	×××	×××	×	××	...	××	...	××	××	××	...	××	...	...	××	×
Xiphichilus tenuissima, Norman.	...	×	...	...	...	...	...	...	...	××	...	...	××	××	...	××	...	...	...	...	...	...	×	...	...	...	×	...	××	×	...	××	××	...	×	××	...	...	...	××
Paradoxostoma variabile, Baird.	×	×	××	××	×	××	××	×	××	...	×	...	×	×	×	...	××	××	×	××	××	×	××	...	××	××	××	×	×	×	××	×	...	×	×	××	×	×	×	××
,, *abbreviatum*, Sars.	...	××	×	...	...	...	...	×	×	...	×	×	...	...	...	...	××	×	×	××	××	...	×	×	×	...	××	...	×	...	...	...	×	...	...	××	...	...	...	×
,, *ensiforme*, Brady.	×	×××	...	×	...	...	...	×	×	××	...	...	...	...	...	×	...	...	×	×	×	...	×	...	××	××	...	×	...	...	×	...	...	××	×	××	...	...	...	...
,, *flexuosum*, Brady.	...	××	×	...	...	×	...	...	...	×	...	...	...	...	×	...	×	×	×	...	×	...	...	××	××	××	...	...	...	...	...	×	...	×	×	...	...	...	×	...
,, *hibernicum*, Brady.	...	...	×	...	...	...	...	×	...	...	...	...	...	...	...	...	×	...	...	...	...	××	×	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, *Fischerii*, Sars.	...	...	×	×	×××	××	...	...	...	...	...	...	××	×	...	...	...	...	...	...	××	...	×	...	×	...	××	...	...	...	...	...	...	...	...	...	...	...	...	×
,, *pulchellum*, Sars.	×	...	...	...	...	...	×××	×	...	××	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	××	...	×	...	...	...	...	...	××	...
,, *arcuatum*, B., C., & R.	...	...	...	...	...	...	...	×	...	...	×	...	...	...	...	×	...	...	...	...	...	...	...	...	...	××	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, *oblongum*, Sars.	×	...	...	...	...	...	...	×	...	...	...	...	...	...	...	...	×	...	...	×	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, *orcadense*, Brady & R.	...	...	...	...	...	...	××	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Philomedes interpuncta, Baird.	...	...	...	...	×	×	...	×	×	××	...	...	×	...	××	...	×	×	...	×	××	...	...	...	×××	×	×	×	...	××	...	...	...	××	×××	××	...	...	××	××
Asterope Mariæ, Baird.	...	...	...	...	××	...	×	×	...	...	×	...	...	...	×	...	×	...	...	×	××	...	×	...	×	...	...	...	...	...	...	...	...	...	×	...	...	...	×	...
,, *teres*, Norman.	...	...	...	...	...	...	...	×	...	...	...	...	...	...	...	...	××	...	...	×	×	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Polycope orbicularis.	...	×	...	...	...	××	...	...	...	×××	×	×	××	××	××	××	...	×	...	...	...	...	...	××	×	×	...	×	...	××	...	××	××	×××	×	...	...	...	×××	...

However similar the habitat of a species may be at the bottom of the sea in one place as compared with another, a little difference of the materials of which it is composed, although that difference is quite inappreciable to the eye, may favour the increase of size, or impoverish and check reproduction. Such difference in the habitat may also give different degrees of intensity and modes of arrangement to the colours and sculpturings, and so produce and develop varieties.

In many cases, there appears to be too much readiness to adduce climatal change as a cause of varieties in the fauna, which may be only the consequence of local circumstances. For example, *Terebratula caput-serpentis* (an Arctic species) is large, well grown, and abundant in Lochfyne, but small, dwarfed, and rare at Cumbrae—at both places in the same depth of water and on similar bottoms, which obviously must be attributable to some unobserved conditions of habitat, independent of climate. There is another curious fact with regard to *Terebratula caput-serpentis*, in common with a few other species—namely, that it is abundant in the Norwegian post-tertiary clays, and rare or absent in those of Scotland, while yet it is a common recent species in the Scottish seas. If temperature were the sole agency which regulated the distribution of species, we might expect to find the remains of nearly all our existing species becoming more abundant in our recent clays, as they approach to the present epoch.

Astarte borealis, on the other hand, is an Arctic type not living in our British seas, but common in many of our Scottish post-tertiary deposits. It is remarkable, however, that of forty-six glacial and post-glacial deposits examined by the late Professor M. Sars, in only one of these was *Astarte borealis* obtained. Reasoning on the climatal hypothesis of transmission, we should infer that *Astarte borealis* would be much more common in the Norwegian than the Scottish deposits; yet the reverse is the case: which might raise the question naturally enough, whether this so-called Arctic species really came from the north to our seas during the glacial period, as seems to be the common opinion, or whether it has not made its way from our seas to its present northern habitat.

On the east coast of Scotland, the post-tertiary fauna has been considered more intensely Arctic than that in the valley of the Clyde on the west; but whatever the cause may have been, it cannot well be attributed to a difference of climate, as, at the

time these beds of shell-bearing clay were deposited, the same seas must have flowed freely between the Firth of Forth and the Firth of Clyde. In drawing inferences from the extreme temperatures of cold that prevailed over the country in glacial times, we are apt not to take sufficiently into account the great difference of range between subaerial and subaqueous temperatures. As the cold never attains in any sea to more than a few degrees below the freezing point of fresh water, it would seem to follow that we cannot reasonably attribute so much influence to the cold in affecting or changing the character of the fauna of our seas, as is frequently assigned to it.

It has been shewn that it is quite a common thing for existing species of the invertebrate fauna to be abundant in one locality and wanting at another at no great distance, where all the conditions appear to be similar; and these anomalies of distribution often remain with great constancy. It would obviously be unwarrantable to conclude that these variations of animal life on different portions of the same sea-bottom were brought about by change of climate.

Abundance or rarity of animal life, both of recent and in older deposits, are and have been (there can be no doubt) largely influenced by the depth of water, the strength and temperature of currents, and the condition of the sea-bottom,—whether it affords the most suitable habitat, or supplies the food best fitted for the healthy development of the species, and what measure of immunity the adult or young enjoy from their enemies. Such circumstances must go far to regulate the dispersion of the invertebrate fauna over the sea-bottom.

In this country, we are in the habit of testing the Arctic character of our glacial shells by the presence or absence of recent species; that is, if a post-tertiary British species is not found living in our present seas, but living in Arctic regions, the conclusion come to is, that the species is of Arctic origin, and had been ushered in with the cold from northern regions, and with the cold had retired back to its former locality. *Pecten Islandicus* is a common type of this character—an abundant shell in the post-tertiary deposits of the valley of the Clyde—and its large dimensions in many of the beds shew that it had lived under most favourable conditions. But how or under what circumstances this species performed the migration from Arctic regions to our latitude and back, may be difficult to say.

The migration of some species of Mollusca from one distant sea to another is full of interest, but their mode of transport is encompassed with much uncertainty. For example, the late Professor Sars remarked that *Tapes decussata* (Linn.) and *Pholas candida* (Linn.) are found in the post-glacial clays of Norway, though not now living on the shores of that country, so far as known; such cases are thought to be the relics of ancient communications between different seas. The difficulty in such cases is to see how a littoral Mollusc could make its way, or propagate by degrees, across hundreds of miles of deep-sea bottom presenting conditions inconsistent with the requirements of food and habitat of a littoral species. Even the deep-sea species in these long migrations might find extensive parts of shallow ooze, sand, or gravel, together with variations of temperature, offering insurmountable barriers to their progress. Still, in spite of all these obstacles, such migrations seem to have taken place.

On comparing the recent Ostracoda and Foraminifera of the Clyde district with those of post-tertiary age, we find that from thirty-five different localities of recent Ostracoda, the average gross number is 34, the lowest number from any one locality being 22, and the highest 50.

The average number of post-tertiary Ostracoda from twenty different localities is 23, the lowest being 10, and the highest 37.

The average number of recent Foraminifera from seventeen localities is 37, the lowest from any one locality 27, the highest 50.

From ten post-tertiary deposits the average number of species of Foraminifera is 17, the lowest 9, and the highest 30.

These results may be tabulated as under:—

OSTRACODA.

Post-Tertiary (twenty localities).		Recent (thirty-five localities).	
Average,	23	Average,	34
Highest,	17	Highest,	50
Lowest,	10	Lowest,	22

FORAMINIFERA.

Post-Tertiary (ten localities).		Recent (seventeen localities).	
Average,	17	Average,	37
Highest,	30	Highest,	50
Lowest,	9	Lowest,	27

From these comparisons it is seen that the recent Ostracoda and Foraminifera in the valley of the Clyde exceed considerably those of post-tertiary deposits—fully one-third in the Ostracoda, and one-half in the Foraminifera. Whatever the cause may have been of so marked a difference in numbers, we can scarcely ascribe much of it to erosion, since the most delicate sculpture remains beautifully sharp and distinct over the calcareous tests of these minute organisms, notwithstanding their long entombment in the clays of our country.

So far as our investigations have gone, both fossil Ostracoda and Foraminifera are less numerous in the clays on the east of Scotland than on the west. From ten deposits—Dryleys, Puggeston, Annochie, Barrie, Errol, King Edwards, Gamrie, Elie, Wick, and Burn of Haster—the average number of Ostracoda is 13; the lowest 6, and the highest 23. The average number of Foraminifera from seven deposits—Dryleys, Puggeston, Elie, Errol, Gamrie, and King Edwards—is 15; the lowest 8, and the highest 28. Thus—

The average fossil Ostracoda on the west is 23, on the east, 13.
" " Foraminifera, " 17, " " 15.

the chief difference being confined to the Ostracoda.

So far as the localities that have been examined indicate, the post-tertiary Ostracoda on the west of Scotland exceed the Foraminifera by nearly one-third, while in the east the Foraminifera slightly exceed the Ostracoda.

In seven Norwegian post-glacial deposits, the average number of Ostracoda is 14, the lowest in any one locality is 9, and the highest 19. The average number of Foraminifera is 19, the lowest 12, and the highest 31. Here the Foraminifera exceed the Ostracoda in their average number of species by nearly one-third, while in the west of Scotland the Ostracoda exceed the Foraminifera to an equal extent.

Further research may change these proportions to some extent, but it is most likely that the general results will remain nearly the same; and there is little reason to suspect fallacy connected with the manner in which the samples were collected for examination, as the quantity of material examined from each locality was nearly the same—the chief difference being that a few gatherings from the recent localties were more gravelly than our brick clays are—a prevailing feature in the

laminated clays of the Clyde district being that they are composed of fine clays interstratified by thin layers of sand, with stones of various sizes thinly interspersed, many of them scratched and grooved, and occasionally covered by the remains of Balani and Serpulæ—the stones, great and small, seldom exceeding nine or ten per cent.

All post-tertiary deposits within the reach of the tide have been excluded, as they would greatly vitiate such comparison, being at all times unavoidably mixed with recent organisms.

There is another fact connected with the distribution of these minute organisms worthy of notice, which is, the great influence that the depth of water appears to have upon the relative proportion of Ostracodā and Foraminifera. In the greatest depths reached by the "Porcupine" and the "Challenger," Foraminifera were found with an entire absence of Ostracoda. I have lately had the opportunity of examining a large number of parcels of material dredged by Mr. Whiteaves in the Gulf of St. Lawrence. In eight of these gatherings, the least depth was 120 fathoms, the greatest depth 313 fathoms, and the average 196 fathoms. In all of these, there is a remarkable scarcity of Ostracoda; in some they are wholly absent, and in others there is only one species, represented by one or two individuals. In some of the other gatherings, there might be two or three species, but in most cases one species only was found, and generally limited to a few individuals. In the same gatherings, Foraminifera are in great abundance, both in genera, species, and individuals. It may be remarked, however, as might be expected, that the decrease of Ostracoda does not strictly follow the increase of depth, for in different localities at the same depth, the proportions of these Ostracoda vary considerably, and also relatively to the Foraminifera, arising, we may reasonably assume, from local causes.

There is yet another remarkable fact connected with these tiny forms—one that we might not readily suspect—viz., that they are in greater abundance in many places exposed to the wild tumults of the sea, than they are in our sheltered lochs. In five of these—Lochfyne, Lochlong, Loch Striven, Loch Ridden, and Loch Ryan—the average number of Ostracoda is 28, against 34 of the general average. The average number of Foraminifera in three lochs—Loch Striven, Loch Ridden, and Loch Ryan—is 29, against 37 species of the general average.

Perhaps the richest haul we have had in the Firth of Clyde was on the exposed coast between Ardrossan and Portincross, about three miles off shore, in thirty fathoms, mud bottom. The Ostracoda numbered 43 species, and the Foraminifera 62, which is about one-half of the British marine Foraminifera obtained in this one haul.

The great number of Ostracoda and Foraminifera that may be collected from a small parcel of mud, dredged from a very circumscribed spot, shews the vast abundance of these minute animals that swarm over the bottom of the sea.

In preparing this catalogue of the marine Ostracoda and Foraminifera of the Firth of Clyde, I include all the tract between a line drawn from the west shore of Loch Ryan to the Mull of Kintyre on the south, and Dumbarton Castle on the north. Not that all this extent has been thoroughly wrought out, but that the gatherings might be from as many distinct points as the district would admit of.

It is not to be understood that more than a haul here and there has been taken at distant points, except in the neighbourhood of the Cumbraes, where more opportunities have occurred of working over a closer succession of points. Nor are the various lists made within these bounds to be viewed as in any sense exhaustive, but only what may have been taken in a single haul;—another gathering at a very short distance might add considerably to the list.

The object aimed at is chiefly to shew how the groupings of the species vary at different places, on different bottoms, and at different depths, which could only be done with any degree of accuracy by confining the lists to one haul, which reduces the risk of mixing two different characters of sea-bottom to a minimum. This object was further secured by the construction of the dredge that was used, which generally filled by dragging it a few boat-lengths.

The appended Tables shew at a glance the relative proportions of both Ostracoda and Foraminifera, as thus obtained over the area described.

OSTRACODA.

Remarks on the Species.

PARACYPRIS POLITA, G. O. Sars.

Paracypris polita,	G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 12.
,,	,, Brady.	Monog. Rec. Brit. Ostrac., p. 378.

Distribution—*Recent:* Norway, Great Britain. *Fossil:* Scotland—Raised beach, Oban. Norway, post-tertiary beds.

In the Clyde district this species may be considered rare, or confined to patches. In the forty gatherings given in the Table, it occurs only in five—in two rare, and in three moderately common, in none abundantly.*

PONTOCYPRIS MYTILOIDES, Norman.

Cythere mytiloides,	Norman.	Ann. Mag. Nat. Hist., vol. ix., p. 50.
Pontocypris mytiloides,	Brady.	Monog. Rec. Brit. Ostrac., p. 385.

Distribution—*Recent:* Norway, Great Britain, Ireland. *Fossil:* Scotland—Dumbarton, Cartsdyke, Paisley; Dipple; Norway.

This species occurs in twenty-six of the gatherings represented in the annexed Table—in twelve it is rare, and in fourteen moderately common, but nowhere found in any great abundance in the Clyde district. Its range is from 6 to 30 fathoms. As a fossil it is more common in silts and raised beaches than in the post-tertiary deposits or those containing Arctic shells. It may be remarked that the young of this species, at an early stage of their growth, assume the adult form; and the colour of the adult shell belongs to the shell itself, and not, as in many cases, where it is only the animal tissues seen through the shell.

PONTOCYPRIS TRIGONELLA, G. O. Sars.

Pontocypris trigonella,	G. O. Sars.	Overs. Nory. Mar., p. 16.
,,	,, Brady.	Monog. Rec. Brit. Ostrac., p. 387.

Distribution—*Recent:* Norway, Great Britain, Ireland, Mediterranean, Cape Verde. *Fossil:* Lochgilp, Paisley, Cartsdyke, Dipple.

Occurs in fourteen out of the forty gatherings from the Clyde district—in eight it is rare and in six moderately common, but does not prevail in any. It is found equally common in raised beaches and post-tertiary deposits.

ARGILLÆCEA CYLINDRICA, G. O. Sars.

Pontocypris angusta,	Brady.	Monog. Rec. Brit. Ostrac., p. 387.

Distribution—*Recent:* Great Britain, Norway. *Fossil:* Scotland—Duntroon, Cartsdyke, Paisley, Dalmuir, Dumbarton.

* Rarity or abundance refers only to the gathering to which it belongs, and not to the district, as a species may be rare in one gathering and common in another in the same locality.

This species occurs only in four of the forty gatherings—in three rare, and in one moderately common. It is more common in the post-tertiary clays than silts or raised beaches.

BAIRDIA INFLATA, Norman.

Cythere inflata, Norman.	Ann. & Mag. Nat. Hist., vol. ix. p. 49.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 388.

DISTRIBUTION—*Recent:* Great Britain, Ireland. *Fossil:* Scotland—Raised beach, Oban.

Occurs in five of the gatherings—in all rare, and all off the shores of the Cumbraes; in 3 to 15 fathoms, mostly on somewhat hard bottom.

CYTHERE LUTEA, Müller.

Cythere reniformis, Baird.	Brit. Entom., p. 169.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 395.

DISTRIBUTION—*Recent:* Baffin's Bay, Iceland, Gulf of St. Lawrence, North Sea, Great Britain, Ireland, Baltic, Mediterranean. *Fossil:* Occurring in nearly all the beds on the west of Scotland, but less frequent on the east. Ireland, Belfast New Docks (silt), and in the raised beach, Portrush; Canada and Norway, post-tertiary.

A widely distributed species in the Clyde district, occurring in thirty-one of the gatherings—in ten rare, in eighteen moderately common, and only in three prevailing to any extent.

CYTHERE VIRIDIS, Müller.

Cythere viridis, Müller.	Entom., p. 64.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 397.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Holland. *Fossil:* In nearly all the clay beds on the west of Scotland, less so on the east of Scotland. Ireland—Portrush raised beach; Norway, post-tertiary beds.

This is one of the commonest species in the Firth of Clyde, and although considered a littoral species, is found in every one of the forty gatherings—in fourteen rare, in twenty-four moderately common, and in two very common. Ranging from low-water to 30 fathoms.

I may remark that in all my gatherings I have never found one of this species green or even greenish, as the specific name implies.

CYTHERE PELLUCIDA, Baird.

Cythere pellucida, Baird.	Brit. Entom., p. 173.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 397.
,, ,, Brady & Robertson.	Ann. & Mag. Nat. Hist., ser. 4., vol. iii.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Holland, Mediterranean, Gulf of St. Lawrence. *Fossil:* Common in the clay deposits of England, Scotland, Ireland, and Norway—both associated with Arctic shells, and in the silts and raised beaches.

Occurs in thirty-three of the gatherings of the Firth of Clyde—in seven rare, in fourteen moderately common, and in twelve very common. More frequently in greater abundance than any other species of Ostracoda in Clyde district.

CYTHERE CASTANEA, G. O. Sars.

Cythere castanea, G. O. Sars. Overs. Nory. Mar. Ostrac., p. 32.
,, ,, Brady. Monog. Rec. Brit. Ostrac., p. 398.
,, ,, Brady & Robertson. Ann. Mag. Nat. Hist., ser. 4, vol. iii.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Holland. *Fossil:* Occurring in most of the clay deposits on the west of Scotland and South Wales, Cardiff New Dock-basin.

A common brackish water or estuarine species, also common under purely marine conditions.

It occurs in fifteen of the gatherings—in ten rare, and in five moderately common; in from 1 to 25 fathoms.

CYTHERE PORCELLANEA, Brady.

Cythere porcellanea, Brady. Ann. Mag. Nat. Hist., ser. 4, vol. iii.,
,, ,, Brady & Robertson. Ibid.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Holland. *Fossil:* West Tarbert, Cartsdyke, Cumbrae, Kilchattan, Dalmuir; South Wales, Cardiff New Dock-basin.

Occurs in eight of the forty gatherings from Clyde district—in four rare and in four moderately common; in 1 to 25 fathoms.

CYTHERE MACALLANA, Brady & Robertson.

Cythere Macallana, Brady & Robertson. Ann. & Mag. Nat. Hist., ser. 4, vol. iii.
,, *propinqua*, G. O. Sars. Undersö. over Christianiafj., p. 57.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Holland. *Fossil:* Scotland—Kilchattan, Cumbrae, Cartsdyke, Dalmuir, West Tarbert; South Wales, Cardiff New Dock-basin.

Rather rare in the Firth of Clyde, occurring only in five of the gatherings—in two rare, in two moderately common, and in one common.

CYTHERE TENERA, Brady.

Cythere tenera, Brady. Monog. Rec. Brit. Ostrac., p. 399.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Bay of Biscay. *Fossil:* Scotland—Wick, Dipple, Oban raised beach; Ireland—Portrush; South Wales—Cardiff New Dock-basin; England—Mersey.

Occurs in twenty-seven of the Clyde gatherings—in six rare, in fourteen moderately common, and in seven very common; ranging from 6 to 30 fathoms. Prevailing most on muddy bottoms, where it is generally associated with *Cythere porcellanea*, and in some cases it is difficult to distinguish the one from the other.

CYTHERE CRISPATA, Brady.

Cythere crispata, Brady. Monog. Rec. Brit. Ostrac., p. 399.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Australia, Hong Kong. *Fossil:* Scotland—Paisley; Ireland, Portrush raised beach; Norway.

In the Firth of Clyde it occurs in seventeen of the gatherings—in nine rare, and in eight moderately common; from 4 to 25 fathoms, and most prevalent on sandy mud bottoms.

CYTHERE BADIA, Norman.

Cythere badia, Norman.	Ann. & Mag. Nat. Hist. for Jan., 1862.
,, *cicatricosa*, G. O. Sars.	Overs. Nory. Mar. p. 33.
,, *badia*, Brady.	Monog. Rec. Brit. Ostrac., p. 399.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Mediterranean, Australia.

This species is rather sparsely distributed over the Firth of Clyde, having been obtained in only four of the forty gatherings—in three rare, and in one common; ranging from low water to 20 fathoms.

CYTHERE RUBIDA, Brady.

Cythere rubida, Brady.	Monog. Rec. Brit. Ostrac., p. 400.

This species was hitherto only met with at Clachland Point, Arran, in rock pools (Norman), and now at low water on sand covered stones, Kames Bay, Cumbrae.

CYTHERE ALBO-MACULATA, Baird.

Cythere albo-maculata, Baird.	Brit. Entom. 169.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 402.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Bay of Biscay, Levant, Cape Verde, Norway. *Fossil:* Post-tertiary clays and raised beaches, Scotland, Ireland, and Norway.

This is rather a littoral species, and does not appear so often in the dredgings as other species less common in the district. It occurs in seventeen of the gatherings—in six rare, in ten moderately rare, and in one common; ranging from low water to 30 fathoms.

As the name implies, this species is often found maculated with small dashes of black within the tidal belt, but in deeper water they are mostly, if not always, of a uniform colour, from a yellowish-brown to a dirty white. That these maculations are the results of food or peculiar localities, rather than constant specific characters, may be inferred from the fact that at some places almost all the species of Ostracoda are affected in the same way. At Whitby, near St. Mary's Island, a few miles north of Newcastle, this was the case with nearly all the Ostracoda in a gathering of sandy mud scraped off the rocks near low water. *Cythere lutea*, and all the members present of the genus *Paradoxostoma*, as well as *Cythere albo-maculata* and *Cytherura nigrescens* shewed a similar state of maculation.

CYTHERE CONVEXA, Baird.

Cythere convexa, Baird.	Brit. Entom., p. 174.
,, *punctata*, Jones.	Entom. Ter. Eng., p. 24.
,, *convexa*, Brady.	Monog. Rec. Brit. Ostrac., p. 401.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Levant. *Fossil:* Scotland—Errol, Paisley, Cumbrae, Lochgilp, and raised beaches, Cumbrae, Oban, West Tarbert silt. Ireland—raised beach, Portrush, silt, Belfast New Docks.

This species is taken moderately common by the dredge in the Clyde district, but not abundantly in any of the gatherings. It is most frequently met with in the muddy sand and harder ground, but seldom on the purely mud bottom of the lochs in the Firth of Clyde.

CYTHERE CUNEIFORMIS, Brady.

Cythere ventricosa, Sars.	*Loc.cit.*, p. 34.
,, *cuneiformis*, Brady.	Monog. Rec. Brit. Ostrac., p. 404.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway. *Fossil:* Raised beach, Oban, West Tarbert, and Bridge of Allan silt.

This species is seldom taken in any great abundance. It occurs in twelve gatherings in the Firth of Clyde—in nine rare, and in three moderately common; ranging from low water to 30 fathoms.

CYTHERE LIMICOLA, Norman.

Cythere limicola, Norman.	Nat. Hist. Trans. Northumb. and Durh., vol. i. p. 20.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 405.

DISTRIBUTION—*Recent:* Great Britain, Norway, Baffin's Bay. *Fossil:* Scotland—Tangyburn, Campbeltown; Stobcross, Glasgow; Dumbarton, Inch Lonaig, Lochlomond; Cartsdyke, Greenock; Cumbrae, Kilchattan, Bute; Kyles of Bute, Duntroon, Argyleshire; Terally, Wigtownshire; Gamrie, Banffshire; Canada—Post-tertiary beds.

Although this is rare as a recent species, it is common in the post-tertiary deposits, but absent in the raised beaches and silts. It only occurs in one of the forty gatherings in the Clyde district (off Girvan, in 12 to 15 fathoms; bottom, dead shells and small gravel), and in that one rare.

CYTHERE TUBERCULATA, G. O. Sars.

Cythereis tuberculata, G. O. Sars.	*Loc. cit.*, p. 37.
Cythere ,, Brady.	Monog. Rec. Brit. Ostrac., p. 406.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Spitzbergen, Baffin's Bay, Bay of Biscay, Gulf of St. Lawrence, West Indies. *Fossil:* In nearly all the post-tertiary beds of Scotland; England—Bridlington, Hopton Cliff; Branston Fen; South Wales—Cardiff New Dock-basin; Ireland—Belfast New Docks, Woodburn, near Carrickfergus.

Occurs in thirty of the gatherings in the Clyde district—in eight rare, in seventeen moderately common, and in five very common.

CYTHERE CONCINNA, Jones.

Cythere concinna, Jones.	Ter. Entom., p. 29.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 408.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Gulf of St. Lawrence, Spitzbergen, Davis' Straits. *Fossil:* Crag, England; post-tertiary clays and raised beaches, Scotland, Ireland, Norway.

This is considered a Scandinavian type. Recent it is moderately common in the Clyde district; where it does occur it is often in considerable numbers, but generally less or more confined to particular areas. It is common in most of the post-tertiary beds in the west of Scotland.

CYTHERE ANGULATA, G. O. Sars.

Cythere angulata, G. O. Sars. Overs. Nory. Mar. Ostrac., p. 40.
" " Brady. Monog. Rec. Brit. Ostrac., p. 409.

DISTRIBUTION—*Recent:* Great Britain, Norway, Baffin's Bay, Davis' Straits. *Fossil:* post-tertiary, England, Scotland, Ireland, and Norway.

Occurs in twenty-eight of the forty gatherings of the Clyde district—in most of these moderately common, but seldom in great profusion. It is equally abundant in the post-tertiary beds in the west of Scotland. Those of the clays are generally more strongly marked than recent species.

CYTHERE EMARGINATA, G. O. Sars.

Cythere emarginata, G. O. Sars. Overs. Nory. Mar. Ostrac., p. 38.
" " Brady. Monog. Rec. Brit. Ostrac., p. 475.

DISTRIBUTION—*Recent:* Arctic Seas, Norway, Gulf of St. Lawrence, Scotland. *Fossil:* Scotland, England, Ireland, Norway, and Canada.

A rare recent species in this country, only occurring once in the forty gatherings from the Clyde district,—viz., in Lochfyne, off Inveraray, in 25 fathoms, mud bottom, where it was moderately common. It occurred also in a gathering from Lerwick Bay, Shetland, in 10 to 12 fathoms, gravelly, sandy, mud bottom.

It is moderately common in the post-tertiary clays in the east of Scotland.

CYTHERE FINMARCHICA, G. O. Sars.

Cythereis finmarchica, Sars. *Loc. cit.* p. 41.
Cythere " Brady. Monog. Rec. Brit. Ostrac., p. 410.

DISTRIBUTION—*Recent:* Davis' Straits, Norway, Great Britain, Ireland, Bay of Biscay, Cape Verde.

This species has only occurred once in my gatherings in the Firth of Clyde. This was in Lochfyne, off Inveraray; but it is occasionally met with both off the English and Irish coasts.

CYTHERE PULCHELLA, Brady.

Cythere pulchella, Brady. Monog. Rec. Brit. Ostrac., p. 404.
" " Brady & Robertson. Ann. Mag. Nat. Hist., ser. iv., vol. iii., p. 369.

DISTRIBUTION—*Recent:* Scotland, Ireland, Baffin's Bay, Holland. *Fossil:* Scotland—common in the post-tertiary clays, silts, and raised beaches; Ireland—Woodburn raised beach, Portrush; silt, Belfast New Dock.

This species is moderately common in the Firth of Clyde, but never in any great abundance. It is apt to be mistaken for the young of *Cythere villosa*. It occurs in fifteen of the dredgings or gatherings in the Clyde district—in ten rare, and in five moderately common; ranging from low water to 20 fathoms. In the fossil, as in the recent state, it never occurs in great abundance.

CYTHERE ROBERTSONI, Brady.

Cythere Robertsoni, Brady. Ann. Mag. Nat. Hist., ser. iv., vol. ii., p. 33.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway. *Fossil:* Lochgilp, Scotland; Norway.

It occurs in seventeen of the Firth of Clyde gatherings—in seven it is rare, in nine moderately common, and in one common; ranging from 5 to 22 fathoms.

CYTHERE VILLOSA, G. O. Sars.

Cythereis villosa, G. O. Sars. *Loc. cit.*, p. 42.
Cythere ,, Brady. Monog. Rec. Brit. Ostrac., p. 411.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Bay of Biscay, Davis' Straits, Gulf of St. Lawrence. *Fossil:* Scotland, England, Ireland, Norway.

From the annexed table, this is seen to be a very common species in the Firth of Clyde, prevailing mostly in 6 to 10 fathoms, on sandy gravelly bottoms. It is generally absent in the deeper muddy lochs. It is also a common post-tertiary species, but seldom in any great abundance.

CYTHERE LATICARINA, Brady.

Cythere laticarina, Brady. Monog. Rec. Brit. Ostrac., p. 412.

DISTRIBUTION—*Recent:* Great Britain, Spitzbergen. *Fossil:* Scotland, Raised beach, Oban.

Very rare in the Clyde district, occurring only in one of the gatherings—Fintry Bay, Cumbrae.

CYTHERE QUADRIDENTATA, Baird.

Cythere quadridentata, Baird. Brit. Entom., p. 173.
,, ,, Brady. Monog. Rec. Brit. Ostrac., p. 413.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Bay of Biscay. *Fossil:* Scotland—Lochgilp.

Occurs in ten of the Clyde gatherings—in four rare, and in four moderately common; 6 to 30 fathoms.

CYTHERE EMACIATA, Brady.

Cythere emaciata, Brady. Brit. Assoc. Report, 1866, p. 210.
,, ,, ,, Monog. Rec. Brit. Ostrac., p. 414.

DISTRIBUTION—*Recent:* Great Britain, Ireland. *Fossil:* Scotland—raised beaches, Irvine and Lochgilp.

Met with sparingly in the Firth of Clyde. Occurring in eight out of the forty gatherings—in four common, and in four moderately common; from 7 to 30 fathoms.

CYTHERE DUNELMENSIS, Norman.

Cythereis Dunelmensis, Norman. Nat. Hist. Northumb. and Durh., vol. i., p. 22.
,, *horrida*, G. O. Sars. Overs. Nory. Mar. Ostrac., p. 45.
Cythere Dunelmensis, Brady. Monog. Rec. Brit. Ostrac., p. 416.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Arctic Seas, Gulf of St. Lawrence. *Fossil:* Scotland—nearly in all the post-tertiary beds; England—Bridlington; Ireland—Woodburn and Belfast New Docks.

In the Firth of Clyde this species occurs in ten out of the forty gatherings—in two rare, in five moderately common, and in three very common; in

depths from 8 to 30 fathoms, and prevails most in the deeper water on muddy bottoms.

CYTHERE WHITEII, Baird.

Cythere Whiteii, Baird. Brit. Entom., p. 175.
,, ,, Brady. Monog. Rec. Brit. Ostrac., p. 416.

DISTRIBUTION—*Recent:* Great Britain, Levant, Gulf of St. Lawrence.

This is a rare species, and was only noticed in the gatherings from Kilchattan Bay and Campbeltown Loch. Where it does occur the examples are always few. It has only been recorded fossil from Belfast New Docks.

CYTHERE ANTIQUATA, Baird.

Cythereis antiquata, Baird. Brit. Entom., p. 176.
Cythere ,, Brady. Monog. Rec. Brit. Ostrac., p. 417.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Bay of Biscay, Levant. *Fossil:* Scotland—Oban raised beach; England—upper boulder clay, Chester; Ireland—Belfast New Docks.

A moderately common species in the Firth of Clyde, occurring in twenty-two gatherings out of the forty; not abundant in any, and rare in eight.

CYTHERE JONESII, Baird.

Cythereis Jonesii, Baird. Brit. Entom., p. 175.
Cythere ,, Brady. Monog. Rec. Brit. Ostrac., p. 418.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Bay of Biscay, Levant. *Fossil:* England—Newton, near Chester; Ireland—Belfast New Docks; Belgium and France, Eocene.

Occurs in twenty-four of the Firth of Clyde gatherings—in seven rare, in sixteen moderately common, and in one very common; from 6 to 30 fathoms; prevailing most on mud or sandy mud bottoms.

CYTHERE GIBBOSA, Brady & Robertson.

Cythere gibbosa, Brady & Robertson. Ann. & Mag. Nat. Hist., ser. iv., vol. iii., p. 368.

DISTRIBUTION—*Recent:* Great Britain, Ireland. *Fossil:* Raised beach, Portrush, Ireland.

Occurs only in two of the forty gatherings from the Firth of Clyde—in one rare (east Tarbert Loch), common off Greenock pier, in 4 to 6 fathoms, where, it will be observed, the water must be more or less brackish, which agrees with its other habitats—viz., Montrose Basin, Scotland; Tidal Pond, Westport, Ireland; Budle Bay and Seaton Burn, below the sluice, England—all of which are more or less brackish.

CYTHERIDEA PAPILLOSA, Bosquet.

Cytheridea papillosa, Bosquet. Entom. Foss. Ter. Tertiair, France, p. 42.
,, ,, Brady. Monog. Rec. Brit. Ostrac., p. 423.

DISTRIBUTION—*Recent:* Baffin's Bay, Gulf of St. Lawrence, Norway, Great Britain. *Fossil:* England, Scotland, Canada, France, tertiary.

This species seems to have a strong preference in the Firth of Clyde to a soft muddy bottom. In most of the lochs it prevails greatly. Out of the forty gatherings it occurred in thirty. It is generally associated with *Cytheridea punctillata*, but seldom in equal numbers at the same place. *C. punctillata* seems to prefer ground somewhat harder, and generally prevails there over *C. papillosa*.

CYTHERIDEA PUNCTILLATA, Brady.

Cytheridea punctillata, Brady.	Monog. Rec. Brit. Ostrac., p. 424.
,, *proxima*, G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 54.

DISTRIBUTION—*Recent:* Baffin's Bay, Gulf of St. Lawrence, Norway, Britain. *Fossil:* Scotland, Ireland, Norway.

This is also a common species in the firth, but less so than *C. papillosa*. It is generally most common on sandy muddy ground in deepish water, but is also met with sparingly in depths from 5 to 8 fathoms. It prevails generally in the post-tertiary clays both on the east and west of Scotland. *C. papillosa* is less frequent and fewer in numbers in the clays.

CYTHERIDEA ELONGATA, Brady.

Cythere angustata, Baird.	(Not Munster). Brit. Entom., p. 172.
,, *elongata*, Brady.	Monog. Rec. Brit. Ostrac., p. 421.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Bay of Biscay, Gulf of St. Lawrence.

This species may be considered moderately rare in the Firth of Clyde; it occurs in ten gatherings out of the forty—in six rare, in four moderately common. Its character as a fossil is restricted in Scotland and Ireland to the estuarine silts and raised beaches; and in England to a deposit (Hopton Cliff, near Yarmouth) described as Middle Glacial by Messrs. S. V. Wood, jun., and F. W. Harmer, in the Palæontographical Society's volume for 1871, p. 22.

CYTHERIDEA SUBFLAVESCENS, Brady.

Cythere subflavescens, Brady.	Brit. Assoc. Report, 1866, p. 210.,
Cytheridea ,, Brady.	Monog. Rec. Brit. Ostrac., p. 429.

DISTRIBUTION—*Recent:* Scotland.

This is a very rare species, hitherto only known from one specimen dredged by the Rev. A. M. Norman in sand amongst the Hebrides, in 45 to 60 fathoms, in the year 1866. It occurs twice in the firth gatherings; one example in Rothesay Bay in 15 to 18 fathoms, and three examples off Fintry Bay in 22 fathoms.

CYTHERIDEA TOROSA, Brady.

Cypridcis torosa, Jones.	Ter. Entom. of Eng., 1851, p. 21.
Cytheridea ,, Brady.	Monog. Rec. Brit. Ostrac., p. 425.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Levant, Azoff. *Fossil:* England and Scotland.

This being a decidedly brackish water species, is only found in two of the firth gatherings—off Langbank and Greenock, at both places brackish.

EUCYTHERE DECLIVIS, Norman.

Cythere declivis, Norman.	Nat. Hist., Trans., Northumb. & Dur., vol. i., p. 16.
Eucythere ,, Brady.	Monog. Rec. Brit. Ostrac., p. 430.

DISTRIBUTION—*Recent:* Norway, Great Britain, and Ireland.

This species is rare in the Firth of Clyde, occurring only in five gatherings out of the forty—in two only moderately common—Kilchattan Bay in 20 to 25 fathoms, and Roseneath Bay in 15 fathoms, both in sandy mud. It has only been found fossil in the College post-tertiary deposit, Cumbrae.

EUCYTHERE ARGUS, G. O. Sars.

Cytheropsis argus, Sars.	Overs. Nory. Mar. Ostrac., p. 58.
Eucythere ,, Brady.	Monog. Rec. Brit. Ostrac., p. 431.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Gulf of St. Lawrence. *Fossil:* Scotland, England, Ireland, Norway, and Canada.

Moderately common in the Firth of Clyde; found in twenty-two out of the forty gatherings, in none very abundant. It seems not to be fastidious, either in the character of bottom, or the depth or purity of the water. It was found in Loch Striven in mud in 26 fathoms; off Whiting Bay, in 7 fathoms muddy sand; off Greenock, in 4 to 6 fathoms muddy sand, in water less or more brackish; also between Port-Glasgow and Laugbank, where the water is still more brackish and impure.

KRITHE BARTONENSIS, Jones.

Cytherideis Bartonensis, Jones.			
Ilyobates	,,	Brady.	Monog. Tert. Entom., p. 50.
Krithe	,,	B., C., & R.	Monog. Post-tertiary Entom., vol. xxviii., p. 184.

DISTRIBUTION—*Recent:* Norway, Great Britain. *Fossil:* England, Scotland, Norway.

This species is not uncommon in the Firth of Clyde, occurring in seventeen out of the forty gatherings, from 8 to 30 fathoms, chiefly on sandy mud bottoms. In some of the dredgings it was very abundant, and in all stages of growth. This is more remarkable from the infrequency with which the young of Ostracoda are met with; often where the adults are in great profusion scarcely an immature form will be seen, and seldom even what could be called fry.

LOXOCONCHA IMPRESSA, Baird.

Cythere impressa, Baird.	Brit. Entom., p. 173.
Loxoconcha ,, Brady.	Monog. Rec. Brit. Ostrac., p. 433.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Bay of Biscay. *Fossil:* Scotland, Ireland, Norway.

This is a very common species, and occurs in almost all the gatherings in the Firth of Clyde. It is less common in the fossil state, and chiefly confined to the silts and raised beaches.

LOXOCONCHA GRANULATA, Sars.

Loxoconcha granulata, Sars.	*Loc. cit.*, p. 64.
Loxoconcha ,, Brady.	Monog. Rec. Brit. Ostrac., p. 434.

DISTRIBUTION—*Recent:* Britain, Norway.

It is not common in the Firth of Clyde, occurring sparingly in thirteen of the gatherings, but in a few—Roseneath, Lochgoil, and Gareloch—it is abundant. Unknown in the fossil state.

LOXOCONCHA TAMARINDUS, Jones.

Cytheredeis tamarindus, Jones.	Ter. Entom., p. 49.
Loxoconcha ,, Brady.	Monog. Rec. Brit. Ostrac., p. 435.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Bay of Biscay. *Fossil:* Crag, England; glacial and raised beaches, England, Scotland, Ireland, Norway.

A common species, and occurring in thirty-two of the forty gatherings. Fossil in nearly all the post-tertiary clays in the west of Scotland, less so in the east.

LOXOCONCHA GUTTATA, Norman.

Cythere guttata, Norman.	Nat. Hist. Trans. Northumb. and Durh., vol. i., p. 19.
Loxoconcha ,, Brady.	Monog. Rec. Brit. Ostrac., p. 436.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Bay of Biscay, Levant. *Fossil:* Scotland.

Found in eighteen of the gatherings in the Firth of Clyde—in two rare, in fifteen moderately common, in one very common (Campbeltown Loch). It occurs in from 8 to 30 fathoms, and mostly in sandy mud.

I have it in a gathering from 8 to 100 fathoms, St. Magnus Bay, Shetland (Jeffreys), but not one *L. impressa;* and common in a gathering at very low water Isle of Man, associated with *L. impressa.* Its fossil habitats are confined to silt deposits, Drip Bridge and Bridge of Allan, Stirlingshire.

LOXOCONCHA MULTIFORA, Norman.

Cythere multifora, Norman.	Brit. Assoc. Report, p. 192.
Cytheropteron multiforum, Brady.	Monog. Rec. Brit. Ostrac., p. 449.
Loxoconcha multifora, B., C., & R.	Monog. Post-tertiary Ostrac. Palæontological Soc., p. 187.

DISTRIBUTION—*Recent:* Great Britain, Ireland.

This species is also moderately common in the Firth of Clyde, where it does not seem to shew much preference either to the depth of water or character of bottom. Fossil in raised beach, Portrush, Ireland.

LOXOCONCHA PUSILLA, Brady & Robertson.

Loxoconcha pusilla, B. & R.	Ann. and Mag. Nat. Hist., July 1870, p. 23.

DISTRIBUTION—*Recent:* Holland, Netherlands, England, Scotland.

It is chiefly confined to tidal rivers and brackish fens. In the Firth of Clyde it was found only in two localities—off Greenock pier, where it has the

mixture of fresh water of the River Clyde, and at Kames Bay, Cumbrae, at low water, where a small stream of fresh water spreads over the shore, bathing the place alternately with stream and tide.

LOXOCONCHA FRAGILIS, G. O. Sars.

Loxoconcha fragilis, G. O. Sars.		Overs. Nory. Mar. Ostrac., p. 65.
,,	,,	Brady & Robertson. Ann. and Mag. Nat. Hist., July, 1870, p. 24.

DISTRIBUTION—*Recent:* Norway, England, Scotland.

The habitats of this species—River Clyde, Montrose Basin, Budle Bay—shew its brackish character. In the Firth of Clyde it occurred off Greenock, in 4 to 6 fathoms, and between Port-Glasgow and Langbank a few feet beyond low water.

Occurs fossil in the post-tertiary clays at Cartsdyke, Greenock, and Paisley, associated with marine Arctic shells.

XESTOLEBERIS AURANTIA, Baird.

Cythere aurantia, Baird.	Mag. Zool. and Bot., vol. ii., p. 143.
Xestoleberis nitida, G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 67.
,, *aurantia*, Brady.	Monog. Rec. Brit. Ostrac., 437.

DISTRIBUTION—*Recent:* Holland, Great Britain, Ireland. *Fossil:* Scotland, England, Ireland, Norway.

This being purely a littoral species, is only found in one of the firth gatherings, at low water, Cumbrae; all the others being taken in deeper water with the dredge. It has been met with fossil only in silts and raised beaches—raised beach, Cumbrae, Scotland; silts, New Dock-basin, Cardiff, South Wales; New Docks at Belfast, Ireland.

XESTOLEBERIS DEPRESSA, G. O. Sars.

Xestoleberis depressa, G. O. Sars.		Overs. Nory. Mar. Ostrac., p. 68.
,,	,,	Brady. Monog. Rec. Brit. Ostrac., p. 438.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway, Spitzbergen, Gulf of St. Lawrence. *Fossil:* Scotland—West Tarbert, Lochgilp, Paisley, raised beach, Oban; Ireland—New Docks, Belfast; Norway; Canada.

This species is moderately common in the Firth of Clyde, occurring in twenty-three of forty gatherings, but in none in any great profusion, and is found on both hard and soft ground.

CYTHERURA NIGRESCENS, Baird.

Cythere nigrescens, Baird.		Mag. Zool. and Bot., vol. ii., p. 143.
Cytherura ,,	G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 71.
,, ,,	Brady.	Monog. Rec. Brit. Ostrac., p. 440.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland. *Fossil:* England—Hopton Cliff; Scotland—nearly all the post-tertiary clays on the west and at Drip Bridge; Ireland—New Docks, Belfast, and at Portrush; Norway; Canada.

This is a common littoral species, yet not uncommon in deeper water. It occurs in twenty-nine gatherings out of the forty in Firth of Clyde, at depths from 7 to 30 fathoms; prevailing most from 4 to 9 fathoms; yet moderately common in various depths from 10 to 30 fathoms, both on soft and harder bottoms.

CYTHERURA ANGULATA, Brady.

Cytherura angulata, Brady. Monog. Rec. Brit. Ostrac., p. 440.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Norway. *Fossil:* Scotland—raised beach, Oban; South Wales—Cardiff New Dock-basin; Ireland—Belfast New Docks, Portrush; Norway.

Occurs in eighteen of the gatherings in the firth—in eleven rare, and in seven moderately common, but in none in profusion.

CYTHERURA STRIATA, G. O. Sars.

Cytherura striata, G. O. Sars. Overs. Nory. Mar., p. 74.
,, ,, Brady. Monog. Rec. Brit. Ostrac., p. 441.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland. *Fossil:* Scotland—Lochgilp, West Tarbert, Kyles of Bute, Cumbrae, Cartsdyke; South Wales—New Dock-basin, Cardiff; Ireland—New Docks at Belfast; Norway; Canada.

Moderately common in the Firth of Clyde. In twenty gatherings, eleven were rare, eight common or moderately common, and one very common.

CYTHERURA LINEATA, Brady.

Cytherura lineata, Brady. Monog. Rec. Brit. Ostrac., p. 441.

This species has hitherto been obtained only in dredgings from the north of Scotland, the Minch, 50 to 60 fathoms (Jeffreys), Isle of Skye (Rev. Mr. Barlee). In the Firth of Clyde it occurs in two gatherings; west of the Ferry-house in 6 fathoms, and off Inverkip in 12 fathoms. It has not been met with fossil, as far as known.

CYTHERURA CUNEATA, Brady.

Cytherura cuneata, Brady. Monog. Rec. Brit. Ostrac., p. 442.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Levant. *Fossil:* Scotland—West Tarbert, with Arctic shells.

In the Clyde district this species may be considered rather rare, although it occurs in fifteen gatherings out of the forty. It is rare in eight, and only prevails in one, off Ardrishaig, in 6 fathoms, bottom muddy sand.

CYTHERURA SARSII, Brady.

Cytherura Sarsii, Brady. Monog. Rec. Brit. Ostrac., p. 442.

DISTRIBUTION—*Recent:* Scotland. *Fossil:* Scotland—Duntroon, Lochgilp, Kyles of Bute, Cartsdyke, Paisley. In all associated with Arctic shells.

Occurs in nine of the firth gatherings, rare in five, and moderately common in four.

CYTHERURA SIMILIS, Sars.

Cytherura similis, Sars.	*Loc. cit.*, p. 72.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 442.

DISTRIBUTION—*Recent:* Norway, Great Britain, Holland, Spitzbergen. *Fossil:* Duntroon, Lochgilp, Kyles of Bute, Kilchattan, Cumbrae, Dumbarton, Cartsdyke, Dalmuir, Barrie; Ireland—New Docks at Belfast, Portrush; Norway.

Rare in the Clyde district; occurs only in four out of forty of the firth dredgings—in three rare, in one moderately common.

CYTHERURA UNDATA, Sars.

Cytherura undata, G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 75.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 443.

DISTRIBUTION—*Recent:* Baffin's Bay, Gulf of St. Lawrence, Spitzbergen, Norway, Great Britain, Ireland. *Fossil:* Scotland, nearly all the post-tertiary beds; Ireland—New Docks at Belfast, Portrush.

Very common in the Firth of Clyde, occurring in thirty gatherings—in ten rare or rather rare, in fourteen common or moderately common, and in six very prevalent.

CYTHERURA PRODUCTA, Brady.

Cytherura producta, Brady.	Monog. Rec. Brit. Ostrac., p. 443.

DISTRIBUTION—*Recent:* Great Britain, Ireland. *Fossil:* South Wales—Cardiff New Dock-basin.

Rare in the Firth of Clyde, occurring only in six of forty gatherings—in three rare, and in three moderately common. In one of the gatherings (De'il's Dyke) it was found in greater numbers than any other in the firth, yet in another gathering close by, in about the same depth of water, and to all appearance the same character of bottom, not one was found. It has been obtained in the west of Scotland, in the Minch (Rev. A. M. Norman), and what is noteworthy, it has been found in the tidal rivers, Aln, Thames, England; and the River Scheldt, Netherlands,* all more or less brackish.

CYTHERURA ROBERTSONI, Brady.

Cytherura Robertsoni, Brady.	Monog. Rec. Brit. Ostrac., p. 444.

DISTRIBUTION—*Recent:* Great Britain, Ireland. *Fossil:* Scotland—West Tarbert silt; Canada—Saxicava sand.

This is characteristically a brackish water species, occurring only at the few places in the firth favourable to its habits; these are off Greenock, and between Port-Glasgow and Langbank, and near the head of Loch Ryan.

CYTHERURA GIBBA, Müller.

Cythere gibba, Müller.	Entom., p. 24.
Cytherura ,, Sars.	Overs. Nory. Mar. Ostrac., p. 70.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 444.

DISTRIBUTION—*Recent:* Britain, Baltic Sea, North Sea. *Fossil:* Scotland

* Ann. Mag. Nat. Hist. for July, 1870.

—West Tarbert, raised beach at Oban; Ireland—Belfast New Docks, Portrush; River Scheldt.

This species is moderately common in the Firth of Clyde, occurring in fourteen gatherings—in ten rare, in three common or moderately common, and in one (St. Ninian's Bay) abundant.

CYTHERURA CORNUTA, Brady.

Cytherura cornuta, Brady. Monog. Rec. Brit. Ostrac., p. 445.

DISTRIBUTION—*Recent:* Britain, Ireland, Dardanelles, Levant. *Fossil:* Scotland, West Tarbert silt; Norway.

A rather rare species in the Firth of Clyde, occurring only in nine gatherings—in six rare, and in three moderately common.

CYTHERURA ACUTICOSTATA, G. O. Sars.

Cytherura acuticostata, G. O. Sars. Overs. Nory. Mar. Ostrac., p. 76.
,, ,, Brady. Monog. Rec. Brit. Ostrac., p. 445.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Holland. *Fossil:* Scotland—Raised beach at Oban; Belfast New Docks, Norway.

Moderately common, occurring in seventeen of the firth gatherings—in eight rare, and in nine common or moderately common, in none abundant.

CYTHERURA CLATHRATA, G. O. Sars.

Cytherura clathrata, Brady. Monog. Rec. Brit. Ostrac., p. 446.

DISTRIBUTION—*Recent:* Baffin's Bay, Norway, Great Britain, Ireland. *Fossil:* Nearly in all the post-tertiary clay deposits on the west of Scotland, and Drip Bridge in the east; Ireland, Portrush; England, Bridlington; Norway.

Very rare in the Clyde district, occurring only in one of the forty gatherings (Callum's Bay, south end of Bute), and there only one instance.

CYTHERURA CELLULOSA, Norman.

Cythere cellulosa, Norman. Nat. Hist. Trans. Northumb. and Durh., vol. i., p. 22.
Cytherura nana, Sars. Overs. Nory. Mar. Ostrac., p. 446.
,, *cellulosa*, Brady. Monog. Rec. Brit. Ostrac., p. 446.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Holland. *Fossil:* Scotland—Raised beach at Oban; Ireland, Belfast New Docks; Norway.

Common in the Clyde district, occurring in twenty-seven of the gatherings—in fifteen rare, in eleven moderately common, and in one only abundant.

CYTHERURA FLAVESCENS, Brady.

Cytherura flavescens, Brady. Ann. & Mag. Nat. Hist., ser. 4., vol. iii., p. 49.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Holland. *Fossil:* Scotland—Kyles of Bute.

Occurs in fourteen of the gatherings—in seven rare, and in seven common.

CYTHEROPTERON LATISSIMUM, Norman.

Cythere latissima, Norman.	Nat. Hist. Trans. Northumb. and Durh., vol. i., p. 19.
Cytheropteron convexum, G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 80.
„ *latissimum*, Brady.	Monog. Rec. Brit. Ostrac., p. 448.

DISTRIBUTION—*Recent:* Baffin's Bay, Norway, Great Britain, Ireland, Spitzbergen. *Fossil:* Scotland—nearly in all the post-tertiary beds; England, Bridlington; Norway and Canada.

Common in the Clyde district, occurring in twenty-five gatherings—rare in five, common or moderately common in fourteen, abundant in six. Although this species is very common in some gatherings, yet like others, none may be found at a very short distance, even when the conditions are apparently similar.

CYTHEROPTERON NODOSUM, Brady.

Cytheropteron nodosum, Brady.	Monog. Rec. Brit. Ostrac., p. 448.

DISTRIBUTION—*Recent:* Britain, Ireland, Gulf of St. Lawrence. *Fossil:* Scotland—nearly in all the post-tertiary beds; England, Bridlington; Ireland, Woodburn, Portrush.

Much less common than the preceding species. It occurs in fourteen of the gatherings—in nine it is rare, in four moderately common, and prevails only in one.

CYTHEROPTERON PUNCTATUM, Brady.

Cytheropteron punctatum, Brady.	Monog. Rec. Brit. Ostrac., p. 449.

DISTRIBUTION—*Recent:* Britain, Ireland.

This species may be said to be locally common in the Clyde district, although it was found only in six forty of the gatherings, in one of these, Lochgoil, in 30 fathoms sandy mud, it was very common, and moderately common off Girvan in 12 to 15 fathoms, on a bank chiefly gravel and dead shells.

CYTHEROPTERON ALATUM, G. O. Sars.

Cytheropteron alatum, Norman.	Brit. Assoc. Report.
Cytheropteron ornatum, Brady & Robertson.	Ann. & Mag. Nat. Hist. January, 1872.

DISTRIBUTION—*Recent:* Scotland; Norway.

The young of *C. alatum* was mistaken for a new species, and named *C. ornatum*. This chiefly arose from the presence of a semitransparent curve on the lateral angles of the alæ; but on further investigation, with a better supply, the changes from *C. ornatum* could be traced into the adult form of *C. alatum*.

It was obtained in nine of the firth gatherings—in two it was rare, and in seven common or moderately common. In the Clyde district it has been obtained in from 15 to 26 fathoms on ground more or less soft, and in Shetland, by Rev. A. M. Norman, in deep water, and by Sars, in Norway, in 250 fathoms.

CYTHEROPTERON ANGULATUM, Brady & Robertson.

Cytheropteron angulatum, B. & R.	Ann. & Mag. Nat. Hist., ser. 4, vol. vi., p. 62.

DISTRIBUTION—*Recent:* Scotland. *Fossil:* Scotland—Duntroon, Crinan, West Tarbert, Kyles of Bute, Kilchattan, Dumbarton, Dalmuir, Inch Lonaig; England—Bridlington; Canada.

Occurs in four of the Clyde gatherings—in three rare, and in one moderately common; in depths from 15 to 30 fathoms—bottom more or less soft.

BYTHOCYTHERE SIMPLEX, Norman.

Bythocythere simplex, Norman.	Nat. Hist. Trans. Northumb. and Durh., vol. i, p. 17.
,, *acuminata*, G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 86.
,, *simplex*, Brady.	Monog. Rec. Brit. Ostrac., p. 450.

DISTRIBUTION—*Recent:* Baffin's Bay, Norway, Great Britain. *Fossil:* Scotland—Duntroon, Lochgilp, West Tarbert, Cartsdyke, Paisley, Dalmuir, Govan, Jordanhill; Ireland—Woodburn.

Occurs in fourteen of the firth gatherings—in four rare, in seven common or moderately common, and in three abundant; in depth from 12 to 30 fathoms—the bottom more or less soft.

BYTHOCYTHERE CONSTRICTA, G. O. Sars.

Bythocythere constricta, G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 85.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 451.

DISTRIBUTION—*Recent:* Great Britain, Ireland, Channel Islands. *Fossil:* Scotland—Tangyburn, Duntroon, Dumbarton, Govan.

Occurs in ten of the Firth of Clyde gatherings - rare in three, and common or moderately common in seven, but does not prevail in any; depth from 15 to 20 fathoms—bottom sandy mud. This species in some conditions is ready to be mistaken for *B. turgida.*

BYTHOCYTHERE TURGIDA, G. O. Sars.

Bythocythere turgida, Brady.	Monog. Rec. Brit. Ostrac., p. 452.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Channel Islands.

Found in eleven of the Clyde district gatherings—in four rare, in six moderately common, and in one (Lochgoil) very common; 30 fathoms mud bottom—the least depth (Colintraive) 10 to 12 fathoms; bottom sandy mud.

PSEUDOCYTHERE CAUDATA, G. O. Sars.

Pseudocythere caudata, Brady.	Monog. Rec. Brit. Ostrac., p. 453.

DISTRIBUTION—*Recent:* Norway, Great Britain, and Ireland. *Fossil:* Scotland—Blackburn, Dalmuir; raised beach, Oban. Ireland—Woodburn.

Occurs in nine of the gatherings in the Clyde district—in five rare, in three

moderately common, and in one very common; and in depths from 6 to 26 fathoms, on ground more or less soft. The shell of this animal is pellucid, and generally of a dull lead colour; but in the gathering where they prevailed most (off De'il's Dyke, Cumbrae), the animal in the greater number was seen through the shell, giving it a fine tinge of brown or red, not over the whole but in patches shading away as they spread.

CYTHERIDEIS SUBULATA, Brady.

Cythere flavida, Baird.	Brit. Entom., p. 168.
Cytheridеis subulata, Brady.	Monog. Rec. Brit. Ostrac., p. 454.

DISTRIBUTION—*Recent:* Britain, Ireland, Bay of Biscay, Cape Verde, Levant.

This species is generally rare in the Firth of Clyde, but at some places it prevails much. It occurred in eight of the Clyde district gatherings—in five rare, in one moderately common, and in two very common (the Clach and Portloy); in 5 to 8 and 10 to 12 fathoms, bottom muddy sand and shell debris. Between Portincross and Ardrossan it was found in 30 fathoms.

SCLEROCHILUS CONTORTUS, Norman.

Cythere contorta, Norman.	Ann. & Mag. Nat. Hist., vol. ix. p. 48.
Sclerochilus contortus, Sars.	Overs. Nory. Mar. Ostrac., p. 90.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 455.

DISTRIBUTION—*Recent:* Britain, Norway, Bay of Biscay, Spitzbergen. *Fossil:* Scotland, in nearly all the post-tertiary beds; South Wales, Cardiff New Dock-basin; Ireland, Belfast New Docks, Portrush; Norway and Canada.

A widely distributed species, and abundant both recent and in the post-tertiary deposits. It occurs in twenty-six out of forty of the Clyde gatherings—in twelve it is rare, and in twelve moderately common, and in two only abundant. The gatherings ranged from 6 to 30 fathoms, and on both hard and soft ground, but it prevailed most on the softer bottoms. In the gathering from Rothesay Bay, the tests were almost all of a fine yellowish-orange tint; others procured within tide mark on the Durham coast were mottled with dashes of black, in all probability arising from the condition of the animal or the character of its food, as such colours have not been noticed on the empty shell.

XIPHICHILUS TENUISSIMA, Norman.

Bythocythere tenuissima, Norman.	Brit. Assoc. Report, 1868, p. 294.
Xiphichilus ,, Brady.	Nat. Hist. Trans. Northumb. and Durh., vol. iii. p. 369.

DISTRIBUTION—*Recent:* England, Scotland.

This species occurs in thirteen of the Clyde district gatherings—in six rare, and in six moderately common, and in one (Callum's Bay, south end of Bute) abundant. These gatherings ranged from 10 to 30 fathoms, and on both hard and soft ground; but it was most frequent on muddy sand or mud.

PARADOXOSTOMA VARIABILE, Baird.

Cythere flavida,	Müller.	Entom., p. 66.
,, ,,	Baird.	Trans. Berwickshire Club, vol. i., p. 98.
Paradoxostoma variabile,	Brady.	Monog. Rec. Brit. Ostrac., p. 457.

DISTRIBUTION — *Recent:* Baffin's Bay, Spitzbergen, Great Britain, Norway, Holland. *Fossil:* Scotland—Tangyburn, Campbeltown, Duntroon, Lochgilp, Blackburn, Tarbert, Kyles of Bute, Cumbrae, Dumbarton, Cartsdyke, Greenock, Paisley, Govan, West Tarbert, raised beach, Oban; Ireland—Woodburn, Belfast New Docks; Norway; Canada.

This is one of the commonest species in the Firth of Clyde, but seldom occurring in any great abundance in one place. Of forty gatherings it occurred in thirty-five—rare in eighteen, moderately common in sixteen, and abundant only in one.

PARADOXOSTOMA ABBREVIATUM, G. O. Sars.

Paradoxostoma abbreviatum,	Sars.	Overs. Nory. Mar. Ostrac., p. 94.
,, ,,	Brady.	Monog. Rec. Brit. Ostrac., p. 458.

DISTRIBUTION — *Recent:* Great Britain, Ireland, Norway. *Fossil:* Scotland—Lochgilp, raised beach, Oban; South Wales, Cardiff.

Occurs in nineteen of the gatherings—in thirteen rare, and in six moderately common, but prevails in none. The depths of these gatherings ranged from 3 to 25 fathoms, both on hard and soft bottom.

PARADOXOSTOMA ENSIFORME, Brady.

Paradoxostoma ensiforme,	Brady.	Monog. Rec. Brit. Ostrac., p. 460.

DISTRIBUTION — *Recent:* Great Britain, Ireland, Levant. *Fossil:* Scotland—Kyles of Bute; South Wales—Cardiff New Dock-basin (silt deposit); England—Bridlington; Ireland—Belfast New Docks (silt), Portrush raised beach.

Occurs in sixteen of the gatherings in the Clyde district—in ten rare, moderately common in five, and very common in one. Depth from 4 to 30 fathoms, both on hard and soft bottom.

PARADOXOSTOMA FLEXUOSUM, Brady.

Paradoxostoma flexuosum,	Brady.	Monog. Rec. Brit. Ostrac., p. 461.
,, ,,	B. & R.	Ann. & Mag. Nat. Hist., January, 1872.

DISTRIBUTION — *Recent:* Britain. *Fossil:* Scotland — Lochgilp; South Wales—Cardiff New Dock-basin, silt.

Not very common in the Clyde district, occurring only in fourteen of the gatherings—in ten rare, and in four moderately common; from 3 to 30 fathoms on various kinds of bottom.

PARADOXOSTOMA HIBERNICUM, Brady.

Paradoxostoma Hibernicum,	Brady.	Monog. Rec. Brit. Ostrac., p. 460.
,, ,,	B. & R.	Ann. & Mag. Nat. Hist., January, 1872.

DISTRIBUTION—*Recent:* Great Britain, Ireland.

Rather a rare species in the Firth of Clyde, occurring only in seven

gatherings out of the forty—in six rare, moderately common in one (Kames Bay, Cumbrae, at low water). The others ranged from 4 to 20 fathoms.

PARADOXOSTOMA FISCHERII, G. O. Sars.

Paradoxostoma Fischerii, G. O. S. Overs. Nory. Mar. Ostrac., p. 96.
" " Brady. Nat. Hist. Trans. Northumb. and Durh., vol. iii., p. 362.
Sclerochilus gracilis, Brady & Rob. Ann. & Mag. Nat. Hist., ser. iv., vol. iii.

DISTRIBUTION—*Recent:* Britain, Ireland, Norway. *Fossil:* Scotland—Lochgilp, Cartsdyke, West Tarbert; South Wales—Cardiff New Dock-basin (silt); Ireland—Belfast New Docks.

Occurs in nine gatherings—in four rare, in four moderately common, and in one abundant. From 6 to 25 fathoms.

PARADOXOSTOMA PULCHELLUM, G. O. Sars.

Paradoxostoma pulchellum, Brady. Monog. Rec. Brit. Ostrac., p. 459.

DISTRIBUTION—*Recent:* Britain, Ireland.

This pretty little species is rare in the Clyde district. It occurs in six out of the forty gatherings—in three it is rare, in two moderately common, and in one common (Glen Sannox, in 20 fathoms, bottom mud); the others from 6 to 25 fathoms—bottom various.

PARADOXOSTOMA ARCUATUM, Brady.

Paradoxostoma arcuatum, Brady. Monog. Rec. Brit. Ostrac., p. 461.

DISTRIBUTION—*Recent:* Scotland and Ireland. *Fossil:* Scotland—raised beach, Oban.

Rare, only obtained in two of the firth gatherings—in one rare, and in one moderately common (Kilchattan Bay, 25 fathoms mud, and off the Lion, Cumbrae, 20 fathoms sandy mud).

PARADOXOSTOMA OBLIQUUM, G. O. Sars.

Paradoxastoma obliquum, G. O. Sars. Overs. Nory. Mar. p. 97.
" " Brady. Monog. Rec. Brit. Ostrac., p. 459.

DISTRIBUTION—*Recent:* Britain, Ireland, and the Channel Islands.

Rare in the Firth of Clyde, occurring only in four gatherings—one to three specimens in each; from 6 to 19 fathoms.

PARADOXOSTOMA ORCADENSE, Brady and Robertson.

Paradoxostoma orcadense, B. & R. Ann. & Mag. Nat. Hist., Jan., 1872.

This very rare species was hitherto only found in Stromness Bay, Orkney, now in Glen Sannox Bay, Arran, Firth of Clyde, moderately common.

It is a curious fact that this species has occurred only in two localities, and so far apart. The same is the case with *Cythere emarginata*, G. O. Sars, occurring in Britain only in Shetland and the Firth of Clyde.

PHILOMEDES INTERPUNCTA, Baird.

Cypridina interpuncta, Baird.	Proc. Zool. Soc. Lond., part 18 (1850), p. 257.
Philomedes longicornis, Lillj.	De Crusta, p. 176.
,, *interpuncta*, Brady.	Monog. Rec. Brit. Ostrac., p. 463.

DISTRIBUTION—*Recent:* Britain, Ireland, Channel Islands.

Occurs in nineteen of the gatherings—in ten rare, in nine moderately common; depth from 5 to 30 fathoms. Most frequently on soft mud bottoms. This species often presents small round patches all over the shell; but those which are taken in the surface net are generally free of such patches.

ASTEROPE MARIÆ, Baird.

Cypridina Mariæ, Baird.	Proc. Zool. Soc. Lond., 1850, p. 257.
Cylindroleberis ,,	Monog. Rec. Brit. Ostrac., p. 465.
Asterope ,, Brady.	Proc. Zool. Soc. Lond., April 4, 1871.

DISTRIBUTION—*Recent:* Britain, Ireland, Channel Islands.

Occurs in thirteen of the firth gatherings—in eleven rare, two moderately common; in depths from 3 to 30 fathoms, on various kinds of bottom, but most frequently on the soft mud. In the surface net after sunset it is taken abundantly.

ASTEROPE TERES, Norman.

Cypridina teres, Norman.	Ann. & Mag. Nat. Hist., vol. viii.
Cylindroleberis teres, Brady.	Monog. Rec. Brit. Ostrac., p. 465.
Asterope teres, Brady.	Proc. Zool. Soc. Lond., 1871, p. 295.

DISTRIBUTION—*Recent:* North Sea; West Coast of Scotland; Ireland; and Scilly and Channel Islands. *Fossil:* Scotland, Jordanhill.

This species in the firth gatherings occurs in four rare, and in one moderately common; in depths ranging from 5 to 20 fathoms. It is occasionally taken in the surface net, but neither so often nor so numerously as the preceding two species.

POLYCOPE ORBICULARIS, G. O. Sars.

Polycope orbicularis, G. O. Sars.	Overs. Nory. Mar. Ostrac., p. 122.
,, ,, Brady.	Monog. Rec. Brit. Ostrac., p. 471.

DISTRIBUTION—*Recent:* Norway, Great Britain, Ireland, Spitzbergen. *Fossil:* Scotland—Duntroon, Dumbarton, Cartsdyke, Paisley, Old Mains, Govan, Dalmuir.

Occurs in eighteen of the firth gatherings—in seven rare, in seven moderately common, and in four very common. The range of depth in these gatherings was from 6 to 30 fathoms, bottom various; but in deeper water and on muddy bottoms they prevailed most, and there generally in the best condition. The translucent shell is often tinged with yellowish-brown, or in some instances with a delicate pink, but it is seldom that the two colours are met with in the same gathering. These colours have been noticed only when the shell contained the animal; they appear, in short, to be the colour of the animal transmitted through the shell.

REMARKS ON THE LOCALITIES.

I.—LOCH RYAN.

Our dredgings were taken down the loch, two or three hundred yards off the Railway Pier, in 6 to 7 fathoms; bottom gravelly mud, with a number of dead shells. The usual method pursued with these dredgings was to take the most favourable looking haul for Ostracoda, Foraminifera, and other small organisms, and after washing and freeing it of the grosser material, put it aside for examination. When more was sought from the same locality to make up the desired quantity of material, it was taken close by on the same character of bottom.

It may be remarked that *Philina aperta* (Linn.) was in very great abundance at this place.

The Ostracoda were not so well represented as the appearance of the ground promised to be. Thirty-four species were obtained, and twenty-eight Foraminifera.

II.—OFF GIRVAN.

Our material was from about four miles off Girvan Pier, in 12 to 15 fathoms, on a bank of gravel and dead shells, which had a most unpromising appearance for Microzoa; yet on examination Ostracoda and Foraminifera were both unusually well represented; thirty-eight well-marked species of Ostracoda were found.

The Foraminifera exceeded the Ostracoda in the number of species, amounting to forty-four. Amongst them was a very fine specimen of *Lagena lagenoides*, (Will).

III.—CAMPBELTOWN LOCH.

The bottom of the loch is covered with mud, or sandy mud, nearly over its whole extent. The depth ranges from 6 to 10 fathoms, except towards the entrance, where the bottom gets harder, and the depth increases to 20 or 22 fathoms.

From the position and character of the surrounding hills, it is free from sudden gusts of wind, so dangerous in many of our western lochs. Spring tides rise only 8½ feet, and neap tides 6 feet, and their motions are so gentle that in many places they are scarcely felt. The general character of the loch is apparently so favourable to the habits of Microzoa that an unusually large gathering was expected. In this hope, however, we were to some extent disappointed. The list of Ostracoda amounted only to thirty-three species and Foraminifera to twenty-seven, seven of which were arenaceous forms.

It must be borne in mind that the gathering was only from one place near the head of the loch, and in all likelihood represents only a portion of the Ostracoda and Foraminifera of the loch.

IV.—EAST TARBERT.

Dredged off the Old Pier in 3 to 4 fathoms; bottom black sandy mud. The Ostracoda obtained were twenty-five species and the Foraminifera eighteen. None of either was of any special interest.

V.—ARDRISHAIG.

The gathering was taken two or three hundred yards off the pier, farther up the loch, in 6 fathoms; bottom muddy sand, some little gravel and dead shells. The Ostracoda obtained were eighteen species, and Foraminifera only eleven. It may be mentioned that in a small ochreous streamlet near the head of the loch, *Quinqueloculina fusca* was abundant.

VI.—LOCHFYNE.

The gathering examined for Microzoa was taken off Inverary, towards Shira Point, in 25 fathoms, bottom soft mud.

This loch has been long famed for its Mollusca as well as its herrings. *Pecten septemradialis* is got in Lochfyne in great abundance, seldom in the dredge, but by means of a net spread over the ground that they frequent, to which they adhere till they are pulled up—as many as 800 have been taken in this way.

Terebratula caput-serpentis (Linn.) is plentiful and large in the loch where the bottom is gravelly. *Cylichna acuminata* (Brug), is common on mud bottom south side of the loch opposite Inverary. The rare *Emarginula crassa* (Sow.) has been occasionally dredged off Shira Point on gravelly bottom.

The Ostracoda obtained were forty-four species. *Cytheridea papillosa* (Bosq.) and *Cytheridea punctillata* (Brady), were both in fine condition and prevailed much.

Foraminifera, thirty-seven species. That of most interest was *Valvulina Austriaca* (D'Orb.) running into *V. conica*.

VII.—GLEN SANNOX BAY, ARRAN.

A great portion of the bottom of this bay is covered by coarse granitic sand, and very barren in Microzoa. On the east side of the bay, in deeper water (20 fathoms), where the bottom is sandy mud, life is more abundant, but still poor as regards genera and species. There were only seventeen species of Ostracoda obtained in the gathering. When species are few it often happens that rare forms are met with, and gatherings containing large numbers of species seldom yield much that is rare.

Amongst the Ostracoda from this place were, *Paradoxostoma pulchellum* (Sars), a moderately rare species, where it does occur being mostly only in twos and threes, but here it is moderately common; and *Paradoxostoma orcadense* (Brady and Robertson), still more rare, the only other locality in which it has been met with being the Bay of Stromness, Orkney. Foraminifera not examined.

VIII.—LAMLASH BAY, ARRAN.

The Bay of Lamlash is much resorted to as a good dredging ground. The field of operations being so near the village of Lamlash for a starting point is a great advantage, and the small but well-marked area of dredging ground is so well known to the native fishermen, and so rich in the various departments of the invertebrate fauna, that a successful day's work may at all times be calculated upon. It is different when the dredging ground has to be sought for at a distance of miles. The depth of the bay in general is about 14 or 15 fathoms. The bottom is variously covered by small gravel, Melobesia, shell

debris, sand, and mud, supplying a diversity of haunts favourable to the different forms of animal life. Confining our remarks to those included in our present subject, the Ostracoda were in considerable profusion, numbering thirty-nine species; Foraminifera also thirty-nine.

IX.—HORSE ISLAND, NEAR ARDROSSAN.

The gathering was taken a little seaward of the island, in 20 fathoms; bottom sandy mud, with a small admixture of gravel and broken shells. Thirty-nine species of Ostracoda were obtained, and thirty-one of Foraminifera. Both were in very fine condition.

X.—BETWEEN PORTINCROSS AND ARDROSSAN.

The gathering was taken about three miles off shore, in 30 fathoms; bottom fine mud. This part of the shore is necessarily exposed to heavy seas, and yet the gathering was very rich, both in Ostracoda and Foraminifera, including forty-three species of the former and fifty-eight of the latter. Although this part of the coast is exposed to the south-west gales, its depth places it beyond the influence of the storm-waves, and the fineness of the mud is evidence that it is not much exposed to undercurrents, and may maintain a calm more favourable to the development of these minute organisms than the apparently sheltered lochs, where the tides, streaming between their narrow sides, scour the bottom every ebb and flow. Yet in some of these lochs where a paucity of Ostracoda and Foraminifera may be remarked, the bottom is covered with mud.

XI.—ST. NINIAN'S BAY, BUTE.

The gathering from this place was taken in 6 to 7 fathoms, on a sandy gravelly bottom. Amongst the material brought up there was little appearance of either animal or vegetable life. The gravel was clean and smooth, evidently from rolling on the sea bottom. The Ostracoda obtained were twenty-eight species. *Cytherura gibba* (Müller), rather a rare species, was abundant and in fine condition.

The Foraminifera numbered thirty-two species. The sculptured *Lagenæ* were well represented; amongst them *Lagena sulcata* (W. & J.) was very fine. The smooth forms, as *Lagena lævis* and *L. gracillima*, were entirely absent.

XII.—LOCH RIDUN.

The bottom of this loch, over its greater extent, is covered with mud and muddy sand. Our gathering was taken about half way up the loch in 16 fathoms, and contained twenty species of Ostracoda. *Cythere tenera* (Brady) and *Cytheridea papillosa* (Bosquet) prevailed most.

Foraminifera were better represented in numbers (twenty-eight), and contained a few beautiful specimens of *Lagena striata* (Montagu), and *Lagena Lyellii* (Sagz.); and it may be noticed that a very fine specimen of the Mollusc *Neæra cuspidata* (Olivi) was obtained at the same place.

XIII.—COLINTRAIVE BAY.

The bay on the north side deepens to 10-12 fathoms; bottom sandy mud, mixed with a little gravel. The Ostracoda obtained were thirty-

one species; some that in most other places are rather rare, were here moderately common; such as, *Cythere antiquata* (Baird), *Cythere Jonesii* (Baird), *Bythocythere constricta* (Sars), *Xiphichilus tenuissima* (Norman), and *Polycope orbicularis* (Sars).

Foraminifera were rather more numerous (thirty-seven species), amongst them *Lituola nautiloidea* (Lamk.), *L. scorpiurus* (Montfort), and *Nodosaria scalaris* (Batsch) were very fine.

XIV.—LOCH STRIVEN.

The gathering was taken near the foot of the loch, in 26 fathoms, mud bottom; and another gathering about four miles further up, in 20 fathoms, mud mixed with a little sand and gravel. The two gatherings did not differ much, and between them twenty-nine species of Ostracoda were obtained, and thirty-one of Foraminifera. There was nothing in either of unusual interest.

XV.—ROTHESAY BAY.

The gathering was taken from opposite the pier, out towards the entrance of the bay, in 15 to 18 fathoms. Bottom brownish mud mixed with gravel and numerous dead shells. *Astarte sulcata* and *compressa* were common, mostly large in size, and all dead, having much the appearance of those from post-tertiary deposits. That they were so is all the more likely, as Dr. J. Grieve dredged a valve of *Pecten Islandicus* in the same locality. Both the Ostracoda and Foraminifera of this gathering must therefore be taken with some reserve, although they do not exceed gatherings obtained in similar localities. The number of species of Ostracoda noticed was forty-three, but few prevailed much individually. The Foraminifera were nearly the same in number, forty-one species, but much more abundant individually. *Nodosaria scalaris* (Batsch) was common.

XVI.—KILCHATTAN BAY, BUTE.

This bay, between tide, is chiefly muddy sand; but as the water deepens the bottom becomes more and more muddy. Our gathering was taken in 20 to 25 fathoms, bottom mud, with a small admixture of sand. Both Foraminifera and Ostracoda were well represented—forty-four species of the former, and forty-six of the latter. Amongst the Ostracoda, *Cytheropteron alatum* (Sars) was common in various stages of growth. Among the Foraminifera the *Lagenæ* were very fine; *Lagena Jeffreysii* especially was of great beauty, and far from being rare.

XVII.—GLEN CALLUM'S BAY, BUTE.

The gathering was taken about two hundred yards out from the bay towards the lighthouse, Little Cumbrae, in 19 fathoms; the bottom shelly mud, gravel, and Melobesia. The Ostracoda obtained were forty-seven species, and Foraminifera thirty-six. The number of species was amongst the highest, particularly of the Ostracoda. That of most interest amongst the Foraminifera was *Trochammina gordialis* (P. & J.)

XVIII.—LITTLE CUMBRAE.

The material was dredged in 3 to 5 fathoms, on the east side of the old castle; the bottom shelly debris, which had a very unpromising appearance.

Still the Ostracoda were moderately well represented, numbering twenty-eight species. Amongst them was *Bairdia inflata* (Norman), a rare species in the Clyde district. *Loxoconcha impressa* (Baird), the only species of the genus noticed at this place, was the most abundant in the gathering.

Foraminifera twenty-seven species. *Polystomella crispa* (Linn.) prevailed, and was in fine condition.

XIX.—MUGGIE POINT

(North-east end of Little Cumbrae).

The gathering for Ostracoda and Foraminifera was taken about 150 yards off shore, in a north-easterly direction, in 16 fathoms, on a gravelly bottom. This place was remarkable for the number of *Comatulæ* of all sizes that the dredge brought up; dozens were in the dredge, and dozens were hanging on the net and rope outside. At another haul about the same place, a long old frond of *Laminaria saccharina* (Linn.) was drawn up, hoary with hundreds of *Pentacrinus Europæus* (Forbes) (the young *Comatula*).

The Ostracoda obtained were thirty-seven species; none in any great number or of special interest.

XX.—THE TAN.

This is off the south end of Great Cumbrae. The buoy marks the edge of a bank of Melobesia, which has long been resorted to by naturalists for dredging operations. *Lima hians* (Gm.) and their nests are very abundant on this bank, especially on the west and south side of the buoy. The material examined for Ostracoda and Foraminifera was taken a little on the outside of the buoy in 10 to 12 fathoms, bottom Melobesia and mud; forty-four species of Ostracoda were obtained, none prevailed much. Foraminifera were still more numerous (forty-nine species). *Quinqueloculina secans* (D'Orb.) and *Q. bicornis* (W. & J.) were abundant, and in very fine condition. The *Lagenæ* were numerous, and many of great beauty; amongst them was *Lagena striata-punctata* (P. & J.). *Patellina corrugata* (Will.) was also abundant and fine.

XXI.—CLACH.

This is the smallest and most westerly of a small group of rocks or islets in Millport Bay. On the north side, or between the rock and the shore, is excellent dredging ground, where Mollusca, Crustacea, and Algæ, are common, and it has the advantage of easy access. The ground may be dredged close by the rock on the north side, where it is chiefly mud and shell debris; but farther shoreward it gets more gravelly, and much grown over with sea-weed. Here Crabs of various kinds are common. As the north shore is neared, the ground gets too rough for the safe working of the dredge. On a line from the north-west end of the rock, in the direction of the west end of Crighton Street, till the lower end of the rock is cleared, we have found to be the richest part of the ground. The depth is from 5 to 8 fathoms. The Ostracoda obtained at this place were forty-six species. *Cythere badia* (Norman), a rather rare form in the Firth of Clyde, is common here. *Cythere crispata* (Brady) is also common, and both in very fine condition. Foraminifera, forty-nine species. Amongst them is *Trochammina squamata* (P. & J.)

XXII.—KAMES BAY, CUMBRAE, AT LOW WATER.

Many good gatherings are made in tide pools between high and low water, but the present is of a different character, and refers to some very interesting and productive gatherings obtained by scraping off the muddy sand on stones and rocks at the verge of low water. These mud-covered stones at low water are generally found to be overgrown with minute species of Algæ, as *Callithamnion Rothii*, &c., and are favourite retreats for Entomostraca and Foraminifera. Of Ostracoda twenty-five species were obtained. As the gatherings in this paper are confined to the dredge, this one from the tidal belt has been introduced as a sample of what may be got on such places.

XXIII.—PORTLOY, CUMBRAE.

A small creek on the east side of Kames Bay, where the stones between tide mark are heaped up against each other, leaving hollows between, where a great profusion of the invertebrate fauna find shelter. At spring tides, by turning over the stones, excellent captures are made. In the early months of the year it is quite a den for the *Nudibranchs*. The creek is small and rather rocky inside, but outside, in 10 to 12 fathoms, on a bottom of sandy mud and small gravel, rich gatherings of Microzoa may be obtained. In one of these, forty-seven species of Ostracoda occurred. *Cytherura cellulosa* (Norman) and *Cytherideis subulata* (Brady) were amongst the prevailing species. *Paracypris polita* (Sars), a rather rare species both in distribution and individuals, is here moderately common.

Foraminifera thirty-nine species. Those prevailing were *Biloculina ringens* (Lam.), *Quinqueloculina subrotunda* (Mont.), *Vernculina polystropha* (Reuss), and *Polystomella crispa* (Linn).

XXIV.—FAIRLAND POINT.

This is at the south-east corner of Kames Bay, where the sea, for some distance off shore, is generally more or less tumultuous.

The material for examination was dredged about 300 yards to the south, the bottom small gravel and muddy shell debris. The Ostracoda obtained were thirty-six species, the most noteworthy being *Cytherura producta* (Brady), hitherto considered a rare species; here moderately common. In another gathering a little farther to the west, in 14 fathoms, on a similar bottom, it was not found—this, as has been remarked, is a common occurrence.

XXV.—CAPEL ROCK.

A large exposed trap dyke on the south side of Cumbrae, locally known by the name of "De'il's Dyke."

The gathering was dredged at about 60 yards off shore, in 10 to 15 fathoms; the bottom muddy shell debris. Forty-three Ostracoda were obtained. *Pontocypris mytiloides* (Norman) was common, and most of them, instead of the usual purplish colour, were of a fine full brown; also *Pseudocythere caudata*, usually of a dull lead colour, was patched over with brownish-red. *Sclerochilus contortus* (Norman) prevailed greatly.

XXVI.—LION ROCK, CUMBRAE.

The gathering was taken in about 150 yards off the rock, in 20 fathoms; bottom mud. Ostracoda forty-three species; Foraminifera thirty-seven species.

XXVII.—FAIRLIE PERCH.

The perch is placed on the edge of a broad spit of sand a little below Fairlie, on the Ayrshire coast. The gathering was taken at a little distance off the perch, in 10 fathoms; bottom sandy. There was nothing remarkable in the gathering. *Cythere villosa* (Sars) prevailed most. The number of species of Ostracoda obtained was thirty-five.

XXVIII.—FERRY HOUSE, CUMBRAE.

The gathering was taken a little west of the pier, in 6 fathoms; bottom sandy mud. Thirty-four species of Ostracoda were obtained; some moderately common, but none in great abundance. *Cythere tenera* was of a fine brown colour, without the porcellaneous character which prevails amongst those found in the same neighbourhood on a softer bottom and in deeper water.

XXIX.—OFF LARGS.

In 20 fathoms; bottom dark-coloured slimy mud. Neither Ostracoda nor Foraminifera were numerous in species. Twenty-five species of Ostracoda were obtained; *Cytheridea papillosa* the most abundant, and in beautiful condition. *Cytheridea punctillata* was common, but not so fine as *C. papillosa*. *Krithe Bartonensis* and *Cythere tenera* were moderately common. Many of this last species were more or less porcellaneous, which I have sometimes noticed occurring on the same character of ground.

Foraminifera twenty-nine species. Amongst them *Bolivina plicata* (D'Orb).

XXX.—WHITE BAY, CUMBRAE.

(North-east End of Cumbrae.)

The gathering was made in 20 fathoms; bottom sandy mud. The number of species of Ostracoda obtained was thirty-one. There was little or nothing remarkable amongst them. The most noteworthy was the state of *Loxoconcha impressa*, the specimens of which were all greatly eroded. *Polycope orbicularis* was common. Foraminifera, thirty-seven species.

XXXI.—WHITE BAY, CUMBRAE.

Another gathering was taken nearer to the shore, in 2 to 7 fathoms, which will be seen in the table to differ much from the other.

XXXII.—OFF FIGGETOCH GLEN, CUMBRAE.

In 22 fathoms; bottom sandy mud. It is remarkable that this gathering does not contain a single species of the genus *Cytherura*. *Cythere tenera* is common; *Cytheridea punctillata* is more abundant than *Cytheridea papillosa*, which is generally the reverse on a muddy bottom (*C. punctillata* is more

attached to ground somewhat harder). Ostracoda twenty-five species; Foraminifera thirty-nine species, amongst the latter *Lagena Jeffreysii* (Brady) was very fine.

XXXIII.—FINTRY BAY, CUMBRAE.

This is a long sandy bay on the north side of the island, more or less gravelly at some points.

The gathering was taken in 22 fathoms, about half a mile off shore, beyond the sand bank, in sandy mud. Thirty-four species of Ostracoda were obtained, *Cytheridea papillosa* and *Cythere tuberculata* prevailing, as they generally do on muddy bottoms. *Polycope orbicularis* was moderately common, and beautifully tinged with red. Foraminifera forty-two species. Amongst them was the rare *Lagena pulchella* (Brady).

XXXIV.—INVERKIP BAY.

The haul taken to be examined for Ostracoda and Foraminifera was in 12 fathoms; bottom mud, mixed with small gravel and broken shells. Thirty-five species of Ostracoda were obtained, mostly well represented. *Cytheridea papillosa* prevailed greatly, *Polycope orbicularis* was common, and mostly marked with a fine dash of red.

Foraminifera were more numerous, forty-three species. *Polymorphina tubulosa* was remarkable in this gathering for its large size and wide-spreading branches, and also a fine specimen of *Rotalia nitida* (Will.)

XXXV.—LOCH LONG.

The gathering was taken off Coulport Ferry, in 15 fathoms; bottom muddy, sandy gravel. Forty-three species of Ostracoda were obtained. *Krithe Bartonensis* (Jones) and *Philomedes interpunctata* (Baird) were very abundant; *Argillœcea cylindrica* (G. O. Sars), a rather rare species, was common. Foraminifera twenty-five species.

XXXVI.—ROSENEATH BAY.

This gathering was made towards the pier on the opposite side, in 10 to 15 fathoms; bottom mud. *Cytheridea papillosa* and *Cythere Dunelmensis* prevailed greatly, as they do in the neighbouring loch, and also *Loxoconcha granulata*. *Bythocythere simplex* was moderately common, and most of the specimens had a fine dash of red towards the anterior extremity.

In a haul nearer the shore, in 2 fathoms, on a sandy bottom, *Cythere pellucida*, *C. porcellanea*, *C. lutea*, and *Eucythere declivis* were common, but absent in that from the deeper water. It may be remarked that here *Cythere porcellanea* was in exceptionally fine condition, and of the true typical form.

These four species, in 2 fathoms, have been placed in the list with those from 10 to 15 fathoms. Ostracoda forty-five species. The Foraminifer, *Verneuilina polystropha* (Reuss), was in excessive abundance.

It may be noticed that *Virgularia mirabilis* is very common in this bay both in the deep and shallower water, on mud bottom, but none of large size. *Psolus Phantapus* (Linn.) is also moderately common between Roseneath and the Row Pier.

XXXVII.—OFF GREENOCK.

The gathering was made about a mile from the pier in the direction of Roseneath, in 4 to 6 fathoms; bottom muddy sand. There is not much of interest amongst the Ostracoda, further than they connect the animals of stronger marine habits with the more brackish forms of Port-Glasgow and Langbank; and they further prove that the south side of the firth at this place is greatly more brackish than the north. This is contrary to a popular belief that the sewage of Glasgow is carried down by the Clyde, and deposited along the shores of Helensburgh and in Roseneath Bay. The gatherings from these latter places scarcely shew a vestige of brackish water forms; while on the Greenock side many of them are decidedly brackish—as *Cythere castanea*, *Cytheridea torosa*, and *Cythere gibba*, and some obviously washed down from the upper reaches of the Clyde, as *Cypris compressa*, *Cypridopsis obesa*, and *Candona albicans*. Ostracoda twenty-three species.

XXXVIII.—PORT-GLASGOW AND LANGBANK.

We may quote here the description given of this place in a paper "On the Ostracoda and Foraminifera of Tidal Rivers," by Brady and Robertson. *Ann. and Mag. of Nat. Hist.*, July, 1870.

"At Langbank the tide leaves bare a long muddy flat along the river, nearly a quarter of a mile broad; and when the tide is out, and the river swollen to any extent, this is covered by fresh water. Our gatherings at this place were taken from low water to near high water mark. Other gatherings were taken from Port-Glasgow up along the river for fully a mile, in 4 to 8 feet water, beyond low tide. In some places the bottom is soft black mud; in others, muddy, gravelly sand, much covered by mussels (*Mytilus edulis*).

"The estuary here is a few miles broad, and the tide rises from 8 to 10 feet, the fresh water being much less felt than at Langbank, which is about 4 miles farther up, where the water narrows greatly as it reaches Dumbarton Castle. It is somewhat remarkable, considering the extent of the gatherings, the diversity of bottom, and the very promising appearance in every way of the locality, together with the profusion of *Coraphium Isopoda* and other forms of animal life, that the Ostracoda and Foraminifera met with were exceptionally few, both in the number of species and individuals, and those mostly of brackish or fresh-water type. We are disposed to think that the great amount of chemical refuse poured into the River Clyde from around Glasgow and Paisley may be the chief cause. In the River Wear, where somewhat similar conditions exist, we have found the fauna affected exactly in the same manner. That some artificial cause is at work seems almost certain, as we have not found so poor a microscopic fauna in any river unconnected with manufacturing operations."

As many of the species of Ostracoda belong to fresh water, probably having been washed down from the higher reaches of the river, which our table does not admit, subjoined is a list of all the species met with—

Cypris compressa, Baird. ×
Cypridopsis obesa, Br. & Rob. ×
Potamocypris fulva, Brady. ×
Candona albicans, Brady. ×
,, *detecta*, Müller. ×
Cythere pellucida, Baird. ×
,, *castanea*, Sars. × ×
,, *viridis*, Müller. × ×
,, *villosa*, Sars. ×
Cythere angulata, Sars. ×
Linnicythere inopinata, Baird.
Cytheridea papillosa, Bosq. ×
,, *torosa*, var. *teres*. × ×
Eucythere argus, Sars. ×
Loxoconcha fragilis, Sars. ×
Cytherura Robertsoni, Brady. ×
Paradoxostoma variabile. ×

XXXIX.—LOCHGOIL.

The gathering was taken off Aird Madaila in 30 fathoms, mud bottom. Neither Foraminifera nor Ostracoda were numerous—twenty-four of the former and thirty-four of the latter. Some of the more common, and a few of the rarer species were in considerable abundance and in good condition, as they generally are, wherever they are found prevailing;—such as *Loxoconcha granulata* (Sars), *Cytheropteron alatum* (Sars), *Bythocythere simplex* (Norman), and *Polycope orbicularis* (Sars).

A gathering a little farther up the loch in 12 fathoms, bottom sandy mud, was much poorer in Microzoa, and had few or none of the rarer forms found so plentifully in that of 30 fathoms.

XL.—GARELOCH.

The gathering was taken in 15 fathoms, near the upper end of the loch. The bottom was fine brown mud, with a little small gravel and sand. The species of Ostracoda obtained were thirty-one. Amongst those that prevailed most were *Cythere tenera* (Brady), *Cytheridea papillosa* (Bosq.), *Loxoconcha granulata* (Sars), *Cytheropteron latissima* (Norman), *Bythocythere simplex* (Norman)—most of these shells contained the animal, which added greatly to their beauty. *Cythere tenera* in this gathering had a tendency to a porcellaneous test. *Cythere Dunelmensis* and *Cythere tuberculata* were also common, but not in very good condition. In another gathering near the head of the loch, in 4 to 5 fathoms, muddy bottom, *Cytheridea papillosa* occurred, but in nothing like the numbers that were found a little farther down the loch in 15 fathoms, where they were in great excess. On the other hand, *Cythere Dunelmensis* was greatly more abundant in 4 to 5 fathoms than they were in the deeper water.

Foraminifera nineteen species.

In connection with the foregoing lists, it may be of use to append a few short notes on the appliances for collecting the Ostracoda and Foraminifera, and on the preparation of the specimens. For further particulars, see an excellent paper by my friend, G. S. Brady, on collecting and preserving Microzoa (*Nature*, vol. viii., p. 63).

Marine Microzoa may be collected by the hand net amongst the tangle, by the surface net, and by the dredge. The latter, however, is by far the most successful means. The dredge, as usually made, is so large and difficult to transport and work, that its use is mainly confined to special occasions requiring much troublesome preparation. As a large dredge is not required to secure these small animals, nor a large bag to hold the material that need be brought up from the sea bottom for examination, I have had a small instrument made, which is found to answer the purpose exceedingly well.

This dredge, with a rope sufficiently long to be worked in forty or fifty fathoms of water, will not exceed 10 or 12 lbs. in weight, and all can be packed in a small basket, and made available at any time when a few hours can be spared at the sea-shore. Any one, moreover, who can use the oars of a boat can manage it by himself if required; and it is surprising what can be done in this way by a single person working at his leisure. The dredge itself is of the usual form, and weighs 4 lbs.; the mouth is 7 inches long by $3\frac{1}{2}$ inches wide; the arms, 4 inches long, are jointed to the lower ends of the frame, admitting of motion only transversely to the mouth. This is a contrary arrangement to the common dredge of the naturalist, on which the arms move inwards along the mouth, and not having the transverse motion, are apt to exercise a leverage in a direction to lift the scraper off the ground, which must be a frequent cause of vexatious disappointment in dredging.

The bag used on the small dredge requires to be sufficiently fine to retain the small animals sought for, and open enough to allow the water to run off freely. The thin cloth known by the name of "cheese cloth," answers the purpose very well, when made to suit the circumference of the dredge, and not less than 30 inches long. The advantage of this great length of bag in proportion to the size of the dredge will be seen, when we consider the tendency that the material has in a short bag to wash out when the sea is in some degree rough. I have found the same form of bag to be equally applicable and efficient with larger dredges. The lower end of the bag is not sewed, but tied with a cord, by which it can be opened and emptied more easily than by the mouth. A stone of two or three pounds weight attached to the lower end of the bag keeps it in good position on the sea bottom, and allows it to fill the more readily. This is managed with little trouble by putting the stone in a small bag or net, and fixing it to the lower end of the dredge bag by a running noose, which does instead of tying the bag with a separate cord. Where the water is deeper than 5 or 6 fathoms, or the sea rough, it is necessary to attach a stone in the same way to the rope 2 or 3 fathoms forward from the dredge, in order to counteract the buoyancy of additional rope, and keep the mouth of the dredge to the ground, the weight requiring to be increased according to the increase of depth or strength of current.

This little dredge has been found exceedingly efficient for the capture of the smaller forms, and the richness of the hauls that have been taken with it has often been a matter of wonder. Although so light and portable, it is sufficiently large to admit, with the exception of a few of the larger and

commoner things, almost everything on our coasts of interest to the naturalist; and in this belief it has been successfully used for days together in general work, in preference to larger dredges. Indeed, knowing what a very small dredge can do, and the great saving of labour in working, I would not think of using one in a rowing boat larger than 10 or 12 inches, except for some special purpose.

To prepare the dredged material for the separation of the minute organisms, it is necessary to have in the boat a tub or pail filled with water, and to wash the dredged material into it through a sieve, of about one-eighth inch meshes, which will allow all the Microzoa to pass into the water. Many of these will be found floating on it, chiefly *Amphipoda*, *Copepoda*, &c., with some of the smooth-shelled Ostracoda, which can all be collected expeditiously by pouring the water through a muslin bag sufficiently fine to retain the animals, after which they are washed by pouring clean water over them. Then they should be transferred to a bottle containing spirits for preservation, care being taken to label it with the name of locality, depth of water, and character of bottom.

The material at the bottom of the tub is next washed in the muslin bag* over the side of the boat till the water runs off clear. Thus cleaned, it is transferred to a small cotton bag—about 10 inches deep by 7 broad is a size that suits very well. When this material has to remain in the bags for some time, as often it has to do before being dried and examined, the animal tissues of the Ostracoda are in almost every instance found to be destroyed, to the loss of that which often affords the only characteristics that can be relied upon to determine the affinity or place of any that may be doubtful or new.

As the quantity of material usually bagged up in this way would be expensive and inconvenient to carry in spirits, I have found that common table salt answers admirably as a preservative to mix up in the bags. In doing this another advantage has been unexpectedly found—viz., when mixed with peaty mud the salt, by entering thoroughly amongst the particles, causes it when dry to dissolve readily in water and sink to the bottom, leaving the Ostracoda and Foraminifera with their usual tendency to float, whereby they can easily be secured. On the other hand, dried peaty mud not treated with salt, when put into water floats altogether, and it is therefore exceedingly difficult to separate the Microzoa from it. We next label as before described, but in this case it is more difficult to do it securely, as both bag and contents are wet, and may have to be packed together in that state for some time, which would necessarily destroy all ordinary labels, whether placed in or outside of the bag. To obviate this we enclose the label in a small wooden needle-case (to be had for threepence or fourpence a dozen), which I have never found to fail, although lying for weeks together in soft mud.

The surface net is another successful means of capture, especially after sunset, but not for either Ostracoda or Foraminifera, except a few of the

* In this case the fabric of the bag requires to be a little finer than that last used, so that none of the minute Foraminifera may escape. A suitable kind of cloth is that known by the name of "Scotch lawn," of the fineness of 26 or 28 cross threads under the draper's glass. The bag may be made about 18 inches deep and 9 inches wide, rounded at the bottom—5 or 6 inches of stout cotton cloth next the top makes it more convenient to work with. It is a great protection to the fine bag when working, to have it within a stronger bag of open texture, when it can be used with more safety and freedom—a strong canvas loose cover is equally useful over the dredge bag.

family *Cypridinidæ*, though often rich in *Amphipoda*, *Copepoda*, &c. Unlike the dredge, with which you may return to ground where you have been successful, with every prospect of obtaining similar good gatherings, the surface net is often disappointing in this respect, as the play or feeding ground of these animals is so changeable, that some nights in passing over the same area where they had been abundant on a previous night, scarcely one is to be found. It often happens that the group taken in the net one night, is very different from that gathered on the following over the same surface. The darker the night and the more luminous the water, the more hopeful it is of success.

There have been many different shapes and sizes of surface nets, but whatever these may be, one thing must be kept in mind—viz., that the mouth of the net must not take in more water than the meshes can freely let out, otherwise the contents will be thrown out by the back water as fast as they come in. There is reason to believe that this has been a cause of frequent disappointment in the use of the surface net. The one I have found most successful and convenient in the rowing-boat is about 10 inches in diameter, and 20 in depth; and as the class of animals taken by the surface net is not so minute as those obtained by the dredge, the net need not be so small in the mesh as that used for washing the mud. The same fabric "Scotch lawn," but coarser, answers very well. The bag is rounded at bottom, and secured by a brass ring at the mouth, strong enough to bear the resistance of the current of water when at work, and a small hose is attached to the ring to receive the handle or walking-stick. A little tin can is required, not less than 6 or 7 inches in diameter, and about 8 or 9 inches deep, half filled with sea water. The net is held over the boat a few inches in the water while it is moving gently along for about 40 or 50 yards; it is then lifted, and, putting the hand to the bottom of it, inverted into the can of water, so as to wash off the captures. It is then withdrawn to its former position, and the process repeated.

When brought home, the contents are best seen when emptied into a white basin, and if anything special appears, it can be put by itself for safety or further examination; the whole may be washed through a coarse sieve to separate the larger impurities, in the same way as the dredged material was washed. Another mode of collecting is by washing in a tub of water the dredged tangle or small Algæ scraped from the rocks in tide pools or at low water—the animals being secured as before described. The same process of washing and straining may be applied with great success to sand or mud taken from low-water mark, which can be managed with smaller vessels than required for the tangle.

Returning to the dredged material that was packed in the bags, the next process is to dry it well; then transfer it to a vessel with water, stirring it thoroughly afterwards; skim off all that floats on the surface, which will contain most of the Microzoa and many of the minute shells, &c. This should be laid on a fine sieve, then more water added to the vessel, and all the sediment again stirred up from the bottom, and the skimming repeated in this way for several times, till all is gathered that floats on the surface after repeated stirrings. Clean water should then be run on the contents of the sieve until freed of all the loose impurities; the residue is then dried and is ready for further examination. The material thus obtained is called "floatings."

In this operation, although the greater number of the Microzoa float, yet

many of them do so only partially, especially the rough, heavy shelled Ostracoda, as *Cythere Dunelmensis* and *C. tuberculata*. In some cases it may, therefore, be necessary to re-dry and float again, or examine the material itself in mass; but where there is a fair quantity to work upon, this need hardly be done.

The next operation is to examine the floatings, which is best done by sifting them through two or three sieves of different sizes; the first to retain the larger forms, and so on, whereby the different grades can be more easily examined, as the larger do not then so readily obscure the smaller forms. We then spread a small quantity on a writing slate, and with a hand lens and small hair pencil pick out those required, which may be transferred to small separate tablets for the different species.

Searching for very minute forms is best done under the microscope with a low power. The work is much facilitated by drawing lines on a slip of thin black cardboard, suitable to the field the instrument will take in, and following between the lines up and down, which guides the eye over the whole material to be searched, without the risk of traversing by haphazard the same surface that has already been gone over.

Mounting.—Objects mounted to be viewed by transmitted light are best seen on a black ground, and for this purpose slides made of cardboard are now in general use for the microscope, and are both convenient and safe for transmission by post, offering great facilities for exchange. They are also cheap, and where not readily to be bought are easily made.

Any paperbox-maker will cover a sheet of cardboard (of proper thickness to suit the objects to be mounted) with paper of the colour desired, and another sheet of cardboard with black paper, cutting both sheets into slips 3 inches long by 1 broad. Let a hole be then punched in the coloured slip of a convenient size to form the cell,* and paste it on the black slip, pressing till dry, and the slide is complete.

The objects to be mounted are now placed in the cell with a little gum-arabic, or two parts of gum-arabic and one part of gum-tragacanth. The addition of a few drops of glycerine makes it less brittle when dry. Those mounted for the cabinet are kept more safely, and can be examined with more freedom, when covered with glass.

The Post-tertiary clays are treated precisely as the dredged material—that is, dried, dissolved, and floated for Microzoa, and when wanted, the residue is washed free of the mud, and re-dried and examined for shells and other animal remains.

Shales.—As the Ostracoda and Foraminifera of the shales do not float, that material when soft and clayey requires only to be washed through a fine sieve (close enough to retain all the Microzoa) till the water runs off clear, then dried, and the coarser material removed by a sieve, and the finer siftings examined by the hand lens or microscope.

These soft shales are often examined by mixing them well in plenty of water, letting it stand a minute or two to allow the Microzoa to subside; then pouring off the muddy water, repeating the process till clean.

Ostracoda embedded in hard shale, lime, or ironstone, are often successfully liberated from their matrix by the concussion in breaking these materials into small pieces.

* Round punches of any size may be had from the gunsmiths, which suits very well. Other shapes are made to order.