



A LIST OF THE
CRETACEOUS MICROZOA OF THE NORTH OF IRELAND,

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FROM the way in which the Chalk of the North of Ireland has been hardened by heat and pressure, consequent on the overflow of the Basalt which everywhere in this country overlies the beds, geologists, until quite recently, had practically failed to find in our Irish Cretaceous rocks any of those beautiful Microzoa which so abound in the English Chalk.

So late as 1872 only one solitary Rhizopod had been recorded, viz., *Orbitolina concava*, found by Mr. Ralph Tate, F.G.S., in the Greensand. Mr. Thomas Galloway, of Belfast, had, however, also found a cast of *Dentalina communis* in flint near that place, and *Cristellaria rotulata* in the Greensand at Cave Hill, but had not recorded their occurrence. On the 13th of November, 1872, a paper was read before the Royal Geological Society of Ireland, by Professor T. Rupert Jones, F.R.S., on four carefully prepared slides of indurated Chalk, and one slide of Chalk flint, which were obtained from the North of Ireland, and had been submitted to him for examination by Professor Hull, Director of the Geological Survey in Ireland. Prof. Jones recognised in these specimens various sections of perfect and fragmentary Foraminifera, belonging to nine different species. In February, 1872, I discovered that the soft powdery material frequently found inside the cavities that often occur in flint, on being washed and cleaned, yielded Ostracoda, Foraminifera, and Sponge spicula, in great profusion; this powder being, in fact, a portion of the old sea bottom of the Cretaceous times. These tiny forms thus preserved in the flint cavities have remained uninjured, notwithstanding influences which converted the surrounding mud into solid limestone. I have since, in company with other members of the Club, examined personally a large portion of the Chalk area of

the North of Ireland, and in addition, through the kindness of Mr. Wm. Gray, M.R.I.A., Mr. S. A. Stewart, F.B.S.E., and Mr. Thomas Galloway, have had an opportunity of examining Chalk powder from 36 different localities in the Counties of Antrim, Londonderry, and Down. Among the many specimens collected from these various places, I have recognised, besides Corals and Polyzoa, 17 species of Ostracoda, 106 species and well marked varieties of Foraminifera, and 27 forms of Sponge spicula; many of these attain fine proportions, being much larger than those usually obtained from the washings of English Chalk. The Microzoa, on being placed in hydrochloric acid, were found to be, either not at all, or but very slightly affected by it, shewing that their original composition has, to a great extent, been replaced by silica. On account of the singular resemblance which many of those large flints known as "Paramoudras," bear to the deep sea siliceous sponge, *Holtenia Carpenteria*, I was specially desirous to obtain material from some of them for examination. Owing to their usually solid nature, this was difficult. I met, however, with several that were suitable, so that I was enabled to investigate the contents of four Paramoudras that were fossiliferous. The following is an analysis of those in question :—

No. 1, from Wolf Hill, near Belfast, 130 Spicula, 57 Foraminifera ; No. 2, from same locality, 130 Spicula, 8 Foraminifera ; No. 3, from Ballytober, Islandmagee, 5 Spicula, Foraminifera in great numbers ; No. 4, from Sallagh Braes, near Larne, Spicula in profusion, Foraminifera plentiful. The above results show that there is no appreciable difference between the contents of Paramoudras and ordinary flints. Both contain Sponge spicula in more or less abundance, the "Paramoudras" not being characterised by any special form of spiculum, which the others do not also contain. The one examined from Sallagh Braes yielded nearly all the different forms of spicula found in our Chalk powder, and in this respect closely resembled what was found in a small ordinary flint at Spring Hill, near Moneymore, Co. Derry ; whilst the "Paramoudra" from Ballytober, Islandmagee, though it contained Foraminifera and Ostracoda in abundance, had but very few spicula. From the general frequency of spicula in flints there cannot, however, I think, be any doubt but that most, if not all, of our nodular flints had their origin in a sponge, or some other soft organism round which the silica aggregated.

The Table given at the end must be considered as only an approximation to the general distribution of the Cretaceous Microzoa over the districts examined, the absence of many of the commoner species at some of the localities may be readily accounted for when we consider the small quantity of powder in some instances obtained. Thus at Larne, and at Spring Hill, near Moneymore, only a few grains of Chalk powder were found, several other localities also yielding but a very limited supply, whilst the flints at Woodburn quarry, as well as those on the shore between Blackhead and Gobbins, yielded, at a single visit, several pounds

weight of the material. Chalk flints are usually found hard and solid throughout, only a small proportion of them having cavities containing Chalk powder. So far as I have observed, those containing the powder appear to be confined to flints that have, for some time, been exposed to the action of the weather, the white material frequently seen in the interior of those newly quarried being always of a hard nature. I have met with Chalk powder in every stage, from powder as fine as the finest flour, to a material so hard that it was difficult to cut it with a penknife. The flints that contain powder may be readily known from the solid ones, by having openings from the outside varying much in size, the only trace at times being a little moss that has taken root on the chalky material exposed near the surface. It is not intended that the present list of Microzoa should be considered exhaustive, our knowledge of the contents of the flints in the North of Ireland is after all but very limited. Many localities in the northern parts of the Counties of Antrim and Londonderry have yet to be explored, whilst at several of the stations already examined the search for Chalk powder has been most cursory, and on several occasions only small samples of it were collected during hurried visits.

The Cretaceous rocks of the North of Ireland are found invariably underlying the Basalt, and are usually well exposed at the base of those hills which occupy the boundary line between it and the sedimentary rocks. They occur as a narrow belt of White Limestone and Greensand around the great basaltic plateau which occupies nearly all Co. Antrim and the eastern part of Co. Derry. I have given the localities for the Chalk Microzoa in the order in which they occur, commencing at Magheralin, the most south-westerly point examined; and then, in a north-easterly direction, through Lisburn, Belfast, Carrickfergus, Islandmagee, to Larne; then, north and north-west, round the coast to the Giant's Causeway; then, inland, into Co. Londonderry, ending in the high escarpment of Slieve Gallion and Keady Hill.

To my friend, Prof. T. Rupert Jones, F.R.S., I am deeply indebted for kind assistance rendered by him in the critical examination of my entire collection of Ostracoda and Foraminifera—an examination which has resulted in the detection of several new species. I am further indebted to Prof. Jones for names and references respecting all the forms here enumerated. Dr. J. S. Bowerbank, F.R.S., has also laid me under weighty obligations, by generously undertaking to revise my whole series of Sponge spicula, a work of peculiar difficulty. His report on the spicula will be given in full. To my friends, Mr. William Gray, M.R.I.A., Mr. Samuel A. Stewart, F.B.S.E., and Mr. Thomas Galloway, I am indebted for kind and liberal assistance in procuring for examination a large amount of material from various localities. To the kindness and skill of my friend Mr. William Swanston I am much indebted for the very accurate drawings in the plates which accompany this memoir.

LIST OF LOCALITIES FROM WHICH CHALK MICROZOA HAVE BEEN OBTAINED:—

1. Magheralin, Co. Down. Quarry about 3 miles S.W. of Moira.

Chalk powder in limited quantity—very rich in Microzoa.

2. Moira, Co. Antrim. Quarry about half-a-mile N. of Moira station.

A considerable quantity of Chalk powder was got in the flints at this place; it contained, however, but few Microzoa, and these usually in poor condition. The powder was frequently found highly coloured, and appeared to have been much altered by the action of heat

3. Kilcorrig, Co. Antrim. Quarry about 3 miles N.W. of Lisburn.

A little powder was found here, very poor in Microzoa.

4. White Mountain, Co. Antrim, 1 mile N.E. of preceding locality.

A little Chalk powder was found at this station, it was poor in Microzoa. This is the only Irish locality where *Lituola inflata* has been found.

5. Colin Glen, Co. Antrim, about $4\frac{1}{2}$ miles S.W. of Belfast.

A few flints were met with up this glen, which yielded a little Chalk powder, poor in Microzoa.

6. Black Hill, near Hannahstown, Co. Antrim. Quarry $3\frac{1}{2}$ miles from Belfast, on the Hannahstown Road.

The Chalk powder found at this quarry was very rich in Microzoa. Two Foraminifera of great interest were met with, viz.: A new *Bulimina*, named by Prof. T. Rupert Jones *Bulimina regularis*—this species is extremely rare, only two specimens of it having as yet been found. The other, a Rotaline form, taking the shape of *Rotalia orbicularis*, with regular openings into each chamber; only one example of this remarkable Rhizopod has been found.

7. Wolf Hill, Co. Antrim. Quarry 2 miles N.W. of Belfast, near the village of Ligoniel.

The Chalk powder found here contained an abundance of the usual forms.

8. Squire's Hill. Quarries near the village of Ligoniel, and not far from the preceding station.

The Chalk powder found in the flints at these quarries yielded the ordinary Chalk Microzoa; Sponge spicules occurred in great abundance.

9. Cave Hill, Co. Antrim. Quarries 2 miles N. of Belfast.

On account of the close proximity of these extensive quarries to the town of Belfast, they have been better examined for Chalk powder than any of the other localities. In the rubbish heaps outside the quarries occur numbers of flints containing Chalk powder, rich in fossil Microzoa. Among the many rare forms found at this place the following may be mentioned as of special interest, viz.: *Lituola* (*Haplostiche*) *clavulina*, *Flabellina* *lingula*, *F. rugosa*, and *Lingulina* *carinata*.

10. Whitewell, Co. Antrim. Quarry 4 miles N. of Belfast, on the Antrim Road.

The Chalk powder found in the flints in this quarry was rich in the usual fossils. Two very rare Foraminifera were found here, viz.: *Marginulina* *seminotata*, and *Cristellaria* (*Saracenaria*) *Italica*.

11. Whiteabbey, Co. Antrim. Quarry 1 mile W. of Whiteabbey station on the Northern Counties Railway.

The Chalk powder collected from this quarry contained the usual Chalk Ostracoda and Foraminifera, but very few Sponge spicules.

12. Woodburn, Co. Antrim. Quarry at the head of Woodburn Glen, 2½ miles N.W. of Carrickfergus.

I only once visited this quarry, and whilst there collected several pounds weight of Chalk powder; it was found to contain Microzoa in great profusion. Many rare Foraminifera occurred, and all our Irish Chalk Ostracoda, with the exception of *Cythere* *Iernica*. *Vaginulina* *costulata* and *Gaudryina* *pupoides*, var. *praelonga*, were among the rare Foraminifera found here.

13. Whitehead, Co. Antrim. Quarry convenient to Whitehead station on the Northern Counties Railway.

A small quantity of Chalk powder was collected at this quarry, it contained the usual Chalk Microzoa; *Fronicularia* *inversa* has been found in this quarry.

14. Blackhead, Co. Antrim. 1½ miles N.E. of Whitehead station, rocks exposed along the shore under the headland.

A few flints were met with at this spot; they contained Chalk powder in quantity, which proved highly fossiliferous.

15. Near Gobbins. Rocks exposed along the shore about midway between that headland and Blackhead.

About midway between Blackhead and the Gobbins a dyke occurs well exposed in a low cliff, and is composed of a mass of ordinary flints and Paramoudras crowded together, and imbedded in a brown ochreous clay. These flints were found to contain Chalk powder in the greatest quantity—one of the "Paramoudras" examined yielded several pounds weight of the powder. The material collected proved extremely rich in Microzoa; all our Irish Cretaceous Ostracoda were met with, and an unusually large number of Foraminifera referable to 79 species and well marked varieties. The following very rare Foraminifera occurred, viz.: *Dentalina Steenstrupi*, *Marginulina seminotata*, and *Bulimina regularis*.

16. Ballytober, Islandmagee, Co. Antrim. Quarry situated near the centre of the island, between the Gobbins and Magheramorne ferry.

Chalk powder was found here in quantity; the Microzoa were in great abundance, and in fine preservation.

17. Mill Bay, Islandmagee, opposite Magheramorne, Co. Antrim. Quarry about quarter of a mile from the Magheramorne ferry.

The flints in this quarry yielded a fair supply of Chalk powder rich in the usual Microzoa.

18. Magheramorne, Co. Antrim. Quarry convenient to Magheramorne station, on the Northern Counties Railway.

The powder found in the flints in this quarry was highly fossiliferous.

19. Ballycarry, Co. Antrim. Quarry about half-a-mile S. of Ballycarry station, on the Northern Counties Railway.

A large quantity of Chalk powder, extremely rich in fossils, was found in this quarry; all the Cretaceous Ostracoda were met with, besides a great variety of Foraminifera and Sponge spicules.

20. Red Hall Glen, Co. Antrim. One mile N.W. of preceding locality.

Flints occur sparingly scattered over the bed of this fine old glen, having been washed out of the white limestone which at one place forms overhanging cliffs. Many of the flints were found to contain Chalk powder rich in Microzoa.

21. Glenoe, Co. Antrim. Quarry 3 miles S.W. of Magheramorne.

A small quantity of Chalk powder found here was rich in the usual forms.

Larne, Co. Antrim. Small quarry half-a-mile S. of the railway terminus at Larne.

A few grains of powder was found in a flint at this quarry ; it contained the following fossils, viz. : *Cythere virginea*, *C. umbonata*, *Cythere (Cythereis) ornatissima*, *C. spiculata*, *Bairdia subdeltoidea*, *Cytherella ovata*, *C. Williamsoni*, *Paracypris gracilis*, *Dentalina marginuloides*, *Cristellaria rotulata*, *Textularia globulosa*, *Bulimina ovulum*, *B. brevis*, *Virgulina tegulata*, *Planorbulina ammonoides*, *Rotalia orbicularis*, var.

22. Waterloo, Co. Antrim. 1 mile N. of Larne, on the coast.

The Chalk powder at this place was highly fossiliferous ; 15 different species of Ostracoda were found in it.

23. Sallagh Braes, Co. Antrim. Quarry $4\frac{1}{2}$ miles N.W. of Larne, on the old road to Glenarm.

A "Paramoudra" was found here containing a quantity of Chalk powder ; it yielded Sponge spicula in great profusion.

24. Glenarm, Co. Antrim. Quarries near the town of Glenarm, on the Coast road.

I am indebted to my friend Mr. Gray for the only Chalk powder I have seen from this place, as also for what was found at the following seven localities. As I have not visited any of these places myself, and as the samples submitted for examination were small, I can give no information as to relative quantity of the powder ; all, however, were found to contain fossil Microzoa in more or less abundance.

25. Carnlough, Co. Antrim. Quarries 1 mile N.W. of the town on the Coast road, $2\frac{1}{2}$ miles N. of Glenarm.

26. Garron Point, Co. Antrim. Quarry on the Coast road, $4\frac{1}{2}$ miles N. of Carnlough.

27. Glenariff, Co. Antrim. Quarries $2\frac{1}{2}$ miles up the glen from Red Bay, on the Coast road.

28. Lurigethan, Co. Antrim. Quarries on the face of a hill 2 miles from Cushendall, on the Coast road.

29. Trostan Mountain, Co. Antrim. Quarry on the north face of the mountain, 3 miles W. of Cushendall.

30. Torr Head, Co. Antrim. North-east corner of Co. Antrim, 11 miles N. of Cushendall, and 8 miles W. of Ballycastle.

31. Ballintoy, Co. Antrim. Quarries at Ballintoy Harbour, $5\frac{1}{2}$ miles N.W. of Ballycastle, on the road to the Giant's Causeway.

32. Whiterocks, Co. Antrim. Quarries on the roadside 3 miles E. of Portrush, on the road to the Giant's Causeway.

A small quantity of Chalk powder collected at this quarry yielded a few Microzoa.

33. North of Moneymore, Co. Londonderry. Quarry about midway between that town and Magherafelt.

A little Chalk powder found in this quarry yielded a few fossils.

34. Springhill, near Moneymore, Co. Londonderry.

A few grains of Chalk powder collected at this quarry yielded vast numbers of Sponge spicules.

35. Slieve Gallion, Co. Londonderry. Quarry situated near the summit of the mountain, $4\frac{1}{2}$ miles N.W. of Moneymore station on the Cookstown line.

This is the highest exposure of White Limestone in the North of Ireland, being at an elevation of 1,500 feet above the level of the sea. The Chalk powder collected at this quarry yielded Microzoa in great abundance and in fine preservation.

36. Keady Hill, Co. Londonderry. Quarries on the face of the hill, 3 miles E. of Newtownlimavady.

The Chalk powder collected at this quarry yielded Microzoa in great abundance.

FORAMINIFERA IMPERFORATA.

MILIOLIDA.

18. TROCHAMMINA CRETACEA (*Reuss*). Rare.

LITUOLIDA.

19. LITUOLA (HAPLOPHRAGMIUM) INFLATA, *Reuss*. Only two specimens found.
20. LITUOLA (HAPLOSTICHE) CLAVULINA, *Reuss* ("Elbthalgebirge," Pl. XXIV., fig. 7). Only one specimen found.

FORAMINIFERA PERFORATA.

LAGENIDA.

21. LAGENA APICULATA, *Reuss*. Rare.
22. LAGENA SULCATA, *W. & J.* Rather frequent.
23. NODOSARIA GLABRA, *D'Orb.*, and Dentaline variety. A long thin *N. radicula* (*Linn.*), passing into *Dentalina nodosa*, *D'Orb.* of his "Mémoire sur la Craie blanche, &c." (not *D. nodosa* of *D'Orb.* "Models"). Rather frequent.
24. NODOSARIA RADICULA (*Linn.*), 3-chambered, thick (near *Glandulina discreta*, *Reuss*; *G. cylindracea*, *Alth.*; *Marginulina bullata*, *Reuss.*) Only one specimen found.
25. NODOSARIA RADICULA (*Linn.*), tapering; *N. lepida*, *Reuss* ("Westphalia"). Rare.
26. NODOSARIA RADICULA (*Linn.*), var. (near *N. conferta*.) Very rare.
27. NODOSARIA PYRULA, *D'Orb.* Rare.
28. NODOSARIA HISPIDA, *D'Orb.* Rather rare.
29. NODOSARIA RAPHAELUS (*Linn.*); *N. Zippei*, *Reuss*. Rather rare.

30. *NODOSARIA RAPHANUS* (*Linn.*), VAR. *INFLATA*, *Reuss*. Frequent.
31. *NODOSARIA RAPHANUS* (*Linn.*), short coarse variety. Abundant.
32. *NODOSARIA RAPHANUS* (*Linn.*), small; *N. obscura*, *Reuss* ("Elbthalgebirge"). Rare.
33. *NODOSARIA ACICULA*, *Lam.*, slightly Dentaline, and thus passing into *Dentalina obliqua* (*Linn.*). Frequent.
34. *NODOSARIA* (*DENTALINA*) *LIBBATA*, *D'Orb.* Rare.
35. *DENTALINA COMMUNIS*, *D'Orb.*, with oblique septa. Frequent.
36. *DENTALINA COMMUNIS*, *D'Orb.*, VAR. *LORNEIANA*, *D'Orb.*, passing into *D. Boueana*, *D'Orb.* Frequent.
37. *DENTALINA COMMUNIS*, *D'Orb.*, VAR. *IRREGULARIS*, *D'Orb.* The nearest figured specimen is *Nodosaria monile*, Von Hag., in *Reuss*' "Kreid. Böhm." t. 8. f. 9 (not f. 7. which, however, *Reuss* regards as the true "monile"); *Dentalina nodosa*, *D'Orb.*, "Mém. Craie blanche" (not *Soldani*) is probably the same; *N. irregularis*, *D'Orb.*, "For. Fos. Vien.," is the same with longer chambers; and *N. longiscata*, *D'Orb.*, has very elongate chambers of the same style. Rare.
38. *DENTALINA COMMUNIS*, *D'Orb.*, VAR.; *D. Lilli*, *Reuss* ("Kreid. Lemberg," Pl. II. fig. 11). Rather rare.
39. *DENTALINA COMMUNIS*, *D'Orb.*, exquisitely delicate var. near *D. peracuta*, *Reuss*. Rare.
40. *DENTALINA COMMUNIS*, *D'Orb.*, VAR. *EMACIATA*, *Reuss*. Very rare.
41. *DENTALINA PAUPERATA*, *D'Orb.*, with straight septa. In great profusion.
42. *DENTALINA STEENSTRUPI*, *Reuss* ("Meklenburg"). Only one specimen found.
43. *DENTALINA NODOSA*, *D'Orb.*, var. with flush and short chambers, marked with delicate lines, near *D. nodosa*, *D'Orb.* (*Soldani*); *D. lineolata*, *Reuss* ("Bohemia"); *D. multilineolata*, *Reuss* ("Elbthalgebirge"); *D. proteus*, *Reuss* ("Maestricht"); *D. polyphragma*, *Reuss* ("Westphalia"); *Nodosaria subornata*, *Reuss* ("Dobrukscha" f. 9, 10; the shape being that of f. 5, *N. inarticulata*, *Reuss*), and others. Rare.
44. *DENTALINA MARGINULINOIDES*, *Reuss* ("Lemberg," Pl. II. f. 12), sub-septate variety. Rather rare.

45. DENTALINA MARGINULINOIDES, *Reuss*, cylindrical variety. Rather rare.
46. FRONDICULARIA STRIATULA, *Reuss* ("Elbthalgebirge," Pl. XXI. fig. 2). Frequent.
47. FRONDICULARIA AUGUSTATA, *Nilsson* (according to *Reuss*). A narrow sub-variety of *F. striatula*. Rare.
48. FRONDICULARIA VERNEUILIANA, *D'Orb.*, narrow variety. Rather rare.
49. FRONDICULARIA ARCHIACIANA, *D'Orb.* Frequent.
50. FRONDICULARIA TENUIS, *Reuss* ("Elbthalgebirge," Pl. XXI. f. 3). Rare.
51. FRONDICULARIA INVERSA, *Reuss*. Only one specimen found.
52. FRONDICULARIA ELLIPTICA (*Nilsson*). Very rare.
53. FRONDICULARIA MUCRONATA, *Reuss* ("Elbthalgebirge") VAR. with trifid mucro ; ? *F. Goldfussi*, *Reuss* ("Westphalia"). Rather rare.
54. FLABELLINA LINGULA, *Von Hagenow*, VAR. Only two specimens found.
55. FLABELLINA RUGOSA, *D'Orb.* Very rare.
56. FLABELLINA RETICULATA, *Reuss*. Frequent.
57. FLABELLINA PULCHRA, *D'Orb.* Very rare.
58. FLABELLINA PULCHRA, *D'Orb.*, narrow neat variety, near *Fr. obliqua*, *Von Münster*. Very rare.
59. FLABELLINA PULCHRA, *D'Orb.*, a smooth variety with parallel sides ; a narrow form of *Fr. obliqua*, *Alth* ("Lemberg"). Very rare.
60. FLABELLINA ORNATA, *Reuss* ("Kreid. Bohm.," Pl. XXIV. fig. 43) ; near *Cristellaria crepidularis*, *Reuss* ("Gault") ; ? *F. Baudouiniana*, *D'Orb.* Only one specimen found.
61. LINGULINA CARINATA, *D'Orb.* VAR. ; broad and short. Only two specimens found.
62. MARGINULINA GLABRA, VAR. ELONGATA, *D'Orb.* Abundant.
63. MARGINULINA BULLATA, *Reuss* ("Westphalia" Pl. VI. fig. 4). Rather rare.

64. MARGINULINA RADICULA (*Linn.*); smooth flush *Nodosaria radicula* with excentric aperture. Only one specimen found.
65. MARGINULINA SEMINOTATA, *Reuss* ("Westphalia Kreid.," Pl. V. fig. 6). Very rare.
66. MARGINULINA RAPHANUS (*Linn.*); *Nodosaria raphanus* with excentric aperture. Only one specimen found.
67. VAGINULINA (MARGINULINA) TRILOBATA, *D'Orb.*; *Marginulina bacillum*, *Reuss*. Frequent.
68. VAGINULINA (CITHARINA) HARPA, *Röm.* var. nov., near *V. discors*, *Reuss*, and *V. arguta*, *Reuss* ("Gault," Pl. III. fig. 10 and 12). Rare.
69. VAGINULINA COSTULATA, *Reuss*. Only one specimen found.
70. VAGINULINA COSTULATA, *Römer* (*Reuss*, "Elbthalgebirge," Pl. XX. fig. 24). Variety, thin and slightly curved. Only two specimens found.
71. PLANULARIA, SP. (near *Planularia longa*), *Cornuel*. Very rare.
72. PLANULARIA CREPIDULA, *D'Orb.*, becoming *Flabellina pulchra*, *D'Orb.* Very rare.
73. CRISTELLARIA RECTA, *D'Orb.* Rather rare.
74. CRISTELLARIA RECTA, *D'Orb.* var. HAMOSA, *Reuss* ("Elbthalgebirge," Pl. XXIV. fig. 2). Rare.
75. CRISTELLARIA RECTA, *D'Orb.* (near *C. Bronni*, *Römer*) (*Reuss*, "Gault," Pl. VII. f. 13). Only one specimen found.
76. CRISTELLARIA ROTULATA (*Lam.*). In great profusion.
77. CRISTELLARIA NAVICULA, *D'Orb.* Rare.
78. CRISTELLARIA TRIANGULARIS, *D'Orb.* Very rare.
79. CRISTELLARIA (SARACENARIA) ITALICA, *DeFrance*. Very rare.
80. CRISTELLARIA (SARACENARIA) ITALICA, *DeFrance*, a long sub-variety. One specimen found.
81. POLYMORPHINA DAMÆCORNIS, *Reuss*, Pl. III. figs. 16 and 17. Very rare.
82. POLYMORPHINA HORRIDA, *Reuss*, Pl. III. figs. 14 and 15. Rather rare.

83. POLYMORPHINA FUSIFORMIS, *Römer*. Not unfrequent.
 84. POLYMORPHINA REGINA, *B. P. & F.*, VAR. Very rare.
 85. UVIGERINA NODOSA, *D'Orb.* Very rare.

GLOBIGERINIDA.

86. GLOBIGERINA CRETACEA, *D'Orb.* In great profusion.
 87. GLOBIGERINA BULLOIDES, *D'Orb.* Very rare.
 88. GLOBIGERINA BULLOIDES, *D'Orb.*, VAR. NOV., heaped. Very rare.
 89. GLOBIGERINA MARGINATA (*Reuss*). Rare.
 90. PULLENIA QUINQUELOBA (*Reuss*). Rather rare.
 91. TEXTULARIA GIBBOSA, *D'Orb.* Rare.
 92. TEXTULARIA PUPA, *Reuss* ("Westphalia"). Rather rare.
 93. TEXTULARIA SAGITTULA, *Defrance*. Abundant.
 94. TEXTULARIA TROCHUS, *D'Orb.* Rare.
 95. TEXTULARIA TURRIS, *D'Orb.* Rare.
 96. TEXTULARIA TURRIS, *D'Orb.*, short and thick varieties. Frequent.
 97. TEXTULARIA FÆDA, *Reuss*. Frequent.
 98. TEXTULARIA PRÆLONGA, *Reuss*. Rather rare.
 99. TEXTULARIA GLOBULOSA, *Ehr.* In great abundance, but liable to be overlooked from its minute size.
 100. VERNEUILINA TRIQUETRA, (*Münster*). Rather rare.
 101. GAUDRYINA RUGOSA, *D'Orb.* Frequent.
 102. GAUDRYINA PUPOIDES, *D'Orb.* VAR. PRÆLONGA (*Reuss*). Rare.
 103. TRITAXIA TRIQUETRA (*Münster*). Rather rare.
 104. BULIMINA PRESLI, *Reuss*. Frequent.

105. *BULIMINA OVULUM*, *Reuss*. Abundant.
106. *BULIMINA BREVIS*, *D'Orb.* In great abundance.
107. *BULIMINA INTERMEDIA*, *Reuss*. Rather rare.
108. *BULIMINA REGULARIS*, *sp. nov.* *Jones, MS.* (near *B. marginata*, *D'Orb.*).
Only one good example found.
109. ? *BULIMINA*, *sp.* Very rare.
110. *VIRGULINA TEGULATA*, *Reuss*, *var.* In great abundance.
111. *BOLIVINA DECORATA*, *sp. nov.* *Jones, MS.* Very abundant.
112. *BOLIVINA*, *sp.* Exquisitely delicate form. Only one specimen found.
113. *PLEUROSTOMELLA FUSIFORMIS*, *Reuss* ("Westphalia"). Rare.
114. *PLANORBULINA** *EXSCULPTA*, *Reuss* ("Westphalia"). Frequent.
115. *PLANORBULINA AMMONOIDES* (*Reuss*). In the greatest profusion.
116. *PLANORBULINA AMMONOIDES* (*Reuss*), *var.* with extra shell-growth, making astral overgrowth on the umbilicus. In great profusion.
117. *PLANORBULINA CRENUлата* (*Reuss*), ("Gaas," Pl. II. fig. 2). Rather rare.
118. *TRUNCATULINA LOBATULA* (*W. & J.*). Frequent.
119. *PULVINULINA MICHELINIANA* (*D'Orb.*) *var.* Frequent.
120. *ROTALIA ORBICULARIS* (*D'Orb.*), *var.* In great profusion.
121. *ROTALIA* vel *PLANORBULINA*? Pl. III. fig. 18. A Rotaline form, like *R. orbicularis* in shape, but having each chamber symmetrically perforated with a large central aperture on the outside. Only one specimen found. Prof. T. Rupert Jones says:—"This specimen is of great interest, when considered with the few other known *open-chambered* Foraminifera. Ehrenberg figures ('Mikrogeologie,' Pl. XIX. fig. 8), a *Pulvinulina* (?) having a symmetrical series of holes, one at the base of each chamber, around the large convex central chamber; and he figures some *Rotalia*

* Prof. W. K. PARKER, F.R.S., has kindly favoured us with his opinion on the *Rotalina* and some of the more obscure of the other *Foraminifera* of this list.

and *Planorbulinae* with less regular holes. M. Vanden Broeck, of Brussels, has lately discovered a Lageniform 'porcellanous' Foraminifer with a regularly cribrate or latticed shell. Thus in both divisions of the *Foraminifera* we have open-chambered shells, *analogous* to the basket-like structure of the siliceous *Polycystina* (*Radiolaria*). How far these may be taken as indications of another, or other divisions of the Rhizopods, further research will show."

122. Fragments of tubular branched forms more or less aculeate near to the so called Dentalina (?) aculeata of D'Orbigny. My friend Professor T. Rupert Jones proposes to distinguish this simple, calcareous, subsegmented, branching, Nodosarian form by the "generic" name RAMULINA (from "ramulus," a little branch); the "species" above mentioned, which is common in the French and British chalk standing as *Ramulina aculeata* (D'Orb.), and our Irish form, which differs from D'Orbigny's in being smooth, as RAMULINA LAEVIS, *gen. et sp. nov.* Jones, see Pl. III. fig. 19. Rather rare.
123. RAMULINA BRACHIATA, *sp. nov.* Jones, see Pl. III. fig. 20. Very rare. Professor T. Rupert Jones says of this form that its nearest known analogue in external form among Protozoa is perhaps Dr. Wyville Thomson's *Calosphæra tubifex*, a peculiar Sponge from the North Atlantic. Still the fixed position of the tubes and the general aspect of the organism are against the probability of these Microzoa being closely allied.

SPONGE SPICULA.*

SKELETON-SPICULA.

124. Acerate spiculum, Pl. II. figs. 1 and 2. This form is found abundantly in the Halichondroid sponges both recent and fossil, but it is generally very minute. The same form also prevails to a great extent in the skeletons of many species of *Tethea* and *Geodia*, in both of which these spicula are of about the same size and form as those found in the Chalk, and I have no doubt that they are from fossil species of one or the other of these genera. Frequent.
125. Attenuato-acuate spiculum; an abnormal form, Pl. II. fig. 3. Very rare.
126. Moniliform attenuato-acuate spiculum, Pl. II. fig. 4. Rather frequent.

* I am indebted to J. S. BOWERBANK, LL.D., F.R.S., for the following report on the Sponge spicula.

127. Furcated porrecto-ternate moniliform spiculum, Pl. II. fig. 5. This is probably an external defensive spiculum from a Sponge closely allied to *Tethea*. I have seen from our southern Chalk the same form with moniliform shaft and radii, but not so distinctly banded. Rather rare.
128. Equiangular triradiate spiculum, Pl. II. fig. 6. This form occurs as a siliceous form rarely, but abundantly in the calcareous Sponges as skeleton spicula. Rare.
129. Spiculated equiangular triradiate spiculum, Pl. II. fig. 7. This occurs as a siliceous form rarely, but abundantly in the calcareous Sponges as internal defensive spicula.* Abundant.

CONNECTING-SPICULA.

130. Incipiently expanso-ternate spiculum, probably from a *Geodia*, Pl. II. fig. 8. It is not uncommon in our southern flints. Rare.
131. Expando-ternate spiculum; closely allied to the last, Pl. II. figs. 9 and 10. This form is found in recent *Tethea*, *Geodia*, and other genera. Frequent.
132. Expando-ternate spiculum, with cylindrical radii, Pl. II. figs. 11 and 12. This form is found in some recent species of *Tethea*, but is not a normal condition. Rather rare.
133. Furcated attenuato-patento-ternate spiculum, Pl. II. fig. 13. This constricted form of an apparently furcated attenuato-patento-ternate spiculum has not yet been found among recent Sponges. It occurs in our southern Chalk flints. Rather rare.
134. Furcated attenuato-patento-ternate spiculum, Pl. II. figs. 14 to 16. This form of spiculum abounds in the expansile dermal system of several of the siliceo-fibrous Sponges, as in that of *Dactylocalyx Bowerbankii*, Johnson (Proc. Zool. Soc. 1869, Pl. III. figs. 6, 7). These spicula vary in form and size to a considerable extent in the same species. In great profusion.
135. Furcated attenuato-patento-ternate spiculum, Pl. II. fig. 17; from the expansile dermal system of a siliceo-fibrous Sponge. In great profusion.

* This rarity of some of our forms of spicula in recent *siliceous* Sponges is of considerable interest, in connection with the fact that *all* the little organisms in the powder from our flints seem to be now silicified, whether they were originally *calcareous* (as the *Foraminifera* and *Ostracoda*) or not.

136. Furcated attenuato-patento-ternate spiculum, Pl. II. fig. 18 ; same as the last, but probably from a different species of Sponge. Frequent.
137. Recurvo-ternate spiculum, Pl. II. fig. 19 ; similar spicula occur in the intermarginal cavities of *Tethea* and *Geodia*, and these are probably from similar positions in the fossil species of these genera. Very rare.
138. Spiculum, Pl. III. fig. 1. This form is quite new to me. It is most probably from the expansile dermal system of a siliceo-fibrous Sponge. Rather rare.
139. Spiculum, Pl. III. figs. 2 and 3. Singular and probably abnormal form of dermal spiculum of a siliceo-fibrous Sponge. Rather rare.
140. Porrecto-ternate spiculum, Pl. II. fig. 20. This form of spiculum occurs in some species of *Tethea* (*Tethea cranium*, British). An external defensive spiculum. Frequent.
141. Porrecto-ternate spiculum, Pl. II. fig. 21. Very rare.
142. Porrecto-ternate spiculum, Pl. II. fig. 22 ; same as the last, but probably indicating a different species. Rather rare.
143. Attenuated rectangulate hexradiate spiculum, Pl. III. figs. 4 and 5, from a siliceo-fibrous Sponge (see "Mon. Brit. Spongiadæ," Vol. I. Pl. VII. fig. 174). In great profusion.

SKELETON-FIBRES.

144. Fragments of skeleton-fibres of a siliceo-fibrous Sponge, Pl. III. figs. 6 and 7. Very rare.
145. Apparently fragments of skeleton fibre of a siliceo-fibrous Sponge, Pl. III. figs. 8 and 9. Abundant.
146. Fragments of skeleton fibre of a siliceo-fibrous Sponge, Pl. III. fig. 10. Rare.
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The following additional forms were found too late for insertion in the body of the report :—

SPONGE SPICULES.

147. Sphero-stellate spiculum, Pl. III. fig. 11. Very rare.
148. Recurvo-dentate quaternate spiculum, Pl. II. fig. 23. Very rare.
149. Spiculum? Pl. III. fig. 12. A spherical body ornamented with five delicate projecting limbs, three on the one plane and one at either end. Only one specimen found.
150. Spiculum? Pl. III. fig. 13. A spherical body covered with numerous projecting limbs. The few specimens found varied much in size.

FORAMINIFERA PERFORATA.

GLOBIGERINIDA.

151. SPIROPLECTA PRÆLONGA (*Reuss*). Zoologically the same as *Spiroplecta sagittula* (*DeFrance*). Very rare.



TABLE SHEWING THE GEOGRAPHICAL DISTRIBUTION IN

List of Species.		Magheralin.	Moir.	Kilcorrig.	White Mountain.	Colin Glen.	Black Hill.	Wolf Hill.	Squire's Hill.	Cave Hill.	Whitewell.	Whiteabbey.	Woodburn.	Whitehead.
		1	2	3	4	5	6	7	8	9	10	11	12	13
OSTRACODA.														
1.	<i>Cythere virginea</i> , <i>Jones</i>	x	..	x	..	x	x	x	..	x	x	x	x	x
2.	<i>Cythere Harrisiana</i> , <i>Jones</i> (?)	x	..	..	..	..	x	x	..	x	x	x	x	x
3.	<i>Cythere umbonata</i> , <i>Williamson</i>	x	..	..	..	..	x	..	..	x	x	x	x	..
4.	<i>Cythere</i> ? <i>Wrightii</i> , sp. nov. <i>Jones</i> , <i>MS.</i>	x	..	..	..	x	x	..	..	x	x	x	x	x
5.	<i>Cythere</i> ? <i>Iernica</i> , sp. nov. <i>Jones</i> , <i>MS.</i>	x	..	..	..	..	x	x	..	x	..	..	..	..
6.	<i>Cythere</i> (<i>Cythereis</i>) <i>ornatissima</i> , <i>Reuss</i>	x	x	..	..	..	x	x	..	x	x	x	x	x
7.	<i>Cythere</i> (<i>Cythereis</i>) <i>alata</i> , <i>Bosquet</i>	..	..	..	..	..	x	x	x	..	x	x	x	..
8.	<i>Cythere</i> (<i>Cythereis</i>) <i>spiculata</i> , sp. nov. <i>Jones</i> , <i>MS.</i>	..	..	..	..	..	..	x	..	..	..	..	x	..
9.	<i>Cythere</i> (<i>Cythereis</i>) <i>vallata</i> , sp. nov. <i>Jones</i> , <i>MS.</i> .	x	..	..	..	..	x	x	..	x	..	x	x	..
10.	<i>Cythere</i> (<i>Cythereis</i>) <i>montuosa</i> , sp. nov. <i>Jones</i> , <i>MS.</i> .	..	..	..	..	..	..	..	..	..	x	..	x	..
11.	<i>Cythere</i> (<i>Cythereis</i>) <i>cuspidis</i> , sp. nov. <i>Jones</i> , <i>MS.</i> .	x	..	..	..	..	x	x	..	x	x	x	x	x
12.	<i>Bairdia subdeltoidea</i> , (<i>Munster</i>)	x	..	x	x	..	x	x	..	x	x	x	x	x
13.	<i>Macrocypris siliqua</i> , <i>Jones</i>	..	..	..	..	..	..	..	..	..	..	..	x	..
14.	<i>Cytherella ovata</i> , (<i>Romer</i>)	x	x	x	x	x	x	x	..	x	x	x	x	x
15.	<i>Cytherella Muensteri</i> , (<i>Romer</i>)	x	..	..	..	..	x	..	..	x	x	x	x	x
16.	<i>Cytherella Williamsoni</i> , <i>Jones</i>	x	..	..	x	..	x	x	..	x	x	x	x	x
17.	<i>Paracypris</i> ? <i>gracilis</i> , <i>Jones</i>	..	..	..	x	x	x	..	..	..	x	..	x	..
FORAMINIFERA.														
18.	<i>Trochammina cretacea</i> , (<i>Reuss</i>)	x	..	..	..	..	..	..	..	x	..	..	..	..
19.	<i>Lituola</i> (<i>Haplophragmium</i>) <i>inflata</i> , <i>Reuss</i> . . .	..	..	..	x	..	..	x	..	..	..	..	..	..
20.	<i>Lituola</i> (<i>Haplostiche</i>) <i>clavulina</i> , <i>Reuss</i> . . .	..	..	..	..	..	..	..	..	x	..	..	..	..
21.	<i>Lagena apiculata</i> , <i>Reuss</i>	x	..	..	x	..	x	x	..	x	..	x	..	..
22.	<i>Lagena sulcata</i> , <i>W. & F.</i>	..	..	..	..	..	..	..	..	..	x	..	x	..
23.	<i>Nodosaria glabra</i> , <i>D'Orb.</i>	x	x	..	..	..	x	x	..	x	x	x	x	..
24.	<i>Nodosaria radícula</i> (<i>Linn.</i>), (3 chambered, thick)	..	..	..	..	..	..	..	..	..	x	..	..	..
25.	<i>Nodosaria radícula</i> (<i>Linn.</i>), (tapering)	..	..	..	..	..	..	..	..	..	..	..	..	..
26.	<i>Nodosaria radícula</i> (<i>Linn.</i>), var. near <i>N. conferta</i> . . .	..	..	..	..	..	..	..	..	..	..	..	x	..
27.	<i>Nodosaria pyrula</i> , <i>D'Orb.</i>	..	..	..	..	..	..	..	x	..	..	..	x	..
28.	<i>Nodosaria hispida</i> , <i>D'Orb.</i>	..	..	..	..	..	..	..	..	..	..	x	x	x
29.	<i>Nodosaria raphanus</i> , (<i>Linn.</i>)	x	x	..	x	..	..	..	..	..	x	x	x	..
30.	<i>Nodosaria raphanus</i> (<i>Linn.</i>), var. <i>inflata</i> , <i>Reuss</i>	x	..	x	..	..	x	x	..	x	x	x	x	..
31.	<i>Nodosaria raphanus</i> (<i>Linn.</i>), short coarse variety	x	x	..	..	..	..	x	..	x	x	x	x	x
32.	<i>Nodosaria raphanus</i> (<i>Linn.</i>), (small)	..	..	x	..	..	x	x	..	x	x	..	x	..
33.	<i>Nodosaria acicula</i> , <i>Lam.</i>	..	..	..	..	..	x	x	..	x	x	x	x	..
34.	<i>Nodosaria</i> (<i>Dentalina</i>) <i>limbata</i> , <i>D'Orb.</i>	x	..	..	..	x	..	..	..	..	x	x	x	x
35.	<i>Dentalina communis</i> , <i>D'Orb.</i>	x	..	..	..	..	x	x	..	x	x	x	x	..
36.	<i>Dentalina communis</i> , <i>D'Orb.</i> ; var. <i>Lorneiana</i> , <i>D'Orb.</i>	..	..	..	..	..	x	x	..	x	..	x	x	x
37.	<i>Dentalina communis</i> , <i>D'Orb.</i> ; var. <i>irregularis</i> (<i>D'Orb.</i>) . . .	..	..	..	..	..	..	..	..	..	x	..	x	..

NORTH OF IRELAND OF THE CRETACEOUS MICROZOA.

	Near Gobbins.	Ballytober.	Near Mill Bay.	Magheramorne.	S. of Ballycarry.	Redhall Glen.	Glenoe.	Waterloo.	Sallagh Braes.	Glenarm.	Carmlough.	Garron Point.	Glenariff.	Lurigethan.	Trostan Mtn.	Torr Head.	Ballintoy.	White Rocks.	N. of Moneymore	Spring Hill.	Slieve Gallion.	Keady Hill.	
15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1.
16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2.
17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3.
18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	4.
19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	5.
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6.
21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	7.
22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	8.
23	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	9.
24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	10.
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	11.
26	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	12.
27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	13.
28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14.
29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15.
30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	16.
31	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17.
32	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	18.
33	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19.
34	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20.
35	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	21.
36	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	22.
37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	23.
38	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	24.
39	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	25.
40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	26.
41	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	27.
42	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	28.
43	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	29.
44	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30.
45	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31.
46	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	32.
47	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	33.
48	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	34.
49	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	35.
50	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	36.
51	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	37.

TABLE SHEWING THE GEOGRAPHICAL DISTRIBUTION IN THE

List of Spec es.		Magheralin.	Moira.	Kilcorrig.	White Mountain.	Colin Glen.	Black Hill.	Wolf Hill.	Squire's Hill.	Cave Hill.	Whitewell.	Whiteabbey.	Woodburn.	Whitehead.
		1	2	3	4	5	6	7	8	9	10	11	12	13
38.	Dentalina communis, <i>D'Orb.</i> ; var. <i>Lilli</i> , <i>Reuss</i>	..	..	..	..	..	..	x	..	x	..	..	x	..
39.	Dentalina communis, <i>D'Orb.</i> , exquisitely delicate variety	..	..	..	..	..	..	x	..	x	x	x	x	..
40.	Dentalina communis, <i>D'Orb.</i> ; var. <i>emaciata</i> , <i>Reuss</i>	..	..	..	..	..	..	x	..	x	x	x	x	..
41.	Dentalina pauperata, <i>D'Orb.</i>	x	x	..	x	x	x	x	..	x	x	x	x	x
42.	Dentalina Steenstrupi, <i>Reuss</i>	..	..	..	..	..	..	..	..	..	..	..	..	..
43.	Dentalina nodosa, <i>D'Orb.</i> , var.	..	..	..	..	..	..	..	..	..	x	x	x	x
44.	Dentalina marginulinoides, <i>Reuss</i> . Subseparate variety	x	x	..	..	..	..	..	..	..	..	..	x	..
45.	Dentalina marginulinoides, <i>Reuss</i> . Cylindrical variety	..	..	..	..	..	..	..	..	..	..	..	..	..
46.	Frondicularia striatula, <i>Reuss</i>	..	..	..	..	..	x	..	x	..	x	x	x	..
47.	Frondicularia angustata, <i>Nilsson</i>	..	..	..	..	..	..	..	..	x	..	..	..	..
48.	Frondicularia Verneuiliana, <i>D'Orb.</i>	..	..	..	..	..	..	..	..	x	..	..	x	..
49.	Frondicularia Archiaciana, <i>D'Orb.</i>	x	..	..	..	..	x	..	..	x	x	..	x	..
50.	Frondicularia tenuis, <i>Reuss</i>	..	..	..	..	..	..	..	..	x	..	..	x	..
51.	Frondicularia inversa, <i>Reuss</i>	..	..	..	..	..	..	..	..	..	..	..	..	x
52.	Frondicularia elliptica (<i>Nilsson</i>)	..	..	..	..	..	..	..	..	..	..	..	x	..
53.	Frondicularia mucronata, <i>Reuss</i> , var.	x	..	..	..	..	x	..	x	x	x	..	x	x
54.	Flabellina lingula, <i>Von Hagenow</i> , var.	..	..	..	..	..	x	..	..	x	..	..	..	..
55.	Flabellina rugosa, <i>D'Orb.</i>	..	..	..	..	..	..	..	..	x	..	..	..	..
56.	Flabellina reticulata, <i>Reuss</i>	x	..	..	..	..	x	x	..	x	x	x	x	..
57.	Flabellina pulchra, <i>D'Orb.</i>	..	..	..	..	..	..	..	..	x	..	..	..	..
58.	Flabellina pulchra, <i>D'Orb.</i> Narrow neat variety	..	..	..	..	..	..	..	..	..	..	..	x	..
59.	Flabellina pulchra, <i>D'Orb.</i> Smooth variety with parallel sides	..	..	..	..	..	..	..	..	..	..	..	x	..
60.	Flabellina ornata, <i>Reuss</i>	..	..	..	..	..	..	..	..	..	..	..	..	..
61.	Lingulina carinata, <i>D'Orb.</i> , var.	..	..	..	..	..	..	..	..	x	..	..	..	..
62.	Marginulina glabra, var. elongata, <i>D'Orb.</i> ..	..	..	..	..	..	x	x	..	x	x	x	x	..
63.	Marginulina bullata, <i>Reuss</i>	..	..	..	..	..	..	..	..	..	..	..	..	..
64.	Marginulina radícula (<i>Linn.</i>)	..	..	..	..	..	..	..	..	x	..	..	..	..
65.	Marginulina seminotata, <i>Reuss</i>	..	..	..	..	..	..	..	..	..	x	..	..	..
66.	Marginulina raphanus (<i>Linn.</i>)	..	..	..	..	..	..	..	..	x	..	..	..	..
67.	Vaginulina (Marginulina) trilobata, <i>D'Orb.</i> ..	..	..	..	..	..	x	x	..	x	x	..	x	..
68.	Vaginulina (Citharina) harpa, <i>Rom.</i> , var. nov.	..	..	..	..	..	..	..	..	..	..	..	x	..
69.	Vaginulina costulata, <i>Reuss</i>	..	..	..	..	..	..	..	..	..	..	..	x	..
70.	Vaginulina costulata, <i>Rom.</i> Variety thin and slightly curved	..	..	..	..	..	..	..	..	x	..	..	x	..
71.	Planularia sp., near Planularia longa, <i>Cornuel.</i>	..	..	..	..	..	..	..	..	..	..	..	..	x
72.	Planularia crepidula, <i>D'Orb.</i> , becoming Flabellina pulchra, <i>D'Orb.</i>	..	..	..	..	..	x	..	..	..	..	..	..	..
73.	Cristellaria recta, <i>D'Orb.</i>	x	..	..	..	x	x	x	..	x	x	..	x	..
74.	Cristellaria recta, <i>D'Orb.</i> ; var. <i>hamosa</i> , <i>Reuss</i> .	..	..	..	..	..	..	..	..	..	..	..	..	..
75.	Cristellaria recta, <i>D'Orb.</i> , near <i>C. Bronni</i> ..	..	..	..	..	..	..	..	..	x	..	..	..	..
76.	Cristellaria rotulata (<i>Lam.</i>)	x	x	x	x	x	x	x	..	x	x	x	x	x
77.	Cristellaria navicula, <i>D'Orb.</i>	x	..	..	..	..	..	x	..	..	..	..	x	..
78.	Cristellaria triangularis, <i>D'Orb.</i>	x	..	..	..	..	..	..	..	..	..	..	x	..
79.	Cristellaria (Saracenaria) Italica, <i>Defrance</i> ..	..	..	..	..	..	..	..	..	..	..	x	..	..
80.	Cristellaria (Saracenaria) Italica, <i>Defrance</i> , long sub-variety	..	..	..	..	..	..	..	..	x	..	..	..	..
81.	Polymorphina damacornis, <i>Reuss</i>	..	..	..	..	..	..	..	..	..	..	..	..	..

TABLE SHOWING THE GEOGRAPHICAL DISTRIBUTION IN THE

List of Species.		Magheralin.	Moir.	Kilcorrig.	White Mountain.	Colin Glen.	Black Hill.	Wolf Hill.	Squire's Hill.	Cave Hill.	Whitewell.	Whiteabbey.	Woodburn.	Whitehead.
		1	2	3	4	5	6	7	8	9	10	11	12	13
82.	<i>Polymorphina horrida</i> , <i>Reuss</i>	..	..	..	..	..	..	x	..	x	x	..	x	..
83.	<i>Polymorphina fusiformis</i> , <i>Romer</i>	..	..	..	..	x	x	..	..	x	x	x	x	..
84.	<i>Polymorphina regina</i> , <i>B. P. & J.</i> , var.....	..	..	..	..	..	..	..	..	..	..	..	..	..
85.	<i>Uvigerina nodosa</i> , <i>D'Orb.</i>	..	..	..	..	..	..	..	..	..	..	..	..	..
86.	<i>Globigerina cretacea</i> , <i>D'Orb.</i>	x	x	..	..	x	x	x	..	x	x	x	x	..
87.	<i>Globigerina bulloides</i> , <i>D'Orb.</i>	x	..	..	..	..	..	x	..	..	..	..	..	..
88.	<i>Globigerina bulloides</i> <i>D'Orb.</i> , var. nov., heaped	..	..	..	..	..	x	..	..	..	..	..	..	..
89.	<i>Globigerina marginata</i> (<i>Reuss</i>).....	..	..	..	..	..	..	..	..	x	..	x	x	..
90.	<i>Pullenia quinqueloba</i> (<i>Reuss</i>).....	x	..	..	..	..	..	..	..	x	x	x	x	x
91.	<i>Textularia gibbosa</i> , <i>D'Orb.</i>	..	..	..	..	..	..	..	..	..	..	x	..	..
92.	<i>Textularia pupa</i> , <i>Reuss</i>	x	..	..	x	..	..	..	..	..	..	x	x	..
93.	<i>Textularia sagittula</i> , <i>DeFrance</i>	x	x	..	x	..	x	..	..	x	x	x	x	x
94.	<i>Textularia trochus</i> , <i>D'Orb.</i>	..	..	..	..	..	..	..	..	..	..	..	..	..
95.	<i>Textularia turris</i> , <i>D'Orb.</i>	..	..	..	x	..	..	..	..	..	..	..	x	..
96.	<i>Textularia turris</i> , <i>D'Orb.</i> , short and thick variety	x	x	..	..	..	x	x	..	x	..	x	x	x
97.	<i>Textularia foeda</i> , <i>Reuss</i>	x	x	..	..	..	..	x	..	x	x	x	x	..
98.	<i>Textularia praelonga</i> , <i>Reuss</i>	..	..	..	x	..	..	..	..	..	..	..	x	..
99.	<i>Textularia globulosa</i> , <i>Ehr</i>	x	..	..	..	x	x	..	..	x	x	x	x	x
100.	<i>Verneuilina triquetra</i> (<i>Munster</i>).....	x	..	..	..	..	..	..	..	..	x	x	x	..
101.	<i>Gaudryina rugosa</i> , <i>D'Orb.</i>	..	..	..	..	..	..	..	..	..	..	x	x	..
102.	<i>Gaudryina pupoides</i> , <i>D'Orb.</i> ; var. <i>praelonga</i> , <i>Reuss</i>	..	..	..	..	..	..	..	..	..	..	..	x	..
103.	<i>Tritaxia triquetra</i> (<i>Munster</i>).....	..	x	..	..	..	..	..	..	..	..	..	..	..
104.	<i>Bulimina Presli</i> , <i>Reuss</i>	x	..	..	x	..	..	..	..	..	x	x	x	..
105.	<i>Bulimina ovulum</i> , <i>Reuss</i>	x	x	x	x	..	x	x	..	x	x	x	x	x
106.	<i>Bulimina brevis</i> , <i>D'Orb.</i>	x	x	x	x	x	x	x	..	x	x	x	x	x
107.	<i>Bulimina intermedia</i> , <i>Reuss</i>	..	..	..	..	..	..	..	..	x	..	..	x	..
108.	<i>Bulimina regularis</i> , sp. nov. <i>Jones</i> , <i>MS</i>	..	..	..	..	..	x	..	..	..	..	..	..	..
109.	? <i>Bulimina</i> sp.....	x	..	..	..	..	..	..	..	..	..	..	..	..
110.	<i>Virgulina tegulata</i> , <i>Reuss</i> , var.....	x	..	x	..	x	x	x	..	x	x	x	x	x
111.	<i>Bolivina decorata</i> , sp. nov. <i>Jones</i> , <i>MS</i>	x	x	..	..	..	x	x	..	x	x	x	x	..
112.	<i>Bolivina</i> , sp.....	..	..	..	..	..	..	..	..	..	..	..	..	..
113.	<i>Pleurostomella fusiformis</i> , <i>Reuss</i>	x	..	..	..	..	x	x	..	x	x	x	x	..
114.	<i>Planorbulina exsculpta</i> , <i>Reuss</i>	x	..	..	..	..	x	x	..	x	x	x	x	x
115.	<i>Planorbulina ammonoides</i> (<i>Reuss</i>).....	x	x	x	x	x	x	x	..	x	x	x	x	x
116.	<i>Planorbulina ammonoides</i> (<i>Reuss</i>), var. with extra shell-growth	x	x	x	x	x	x	x	..	x	x	x	x	x
117.	<i>Planorbulina crenulata</i> (<i>Reuss</i>).....	x	..	..	..	..	x	x	..	x	x	x	x	..
118.	<i>Truncatulina lobatula</i> (<i>W. & J.</i>).....	x	..	..	..	..	x	x	..	..	..	x	x	..
119.	<i>Pulvinulina Micheliniana</i> (<i>D'Orb.</i>).....	..	..	x	x	..	..	..	..	x	x	x	x	x
120.	<i>Rotalia orbicularis</i> (<i>D'Orb.</i>), var.....	x	x	..	x	..	x	x	..	x	x	x	x	x
121.	<i>Rotalia vel Planorbulina</i> ?, with each chamber symmetrically perforated	..	..	..	..	..	x	..	..	..	..	..	..	..
122.	<i>Ramulina laevis</i> , gen. et sp. nov. <i>Jones</i>	..	..	..	..	..	..	..	..	..	..	..	x	..
123.	<i>Ramulina brachiata</i> , sp. nov. <i>Jones</i>	..	..	..	..	..	..	..	..	..	..	..	..	..
SPONGE SPICULA, &c.														
124.	<i>Acerate spiculum</i> . Pl. II., figs. 1 & 2.....	..	..	..	x	x	..	..	..	x	..	..	..	..
125.	<i>Attenuato-acuate spiculum</i> . Pl. II., fig. 3 ..	x	..	..	..	x	x	x	..	x	x	..	x	..
126.	<i>Moniliform attenuato-acuate spiculum</i> . Pl. II., fig. 4.....	..	..	..	..	..	..	x	..	x	..	x	x	..
127.	<i>Furcated porrecto-ternate moniliform spiculum</i> Pl. II., fig. 5	..	x	..	..	..	x	x	..	x	..	..	..	..

List of Species.

[illegible]

ORTH OF IRELAND OF THE CRETACEOUS MICROZOA—(Continued).

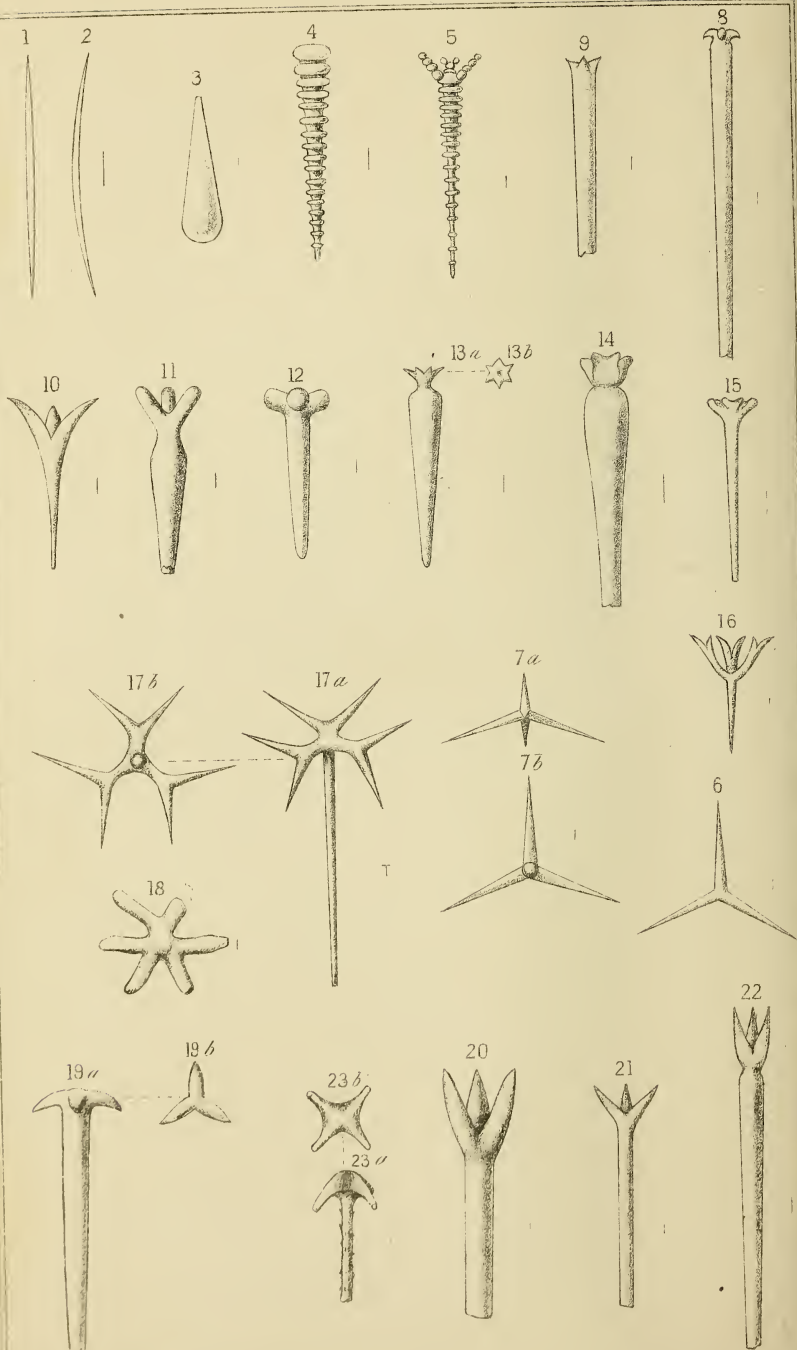
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
Near Gobbins.	Ballytober.	Near Mill Bay.	Magheramorne.	S. of Ballycarry.	Redhall Glen.	Glencoe.	Waterloo.	Sallagh Braes.	Glenarm.	Carnlough.	Garron Point.	Glenariff.	Lurigethan.	Trostan Mtn.	Torr Head.	Ballintoy.	White Rocks.	N. of Moneymore.	Spring Hill.	Slieve Gallion.	Keady Hill.	
..	x	..	x	..	..	..	..	..	..	..	..	..	..	..	..	..	..	x	..	x	..	128.
x	x	..	x	x	x	..	..	x	x	..	..	x	..	..	x	x	x	x	x	x	x	129.
x	x	..	..	x	..	x	..	x	..	..	..	x	..	..	x	..	..	..	..	..	..	130.
x	x	x	..	..	..	x	..	..	x	..	..	x	x	..	x	x	..	x	..	..	..	131.
x	..	x	..	..	..	..	..	x	..	..	..	..	..	x	..	..	..	..	..	x	..	132.
..	x	..	..	x	..	..	..	..	x	..	..	..	..	..	x	..	..	..	x	x	..	133.
x	x	x	..	x	x	..	x	x	x	..	..	x	..	..	x	x	x	x	x	x	x	134.
x	x	x	..	x	..	..	..	x	x	x	..	x	x	..	x	x	..	x	x	x	x	135.
x	x	..	..	x	..	..	..	..	x	..	..	x	..	x	x	x	x	x	x	x	x	136.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	137.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	138.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	139.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	140.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	141.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	142.
x	x	x	..	x	..	..	..	x	x	..	..	x	x	x	x	x	x	x	x	x	x	143.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	144.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	145.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	146.
..	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..	..	..	..	..	..	147.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	148.
..	x	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	149.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	150.
..	..	..	..	x	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	151.

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EXPLANATION OF PLATE II.

[The figures in parentheses refer to the numbers in the List of Species.]

Figs. 1, 2	(124)	<i>Acerate spicula.</i>	Springhill, Co. Derry.
„ 3	(125)	<i>Attenuato-acuate spiculum.</i>	Springhill, Co. Derry.
„ 4	(126)	<i>Moniliform attenuato-acuate spiculum.</i>	Springhill, Co. Derry.
„ 5	(127)	<i>Furcated porrecto-ternate moniliform spiculum.</i>	Keady Hill, Co. Derry.
„ 6	(128)	<i>Equiangular triradiate spiculum.</i>	Moirá, Co. Down.
„ 7	(129)	<i>Spiculated equiangular triradiate spiculum.</i>	Moirá, Co. Down.
„ 8	(130)	<i>Incipiently expanso-ternate spiculum.</i>	Glenariff, Co. Antrim.
„ 9	(131)	<i>Expando-ternate spiculum</i> (immature).	Cave Hill, Co. Antrim.
„ 10	(131)	<i>Expando-ternate spiculum.</i>	Sallagh Braes, Co. Antrim.
„ 11, 12	(132)	<i>Expando-ternate spicula, with cylindrical radii.</i>	Sallagh Braes, Co. Antrim.
„ 13	(133)	<i>Furcated attenuato-patento-ternate spiculum</i> (constricted). 13 <i>b.</i> Plane of the radii.	Slieve Gallion, Co. Derry.
„ 14, 15, 16	(134)	<i>Furcated attenuato-patento-ternate spicula.</i>	Sallagh Braes, Co. Antrim.
„ 17	(135)	<i>Furcated attenuato-patento-ternate spiculum.</i>	17 <i>b.</i> Plan of the radii. Springhill, Co. Derry.
„ 18	(136)	<i>Furcated attenuato-patento-ternate spiculum.</i>	Cave Hill, Co. Antrim.
„ 19	(137)	<i>Recurvo-ternate spiculum.</i>	19 <i>b.</i> Plane of the radii. Sallagh Braes, Co. Antrim.
„ 20	(140)	<i>Porrecto-ternate spiculum.</i>	Torr Head, Co. Antrim.
„ 21	(141)	<i>Porrecto-ternate spiculum.</i>	Sallagh Braes, Co. Antrim.
„ 22	(142)	<i>Porrecto-ternate spiculum.</i>	Sallagh Braes, Co. Antrim.
„ 23	(148)	<i>Recurvo-dentate quaternate spiculum.</i>	23 <i>b.</i> Plane of the radii. South of Ballycarry Station, Co. Antrim.

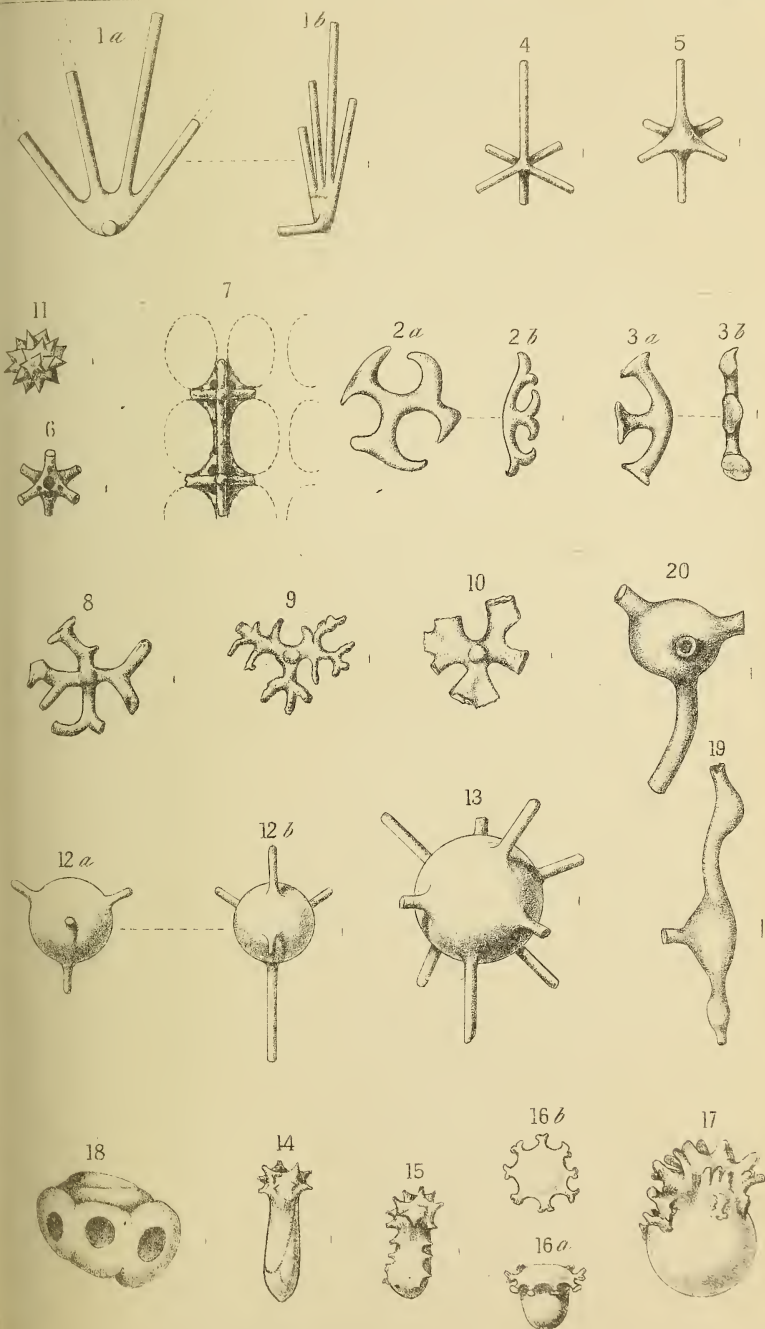
The figures are all enlarged—the line at the side of each indicates the natural size.

EXPLANATION OF PLATE III.

[The figures in parentheses refer to the numbers in the List of Species.]

Fig. 1	(138)	<i>Spiculum</i> —new.	1 b. Side view.	Keady Hill, Co. Derry.
„ 2, 3	(139)	<i>Spicula</i> .	2 b, 3 b. Side views.	Sallagh Braes, Co. Antrim.
„ 4	(143)	<i>Attenuated-rectangulate hexradiate spiculum</i> .		Springhill, Co. Derry.
„ 5	(143)	<i>Attenuated-rectangulate hexradiate spiculum</i> .		Ballytober, Co. Antrim.
„ 6	(144)	<i>Fragment of Skeleton fibre</i> .		Sallagh Braes, Co. Antrim.
„ 7	(144)	<i>Fragment of Skeleton fibre, same as the preceding one, front view</i> .		South of Ballycarry Station, Co. Antrim.
„ 8	(145)	<i>Fragment of Skeleton fibre</i> .		Sallagh Braes, Co. Antrim.
„ 9	(145)	<i>Fragment of Skeleton fibre</i> .		Keady Hill, Co. Derry.
„ 10	(146)	<i>Fragment of Skeleton fibre</i> .		Ballintry, Co. Antrim.
„ 11	(147)	<i>Sphero-stellate spiculum</i> .		Sallagh Braes, Co. Antrim.
„ 12	(149)	<i>Spiculum?</i>	12 b. Side view.	Ballytober, Co. Antrim.
„ 13	(150)	<i>Spiculum?</i>		South of Ballycarry Station, Co. Antrim.
„ 14, 15	(82)	<i>Polymorphina horrida</i> , Reuss.		Near the Gobbins, Co. Antrim.
„ 16	(81)	<i>Polymorphina damæcornis</i> , Reuss.	16 b. Upper surface.	South of Ballycarry Station, Co. Antrim.
„ 17	(81)	<i>Polymorphina damæcornis</i> , Reuss.		Near the Gobbins, Co. Antrim.
„ 18	(121)	<i>Rotalia vel Planorbulina?</i>	With each chamber symmetrically perforated.	Black Hill, Co. Antrim.
„ 19	(122)	<i>Ramulina lævis</i> , gen. et sp. nov. Jones.		Sallagh Braes, Co. Antrim.
„ 20	(123)	<i>Ramulina brachiata</i> , sp. nov. Jones.		Keady Hill, Co. Derry.

The figures are all enlarged—the line at the side of each indicates the natural size.



*As it is intended to issue, from time to time, further
Lists of the Fauna, Flora, Fossils, and Anti-
quities of the North of Ireland, Members are
requested to preserve this Appendix for binding
with those to be issued in the future.*

APPENDIX IV.

R E C E N T

Foraminifera of Down and Antrim,

BY

JOSEPH WRIGHT, F.G.S.,

Hon. Assoc. of the Belfast Nat. Hist. and Phil. Soc.

CORRELATION

OF THE

SILURIAN ROCKS OF THE CO. DOWN,

BY

WILLIAM SWANSTON, F.G.S.,

Hon. Assoc. of the Belfast Nat. Hist. and Phil. Soc.,

AND

CHARLES LAPWORTH, F.G.S.

PUBLISHED BY

THE BELFAST NATURALISTS' FIELD CLUB.



RECENT FORAMINIFERA OF DOWN AND ANTRIM.

By JOSEPH WRIGHT, F.G.S.

NOTWITHSTANDING the many fine bays and loughs which indent our coast, and the facility thus afforded for studying our recent Foraminifera, the subject has hitherto received but little attention from Irish naturalists. In the year 1858 Prof. Williamson published his Monograph on the recent British Foraminifera (1), and through its pages are frequent references to species found in Ireland. Most of these were collected by the late George C. Hyndman, in Carnlough Bay. The year previous to this a series of dredgings had been taken in Belfast Lough, under the auspices of the British Association; the fine material thus obtained was examined by Prof. Williamson, and yielded 24 species of Foraminifera.

In 1864 a paper was read by Dr. Alcock before the Lit. and Phil. Soc., Manchester, on Natural History Specimens from Connemara. (2.) It included a very instructive and complete list of Foraminifera, numbering no less than 60 species. They were all collected from shore sand, and one locality, viz., Dog's Bay, Roundstone, Connemara. From these three sources we have a list of 65 species, and they comprise all that was known of Irish Foraminifera up to 1875. (3.)

In the autumn of 1875 a number of the Belfast naturalists joined Mr. Thomas Workman, in his yacht Denburn, for the purpose of dredging in Belfast Lough and waters adjacent; and thus commenced a series of dredging

(1.) Recent Foraminifera of Great Britain, 1858.

(2.) Proc. Lit. and Phil. Soc., Manchester, Vol. IV., No. 15. Session 1864-5, p. 192.

(3.) In Thompson's Natural History of Ireland a list of 31 Foraminifera are given, but as in several of these it is uncertain what species were meant, no notice is taken of them in the above estimate.

operations which have been the means of adding considerably to our knowledge of the Foraminifera around our coast. Gatherings have been taken at 29 stations; 7 of these were from Strangford Lough, and the remainder from Belfast Lough and Channel outside; 6 were from between tides, the others were from depths varying from 4 to 72 fms., the greatest depths attained being in the vicinity of the Maiden Lighthouses. Strangford Lough was dredged in company with Mr. S. A. Stewart, F.B.S.E.; the others with Mr. Wm. Swanston, F.G.S., to whose hearty co-operation much of the success attending these excursions is due. Already 110 species have been found, or about 65 per cent. of our British forms. All of these, with the exception of *Lagena striato-punctata*, occur in Belfast Lough and waters outside, and 95 in Strangford Lough.

I have also examined 9 shore gatherings from various places round our N.E. coast; these have been contributed by Mr. Wm. Gray, M.R.I.A. They have been collected with great care from rich foraminiferal sand (see note on table appended). The results of the examination of these gatherings is given in the first nine columns of Table lettered A to I.

Strangford Lough is a fine landlocked bay, 21 miles long by about 5 to 7 miles wide, and connected with the sea by a narrow channel 8 miles long, through which the tides rush in and out furiously. The lough is studded over with innumerable islands and sunken rocks, the depths being very variable, in parts attaining 30 to 35 fms. Its waters abound in marine life, especially starfishes, the dredges frequently coming up quite choked with them. The Foraminifera, though not so numerous in species as in Belfast Lough, are usually of finer proportions, more especially the *Miliolida*, which are unusually large and numerous. At the upper end of the lough the water becomes more or less brackish, as may be inferred from the occurrence of the brackish water forms, *Trochammina inflata*, and *macrescens*, *Quinqueloculina fusca*, and *Polystomella striato-punctata*, in shore gatherings taken at Greyabbey and Newtownards.

Belfast Lough being more convenient for operations than Strangford Lough has been better examined; the water is shallow throughout, but gets gradually deeper as we near its mouth. From White Head on its northern entrance to Orlock Point on its southern side, the greatest depth is 9 to 10 fms., the deepest parts being near the northern shore; and this continues also to be the case outside the lough. Three miles off the Gobbins, a bold headland situated three miles N.E. of White Head, the water attains a depth of 60 to 70 fms., and in the vicinity of the Maiden Lighthouses 70 to 100 fms. Here, however, the bottom is rocky, and yields little or no fine material. The tides all round the coast run with great violence. Too much stress cannot be laid on the necessity

of selecting slack tides for dredging these parts, as otherwise the operations are certain to end in disappointment and failure.

A table is appended of the stations from which the various gatherings were taken, with particulars of bathymetrical range, nature of sea bottom, weight of material brought up, and number of species found. As the quantity of material dredged varied greatly at different stations, it appeared desirable to record the weight collected at each place, so as to arrive at a correct estimate of the relative abundance of foraminiferal life at the various places. (1.)

To my friend Mr. Henry B. Brady, F.R.S., I am deeply indebted for the kind assistance he has rendered me in the critical examination of the doubtful species; and likewise to my friend Mr. William Swanson, F.G.S., for the accurate and artistic drawings in the plate which accompanies this memoir.

The following Foraminifera deserve a passing notice, viz.:—

BILOCULINA RINGENS, (*Lamk.*).

Generally distributed at various depths. A variety of this species is not uncommon in deep water, small in size, and in contour approaching *B. sphaera*.

TRILOCULINA OBLONGA, (*Montagu*).

Very abundant in Strangford Lough, where the specimens are large and typical; in Belfast Lough it is rare, and the specimens usually small.

LITUOLA GLOBIGERINIFORMIS, *P. and J.*

Not unfrequent in Belfast Lough and Strangford Lough; and it also occurs plentifully in Cork Harbour and Kinsale Harbour.

LAGENA SULCATA, *W. and J.*

The costæ on this species are sharply defined, about every alternate one extending up the neck, round which they are usually somewhat twisted.

LAGENA COSTATA, (*Will.*).

This species differs from the last in being entosolenian; in full-grown examples the shell is spherical, with the costæ slightly raised and very regular, extending to near the neck, where they usually end abruptly, the remainder being smooth, as is also the neck, which is short. The texture of the shell is more glassy than in *L. sulcata*. Williamson's figure represents a young speci-

(1.) A very ingenious dredge has been constructed by Mr. David Robertson, F.G.S., of Glasgow. It dips deep into the bottom and fills quickly. It has an advantage over the ordinary dredges in this respect, as each haul brings up a very uniform quantity of the sea bottom. See notes on the recent Foraminifera and Ostracoda of the Firth of Clyde, by David Robertson, F.G.S.—Trans. Geol. Soc. of Glasgow, Vol. V., Part I., p. 112.

men; in this state it has no neck, the shell is thin and sufficiently transparent to show the internal tube.

LAGENA WILLIAMSONI, (*Alcock*).

This form differs from *Lagena costata*, to which it is closely allied, in being smaller in size, less spherical in shape, and the sulci more sharply defined. Its chief peculiarity, however, is in the neck, which is short, and formed of two distinct portions—the first directly continuous with the body, and ornamented with two or three rows of hexagonal reticulations; the second a small cylindrical tube, continued from the centre of it. This form is abundant everywhere round our coast, and common in the Estuarine Clay at Magheramorne, County Antrim.

LAGENA STRIATO-PUNCTATA, *P. and J.*

A few examples of this *Lagena* were met with in Strangford Lough; one specimen was also found in Cork Harbour. Abundant in the Estuarine Clay at Magheramorne, County Antrim (1).

LAGENA HISPIDA, *Reuss*.

Ovate, surface covered with numerous blunt spines having a tendency to run into one another in longitudinal rows; a very rare species, only a few examples having been found. It is new to Britain.

LAGENA JEFFREYSII, *Brady*.

Only one example found; transverse section round. Mr. H. B. Brady, F.R.S., informs me "that the species is usually slightly quadrate in transverse contour, but sometimes quite round; is always slightly aculeate; the aculei quite spinous and pointed, very numerous and minute, and the neck commonly with spiral ornamentation. It often has to be washed with hot solution of some alkali to get the encrusting dirt off, as it seems without this a mere rough form that catches dirt."

LAGENA TRIGONO-MARGINATA, *P. and J.*

A three-sided form of *Lagena marginata*. Very rare.

LAGENA OBLONGA, (*Seguenza*).

A three-sided form of *Lagena lucida*. Very rare. A few examples have been found in the Estuarine Clay at Magheramorne, County Antrim.

(1.) I am indebted to my friend Prof. T. Rupert Jones, F.R.S., for his opinion on this *Lagena* and for some of the other Foraminera given in this list.

VAGINULINA LEGUMEN, (*Linn.*).

Large and abundant in the deep water of Strangford Lough.

VAGINULINA LINEARIS, (*Montagu*).

Large and abundant in the deep water in the vicinity of the Maiden Lighthouses.

TINOPORUS LUCIDUS, *Brady MS.*

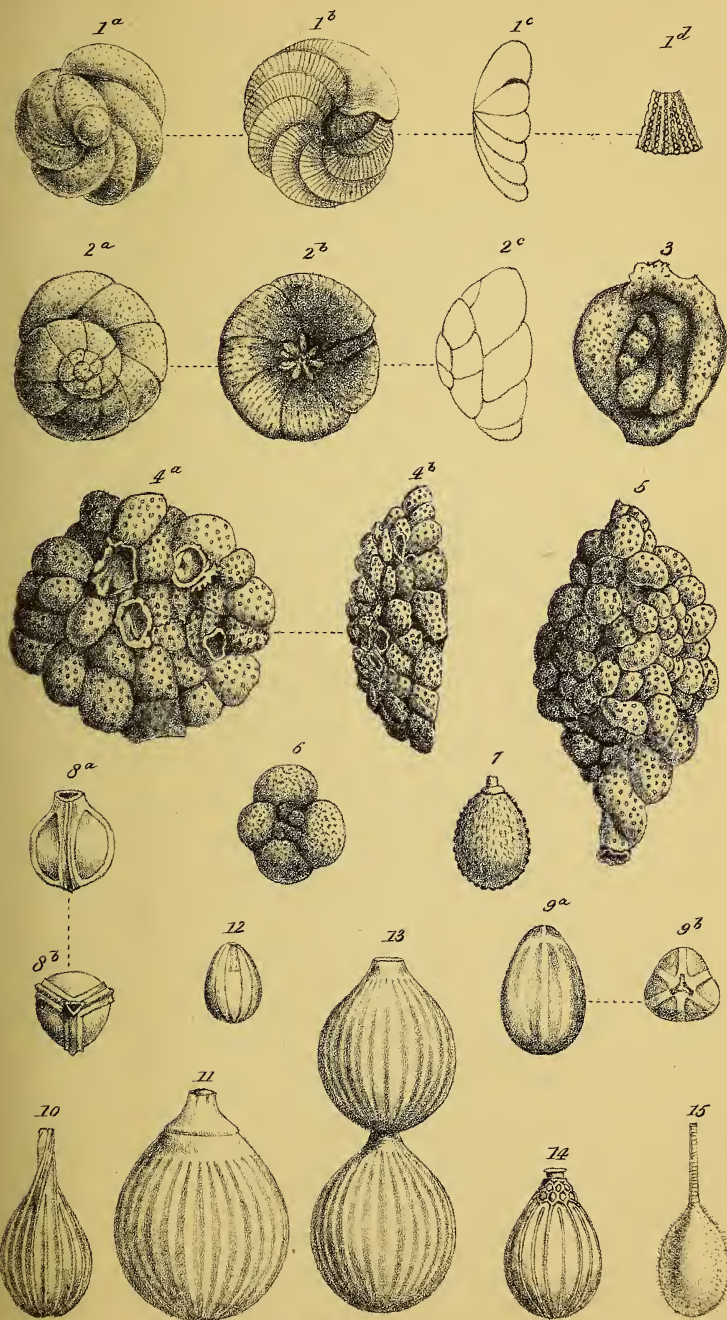
Generally distributed, but usually occurring in a very fragmentary state. Living specimens were found in the deep water in Strangford Lough, as also in the vicinity of the Maiden Lighthouses. This species is abundant in Dog's Bay, Connemara; it also occurs in Kinsale Harbour, and Cork Harbour. A few examples have been met with in the Estuarine Clay, Magheramorne, County Antrim.

DISCORBINA PARISIENSIS, (*D'Orb.*).

This species has not hitherto been recorded as British. It was first found in shore sand near Greyabbey, Strangford Lough; spire depressed, and exhibiting in fine state the characteristic dotted lines on the inferior surface. It has since been found in abundance in several of the shallow water gatherings in Belfast Lough, the specimens being usually more conical than those from Greyabbey (see figs 2a, 2b). It has been also found in Kinsale Harbour, and occurs, fossil, in the Estuarine Clay at Magheramorne, County Antrim. Mr. H. B. Brady writes me with reference to this species :—"The specimens of *Discorbina parisiensis* are all very minute, and they vary considerably in contour, some having the thin sharp edge, and low conical figure of D'Orbigny's Models, whilst others are round-edged and thicker; all have the characteristic striation of the inferior surface. The latter variety approximates closely to the characters of *D. obtusa*, and suggests the near relationship of the two forms. It should be observed that *D. parisiensis* has been obtained of the Rev. A. M. Norman, in dredgings from the North Atlantic, whilst *D. obtusa* is not only of frequent occurrence in the Arctic Seas, but has been found on our own shores."

EXPLANATION OF PLATE IV.

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- Fig. 1. *Discorbina parisiensis*, (D'Orb.). 1 *a*, upper surface; 1 *b*, lower surface; 1 *c*, edge view, x 60, diam.; 1 *d*, fragment of lower surface, showing structure, greatly enlarged. Shore sand, Greyabbey, Strangford Lough, County Down.
- „ 2. *Discorbina parisiensis*, (D'Orb.). 2 *a*, upper surface; 2 *b*, lower surface; 2 *c*, edge view; x 60 diam. Off Grey Point, 6 fms.
- „ 3. *Trochammmina gordialis*, P. and J. x 60 diam. Off Black Head, 20 fms.
- „ 4. *Tinoporus lucidus*, Brady MS. 4 *a*, upper surface; 4 *b*, edge view; x 40 diam. White Knowe, Strangford Lough, 6 fms.
- „ 5. *Tinoporus lucidus*, Brady MS. Encrusting a stem of polyzoan; x 30 diam. Off Maiden Lighthouses, 60 fms.
- „ 6. *Lituola globigeriniformis*, P. and J. x 60 diam. Off Maiden Lighthouses, 60 fms.
- „ 7. *Lagena hispida*, Reuss. x 60 diam. Off Black Head, 18 fms.
- „ 8. *Lagena trigono-marginata*, P. and J. 8 *a*, side view; 8 *b*, end view showing aperture; x 60 diam. Off White Head, 7 fms.
- „ 9. *Lagena oblonga*, (Seguenza). 9 *a*, side view; 9 *b*, end view, showing aperture; x 60 diam. Off White Head, 10 fms.
- „ 10. *Lagena sulcata*, W. and J. x 60 diam. Off Black Head, 18 fms.
- „ 11. *Lagena costata*, (Will.). x 60 diam. Off Black Head, 18 fms.
- „ 12. *Lagena costata*, (Will.). A young specimen, x 60 diam. Off Maiden Lighthouses, 60 fms.
- „ 13. *Lagena costata*, (Will.). Bilocular, x 60 diam. Off Orlock Point, 11 fms.
- „ 14. *Lagena Williamsoni*, (Alcock). x 60 diam. Off White Knowe, Strangford Lough, 6 to 8 fms.
- „ 15. *Lagena Jeffreysii*, Brady. x 60 diam. Off Maiden Lighthouses, 62 fms.



LIST OF LOCALITIES, WITH PARTICULARS OF DEPTH, &c.

	Localities.	Bathymetrical range.	Sea Bottom.	Relative quantities of material examined.	Number of Species from each locality.
A	Downhill beach, Co. Derry, 5 miles N.W. of Coleraine	Between tides	Sand	4 oz	33
B	Carnlough, Co. Antrim, on East, 14 miles N. of Larne	ditto	Sand	9 oz	38
C	Brown's Bay, Islandmagee, Co. Antrim	ditto	Sand	1 lb 1 oz	41
D	Ballyholme Bay, Co. Down, 1 mile E. of Bangor	ditto	Sand	6 oz	31
E	Ballywalter, Co. Down, 7 miles S. of Donaghadee	ditto	Sand	6 oz	27
F	Ballyhalbert, Co. Down, 4 miles S. of Ballywalter	ditto	Sand	4 oz	42
G	Cloghy Bay, Co. Down, 5½ miles S. of Ballyhalbert	ditto	Sand	4 oz	18
H	Ballyhornan Bay, Co. Down, 6 miles E. of Downpatrick	ditto	Sand	9 oz	41
I	Tyrella or Dundrum Bay, Co. Down, 6 miles S. of Downpatrick	ditto	Sand	12 oz	36
J	Newcastle beach, Co. Down, between Newcastle and Dundrum	ditto	Sand	4 oz	34
1	Conswater, between Railway Bridges, brackish	ditto	Mud	2 lb 4 oz	12
2	Hollywood Bank	ditto	Fine sand	8 lb	36
3	Between Carrickfergus and Kilroot	ditto	Fine sand	8 lb	26
4	Donaghadee	ditto	Fine sand	8 lb	46
5	Off Rockport	4 fms	Sand and dead shells	9 oz	49
6	Off Carrickfergus	5 fms	Coralline	5 oz	66
7	Bangor Bay	4 to 5 fms	Sand and dead shells	9 oz	56
8	Off Bangor Bay	5 fms	Sand and dead shells	3 lb 8 oz	46
9	Off Grey Point—Mid-channel	6 fms	Muddy sand and dead shells	3 lb	76
10	Off White Head	6 to 7 fms	Coralline and mud—two gatherings	2 lb	66
11	Off White Head	10 fms	Sand and dead shells	3 lb	80
12	Off Orlock Point	11 fms	Sand	8 lb	89
13	Off Black Head	15 to 18 fms	Mud, sand, shells, Polyzoa—six gatherings	6 lb 5 oz	92
14	Off Black Head	20 fms	Sand	22 lb	91
15	¼ Mile off Coalpit Bay	13 fms	Sponges	7 oz	67
16	2 Miles N.W. of Copeland Island	14 fms	Sand and shells	1 lb 9 oz	78
17	2 Miles N.E. of Larne	22 fms	Dead shells	1 oz	21
18	2½ Miles N.E. of Donaghadee	25 fms	Sand and dead shells	1 lb 2 oz	38
19	2 Miles N.E. of Muck Island	50 fms	Stones and shells	4 oz	30
20	2 Miles S. of Maiden Lighthouses	60 fms	Sand	8 lb	85
21	3 Miles S.S.E. of Maiden Lighthouses	62 fms	Sand	5 lb 13 oz	77
22	2 Miles S.S.E. of Maiden Lighthouses	72 fms	Sand and Zoophytes—several gatherings	11 oz	68
23	Near Newtownards, Strangford Lough, brackish	Between tides	Sand	6 lb	6
24	Near Greyabbey, Strangford Lough, slightly brackish	ditto	Sand	3 lb 12 oz	23
25	Off White Knowe, Strangford Lough	6 to 8 fms	Mud and sand	8 lb	85
26	Off Chapel Island, Strangford Lough	8 to 10 fms	Sand	2 lb 8 oz	73
27	Off Bar Rock, Strangford Lough	10 to 15 fms	Sand and shells	2 lb 12 oz	54
28	Off Dononeill, Strangford Lough	12 fms	Sand and shells	2 lb	77
29	Off Marpool, Strangford Lough	20 to 25 fms	Sand	5 lb	52

NOTE.—The first nine gatherings, lettered A to I, have been sent me by Mr. Wm. Gray, M.R.I.A., accompanied with a note giving the following particulars:—“Herewith I send you nine samples Foraminiferal sand. All the samples were collected off the surface of the beach sand, along the fringes of the wave lines left by the receding tide. In some cases I was able to take a cleaner gathering of the organic remains than in others. However, I would not place any value on the relative proportions of sand and organic remains from the respective stations, as the proportion must vary with the condition, time, season, and weather under which the several gatherings were made.”

TABLE SHEWING THE DISTRIBUTION OF FORAMINIFERA IN THE COUNTIES OF DOWN AND ANTRIM.

ABBREVIATIONS:—v. r., very rare; r., rare; c., common; v. c., very common. Species marked * are new to the British Fauna. Figures in column marked † refer to Plate (IV) accompanying this paper.

LIST OF SPECIES.

SUBORDER IMPERFORATA.

[illegible]