The Foraminifera of the River Dee.

BY J. D. SIDDALL.

THE results proposed to be offered in the following Catalogue have been attained from the examination of the Microzoa of the Estuary of the river Dee. Material for the purpose has been collected from all parts of the river from Chester to the Sea, principally by scraping the sand near low-water mark, but also by means of the tow-net and dredge. The richest and most productive gatherings of Foraminifera have been made at the following points, viz. :—Chester, from the sandbank opposite the old cheese-stage; Saltney, from the sandbanks opposite the wharf, and also immediately below the next bend of the river; Holywell, from the pools on the shore near high-water mark; and Hilbre Island, from among the rocks between the Little Eye and Middle Island. Sand collected at intermediate places either by scraping or dredging, was not nearly so rich as any of these four, either in point of the number of shells in it, or in the variety of species. Living specimens have been obtained from Burton Marsh, Holywell, and Hilbre Island. These may always be got by carefully scraping the surface of the velvety brownish mud at the bottom of the pools left by the tide, or by skimming the top of the water if this mud be found to have risen, as it sometimes will, under the influence of light, &c. This oozy mud should then be washed through a fine muslin net, to get rid of the impalpable part of it, and the residuum collected into small bottles, which should be kept uncorked in a cool place out of direct sunlight, when the Foraminifera will creep up the sides of the bottles, and will live there for many

months. From thence they are readily picked off with a fine-pointed camel's hair pencil, and transferred to a slide or cell for microscopic examination. The species most commonly found living are *Polystomella striato-punctata*, *Nonionina depressula*, and *Gromia oviformis*; and frequently associated with these are *Difflugia pyriformis* and *D. aculeata*. Specimens are thus readily obtainable for studying the life-history of both the Imperforate and Perforate divisions of the group, and also the Amœbina.

Foraminifera of various species are brought up the river in the frothy scum which floats with the tide, but no living specimen has ever been obtained from this source; those so found being dead and dry shells which have been picked up from the sand-banks by the "bore" of the tide, and carried towards Chester along with it. Surface gatherings from the lower parts of the river abound with large and heavy forms of Diatomaceæ, the exuviæ of Crustacea, and swimming Entomostraca, but contain no Foraminifera. Mr. Shepheard, Mr. A. O. Walker, and Dr. Stolterfoth have also diligently used the tow-net hereabouts, but the only living Foraminifer I have either seen or heard of from this source was a small *Textularia variabilis*, obtained by the last-named gentleman, although bottom dredgings from the same localities yield Foraminifera abundantly.

In a very rich gathering of Rhizopoda, made at Holywell on the 19th of April, 1875, all the above-mentioned species were very plentiful; and some fine living specimens of *Polystomella striato-punctata* then obtained were afterwards kept under observation for several days. They were for a few days particularly active, and crawled about the cells in which they were placed for examination. At the end of that time, the pseudopodia of some became finally retracted, and the sarcode showed a tendency to become granulated and condensed into an oval mass in the centre of each chamber of the shell. The following note, having reference to this aggregation of the sarcode, was made at the time:—" . . . Twelve chambers of shell were visible externally. The granular oval contents of chambers

Nos. 2, 4, and 9 (from the aperture) were furnished with cilia, distinctly apparent with a power of 400 diameters, and swam freely about in the chambers; on the contents of the other chambers no cilia were visible, and the form assumed by the contracted sarcode was not so definite. Colour of sarcode brownish yellow; moving bodies rather more dense, and therefore very slightly darker in colour." The cilia were very plain; and the writer was corroborated in his observation by the Rev. J. L. Bedford, F.L.S., who was present at the time.

This formation of ciliated spheroids of sarcode within the chambers of the parent shell, no doubt represented the earliest stages of one kind of reproduction of the species, and the probability is, that on the breaking up of the shell the spheroids would be liberated, and live for some time in the free swimming condition; then absorb their cilia, settle down, and secrete a shell, and become the primordial chamber of a form like the parent.

The old river "silt" has also been examined superficially from Sealand, from the Roodee near the Dee Stands and City Walls, the Groves near the Suspension Bridge, and Deva Terrace. This "silt" was collected from depths of three to six feet below the surface during the recent drainage operations. It was in most places distinctly laminated, and had every appearance of having been deposited by the river before it was confined to the present channel. That from the Roodee was obtained from *below* the thin peaty band upon which Roman remains were found so plentifully, and, in common with all the other gatherings, was found to contain large quantities of Foraminifera, which, taken as a whole, appeared to differ very slightly from freshly gathered specimens from the lower parts of the river. A list of these sub-recent Foraminifera would be very interesting for comparison with that appended below, and for this reason:— it is well known that the degree of salinity of the water has a marked effect upon them; larger and better grown shells are now obtained from Holywell and Hilbre than Chester or Saltney. Before Sealand and the Roodee were reclaimed, a much larger quantity of tidal water must have reached Chester,

and this would tend to make the Chester forms then as fine and well grown as those from Hilbre are now. So far as was seen this seemed to be the case, but the comparison was not carried far enough to place it beyond doubt.

The subjoined catalogue has been arranged in accordance with DR. CARPENTER'S "Introduction to the Study of the Foraminifera." The debated question whether *Gromia* should or should not be included amongst Foraminifera is not of much moment in the present case.

Some of the forms contained in the list are new to the British fauna, or otherwise possess points of considerable interest, and the following notes respecting them may be acceptable :—

Gromia oviformis, and *Gr. Dujardini.*

Gromia oviformis, Dujardin, 1835, Ann. des Sci. Nat., Sec. 2, vol. iii., p. 313 ; and vol. iv., p. 345, pl. 9, fig. 1.
Gromia Dujardinii, Max Schulze, 1854, Ueber den Organ. Polythal., p. 55, pl. 7, fig. 1—7.

Among collections of living Dee Foraminifera, *Gromia* is always largely represented, but its test is very rare indeed among shells obtained by the usual process of drying and floating from sand. This is owing to the great tenuity and delicacy of the test, which is little more than membranous, and does not possess sufficient strength to support its own weight. When living specimens are allowed to dry upon a slide, their tests collapse, and either assume hemispherical or scale-like forms, or become shapeless masses, each one surrounded by a glistening ring of dried sarcode.

Cornuspira involvens, Reuss.

Operculina involvens, Reuss, 1849, Denkschr. Akad. Wien., vol. i., p. 370, pl. xlv., fig. 20.
Cornuspira involvens, Jones, Parker, and Brady, 1865, Monog. Crag Foram. p. 3, pl. iii., figs. 52-54.

Messrs. Jones, Parker, and Brady *(loc. cit.)* admit Professor Reuss's name for the thicker *Cornuspiræ* with rounded tube,

as distinct from the outspread flattened contour of *C. foliacea*. Probably the real zoological significance of the character is not great; but it seems quite worth recognizing.

*Quinqueloculina tenuis, Czjzek.

Quinqueloculina tenuis, Czjzek, in Haidinger's Abhandl. Wiss., vol. ii., p. 149, pl. xiii., figs. 31-34.

Miliola (Quinqueloculina) tenuis, Parker and Jones, North Atlantic and Arctic Foram., p. 411, pl. xvii., fig. 84.

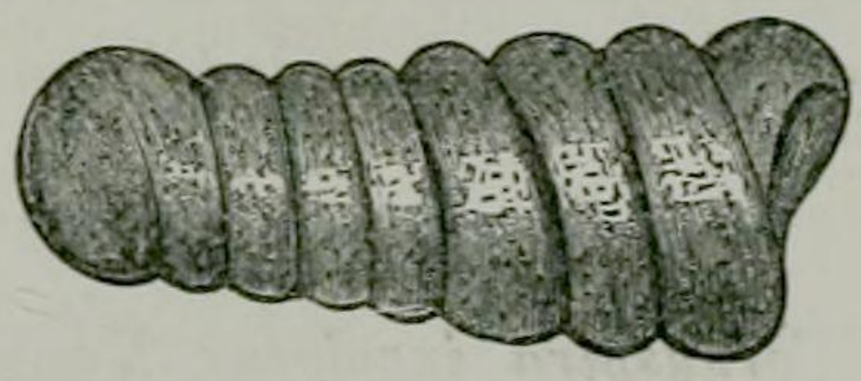
An extreme enfeeblement of *Q. seminulum*, Spiroloculine in aspect, and twisted on itself. Several small specimens of this have been found by Mrs. Shone in the Dee, but it is more at home in the deeper waters of the Mediterranean and other Seas. It also occurs fossil in the Lias Clay of Stockton, Warwickshire.

Trochammina Shoneana, n. sp., fig. 1, 2.

Characters.—Test spiral, subcylindrical, slightly tapering, narrow end rounded; composed of a single series of close convolutions of a non-septate tube on a linear axis. Sutural line more or less depressed externally. Aperture large, rounded, formed of the end of the tube, somewhat constricted. Texture finely arenaceous; colour light brown to rusty red. Length $\frac{1}{100}$th to $\frac{1}{80}$th inch.

Fig. 1.

Fig. 2.



This form is closely allied to *Trochammina gordialis*, and *Tr. charoides*. It differs from the former in its elongate regular habit of growth, and from the latter in the extension of the convolutions lengthwise in single series, instead of their superposition in several layers.

The very few specimens which have been found by Mrs. Shone and myself, have all been obtained from Hilbre or Holywell, and, finding that it is new to science, I have, with her permission, named it after my valued friend and co-worker.

* *Trochammina charoides*, Parker and Jones.

Trochammina squamata charoides, Parker and Jones, Quart. Jour. Geol. Soc., 1860, vol. xvi., p. 304.

Trochammina charoides, Carpenter, Introduction to Foram., 1862, p. 141, pl. xi., fig. 3.

So named from the resemblance of the test to the "nucule" of *Chara*.

Lituola findens, Parker.

Lituola findens, Parker, (in G. M. Dawson's paper) Canadian Naturalist, N.S., vol. v., p. 176, wood-cut, fig. 1.

Typical examples of this are twice or thrice forked, but in the Dee we seldom find it with more than a simple column of five to eight chambers, which, in outward appearance, closely resembles the uni-serial portion of *Bigenerina digitata*, and, being generally found broken, it is just possible that the fragments which have led to the placing of the latter name on the list, may belong to the above.

Haliphysema Tumanowiczii, Bowerbank.

Haliphysema Tumanowiczii, Bowerbank, Brit. Spong., vol. i., pl. xxx., fig. 359.

Squamulina scopula, Carter, 1870, Ann. and Mag. Nat. Hist., Ser. 4, vol. v., p. 309, pl. 4 and 5.

Originally described by Dr. Bowerbank as "the smallest of British Sponges," the true rhizopodal nature of this has recently been demonstrated by Mr. Saville Kent, who has seen the pseudopodia extended in specimens from the Channel. The first example from the Dee was dredged at the mouth of the river by A. O. Walker, Esq., F.L.S. It is fixed upon *Quinqueloculina subrotunda*, and was entangled among the roots of *Cellularia avicularia*.

* *Lagena aspera*, Reuss.

Lagena aspera, Reuss, 1861, Sitzungsb. d. k. Akad. Wiss. Wien., vol. xl., p. 305, pl. i., fig. 5.

A rare species, with superficial rugosity caused by small, short, blunt spines. Well figured by Professor Reuss from fossil Tertiary specimens, but not figured in any English work.

Lagena trigono-marginata, Parker and Jones.

Lagena trigono-marginata, Parker and Jones, 1865, Phil. Trans., vol. clv., p. 419, pl. 48, fig. 1 a. b.

L. marginata, *L. ornata*, and *L. lucida*, all occur in the trigonal condition in the Dee, the latter form being the most frequent. Messrs. Parker and Jones figure the first-named in the supplementary plates of their Monograph of North Atlantic and Arctic Foraminifera. Their specimens were from the Eocene beds of Grignon, in France, but some of the trifacial and trimarginate forms have been met with by Mr. D. Robertson, F.G.S., on the coast of Durham, and by Mr. Jos. Wright, F.G.S., on the North coast of Ireland. These varieties were first noticed, by Seguenza, in the Miocene marls of Messina, who described six "species" from this source, under the distinct generic name *Trigonulina*.

Polymorphina Thouini, D'Orbigny.

Polymorphina Thouini, D'Orbigny, 1826, Ann. Sci. Nat., vol. ii., p. 265, No. 8, Modéle No. 23; Brady, Parker, and Jones, 1870, Trans. Linn. Soc., Lond., vol. xxvii., p. 232, pl. xl., fig. 17.

An interesting and exceedingly well-marked variety, of which one very beautiful specimen was obtained. It has an attenuated subcylindrical contour, with long, upright, compactly fitting segments.

* *Polymorphina spinosa*, D'Orbigny.

Globulina spinosa, D'Orbigny, 1846, For. Foss., Vien., p. 203, pl. xiii., figs. 23, 24.

Polymorphina spinosa, Brady, Parker, and Jones, 1870, Trans. Linn. Soc., Lond., vol. xxvii., part 2, p. 243, pl. xlii., figs. 36 a. b.

A solitary specimen of this extremely rare shell, the surface

of which is studded with short stout spines, was found by MRS. SHONE. Hitherto it had only been known as a Miocene fossil from the south of Europe.

❁ *Sphæroidina bulloides*, D'Orbigny.

Sphæroidina bulloides, D'Orbigny, 1826, Ann. Sci. Nat., vol. vii., p. 267, No. 1, Modéles No. 65.
Sphæroidina Austriaca, Reuss, 1850, Deukschr. Akad. Wein., vol. i., pl. 51.
Sphæroidina bulloides, Parker and Jones, 1864, North Atlantic and Arctic Foram., p. 369, pl. xvi., fig. 52.

A deep water form, allied to *Globigerina*, very small and rare in the Dee.

Pullenia sphæroides, D'Orbigny.

Nonionina sphæroides, D'Orbigny, 1826, Ann. Sci. Nat., vol. vii., p. 293, No. 1, Modéle No. 43.
Pullenia sphæroides, Parker and Jones, 1864, North Atlantic and Arctic Foram., pl. xiv., figs. 43, a b, and xvii., fig. 53.

A neat little shell resembling *Nonionina*, but more nearly allied to *Globigerina;* one of the rarest Dee forms, but probably occasionally overlooked through its minute size.

Bulimina squamigera, D'Orbigny.

Bulimina squamigera, D'Orbigny, 1839, Foram. Canaries, p. 137, pl. 1, fig. 22-24.

A single specimen has been found of an elongate, subcylindrical *Bulimina*, slightly flattened on three sides, with flush sutures and rounded extremities, which, but for its characteristic aperture, might have passed for a *Clavulina*. It answers fairly well to D'Orbigny's figures of *Bulimina squamigera*, to which species, pending the discovery of further examples, it may perhaps be assigned.

Spirillina tuberculata, Brady.

This is a manuscript species, concerning which MR. BRADY has forwarded me the following particulars:—

"CHARACTERS.—Test, free, discoidal, spiral; consisting of a non-
"septate tube coiled on itself in one plane. Upper and lower surfaces flat
"or very slightly concave, studded with minute tubercles; exterior
"presenting little or no trace of the course of the spiral tube; periphery
"square. Colour white. Diameter $\frac{1}{50}$ inch.

"This form, which is perhaps a strongly developed variety of *Spirillina*
"*margaritifera*, was first obtained from deep water off Eddystone, and has
"been since found by MR. ROBERTSON on other parts of our coast."

A few specimens have been found in the Dee which come nearer to this than to any other known form, but differ from it in having only the lower surface tuberculate, while the upper surface has the spiral sutural line strongly limbate, and the shell perforations numerous and well marked.

Discorbina biconcava, Parker and Jones.

Parker and Jones, 1865, North Atlantic and Arctic Foram., p. 422, pl. xix., fig. 10 a b c.

A square-edged, bi-concave form, easily distinguished from the other *Discorbinæ*, but very feeble and rare in the Dee.

Tinoporus lucidus, Brady, MS.

Tinoporus lucidus, Brady, 1870, Cat. Brit. Foram. in the Edinburgh Museum, p. 8. (No description.)

This is by no means an uncommon form, and MR. BRADY'S manuscript name has been generally adopted by British rhizopodists. It was originally described in a paper on the "Rhizopodal Fauna of the Hebrides," at the meeting of the British Association in 1866, the author then regarding it as a species of *Polytrema*, a genus in which it might be placed with almost equal justice, but in the doubt which still existed as to its affinity, the description did not appear in the abstract of the paper. Somewhat later, the same organism was figured by MR. PARFITT as a Polyzoan (*Cellepora hemisphærica*, Ann. and Mag. Nat. Hist., 1873, 4 Ser., vol. xii., p. 98, pl. 3 b, fig. 1-6), a position to which it has no claim. In the absence of any published details, the following characters will serve to identify

the species :—The test is normally adherent, and, when young somewhat resembles that of *Planorbulina mediterranensis*. At a later stage it either spreads laterally over the surface of the body on which it is growing, or piles its little inflated chambers one upon the other in acervuline fashion, until the mass assumes a nearly hemispherical contour. It is tolerably common on the West coast of Ireland, and has been found by MR. BRADY, MR. ROBERTSON, and the REV. A. M. NORMAN, in dredgings off the shores of Scotland and elsewhere. The loose specimens obtained from Hilbre and the lower parts of the Dee estuary, are generally somewhat rolled and abraded, as though they had been washed in by the tide, but I have also found it growing upon a Sertularian.

All the species contained in this list have, with characteristic kindness, been carefully revised and authenticated by H. B. BRADY, ESQ., F.R.S. Those to which an asterisk is prefixed have been collected by MRS. ELIZABETH SHONE, whose persevering study has been rewarded by the discovery of several species new to the British seas. Some of the forms enumerated are only represented by one or two depauperated, broken, or unsatisfactory specimens, and it is very desirable that future observers should verify the occurrence of the shells marked "very rare."

Sub-Kingdom, PROTOZOA.

Class, RHIZOPODA.

1. Order, RADIOLARIA—Actinophryna, Acanthometrina, Polycystina, Thalassicollina.
2. Order, LOBOSA—Amœbina.
3. Order, RETICULARIA—Foraminifera.

ORDER—FORAMINIFERA.

SUB-ORDER—IMPERFORATA.

1. FAMILY—GROMIDA.

TYPICAL SPECIES.	GENERA, SPECIES, AND VARIETIES.	REMARKS.
	GROMIA, *Duj.*	
	Dujardini	rare.
	oviformis	frequent.

2. FAMILY—MILIOLIDA.

TYPICAL SPECIES.	GENERA, SPECIES, AND VARIETIES.	REMARKS.
Cornuspira foliacea, *Phil.*	CORNUSPIRA, *Schultze*	
	involvens, *Reuss*	rare, new to Britain.
Miliola seminulum, *Linn.*	BILOCULINA, *D'Orb.*	
	ringens, *Lamk*	very rare.
	elongata, *D'Orb*	frequent.
	depressa, *D'Orb*	,,
	TRILOCULINA, *D'Orb.*	
	oblonga, *Montagu*	,,
	tricarinata, *D'Orb*	very rare.
	trigonula, *D'Orb*	rare.
	*Brongniartii, *D'Orb.*	very rare.
	QUINQUELOCULINA, *D'Orb.*	
	agglutinans, *D'Orb.*	rare.
	seminulum, *Linn.*	frequent.
	*tenuis, *Czjzek*	very rare.
	pulchella, *D'Orb.*	rare.
	bicornis, *W. & J*	frequent.
	secans, *D'Orb*	rare.
	subrotunda, *Montagu*	abundant.
	Ferussaccii, *D'Orb*	very rare.
	Candeina, *D'Orb.*	,,
	fusca, *Brady*	rare.
	SPIROLOCULINA, *D'Orb.*	
	planulata, *Lamk*	,,
	canaliculata, *D'Orb.*	,,
	limbata, *D'Orb.*	,,
	excavata, *D'Orb*	,,

3. Family—LITUOLIDA.

Typical Species.	Genera, Species, and Varieties.	Remarks.
Trochammina squamata, *P. & J.*	Trochammina, *P. & J.*	
	incerta, *D'Orb.*	rare.
	Shoneana, *n. sp*	very rare.
	gordialis, *P. & J.*	,,
	*charoides, *J. & P.*	,,
	squamata, *P. & J.*	rare.
	macrescens, *Brady*	,,
	inflata, *Montagu*	frequent.
Lituola nautiloidea, *Lamk.*	Lituola, *Lamk.*	
	canariensis, *D'Orb*	,,
	findens, *Parker*	rare; new to Britain.
	scorpiurus, *Montf.*	,,
	fusiformis, *Will*	,,
	globigeriniformis, *P. & J.*	,,
Haliphysema Tumanowiczii *Bow.*	Haliphysema, *Bowerbank.*	
	Tumanowiczii, *Bow.*	very rare.

Sub-Order — PERFORATA.

1. Family—LAGENIDA.

Lagena sulcata, *W. & J.*	Lagena, *W. & J.*	
	sulcata, *W. & J.*	frequent.
	Lyelli, *Seguenza*	rare.
	lævis, *Montagu*	frequent.
	gracillima, *Seguenza*	very rare.
	striata, *D'Orb*	rare.
	gracilis, *Will.*	very rare.
	semistriata, *Will*	frequent.
	globosa, *Montagu*	,,
	marginata, *W. & J.*	,,
	trigono-marginata, *P. & J.*	very rare.
	ornata, *Will.*	rare; also trigonal.
	pulchella, *Brady*	very rare.
	lucida, *Will*	frequent; also trigonal.
	*aspera, *Reuss.*	new to Britain.
	caudata, *D'Orb.*	rare.
	melo, *D'Orb.*	frequent.
	squamosa, *Montagu*	,,
	*striato-punctata, *P. & J.*	very rare.
	*distoma, *P. & J.*	,,
	*Jeffreysii, *Brady*	,,
Nodosaria raphanus, *Linn.*	Nodosaria, *Lamk.*	
	scalaris, *Batsch*	rare.
	radicula, *Linn*	very rare.
	Dentalina, *D'Orb.*	
	guttifera, *D'Orb*	rare.
	obliqua, *D'Orb.*	,,
	communis, *D'Orb.*	frequent.

1. Family--LAGENIDA—*continued.*

Typical Species.	Genera, Species, and Varieties.	Remarks.
Nodosaria raphanus, *Linn.*	Vaginulina, *D'Orb*	
	*legumen, *Linn.*	very rare; fragment.
	Marginulina, *D'Orb.*	
	raphanus, *D'Orb*	very rare.
	glabra, *D'Orb*	,,
	Cristellaria, *Lamk.*	
	rotulata, *Lamk.*	rare.
	italica, *Defrance*	very rare.
	crepidula, *F. & M.*	frequent.
Polymorphina lactea, *W. & J.*	Polymorphina, *D'Orb.*	
	communis, *D'Orb.*	,,
	compressa, *D'Orb.*	,,
	oblonga, *Will.*	,,
	Thouini, *D'Orb.*	v r; new to Britain.
	*spinosa, *D'Orb*	,, ,,
	*Orbignii. *Zborzewski*	very rare.
	fusiformis, *Roemer*	,,
	lactea, *W. & J.*	frequent.
	concava, *Will*	rare.
	gibba, *D'Orb.*	frequent.
	var. æqualis, *D'Orb.*	,,
Uvigerina pygmæa, *D'Orb.*	Uvigerina, *D'Orb.*	
	angulosa, *Will.*	,,
	pygmæa, *D'Orb.*	,,
	*irregularis, *Brady*	,,

2. Family—GLOBIGERINIDA.

Orbulina universa, *D'Orb.*	Orbulina, *D'Orb.*	
	universa, *D'Orb.*	rare.
Globigerina bulloides, *D'Orb.*	Globigerina, *D'Orb.*	
	bulloides, *D'Orb*	frequent.
Sphæroidina bulloides, *D'Orb.*	*Sphæroidina, *D'Orb.*	
	bulloides, *D'Orb.*	very rare.
Pullenia sphæroides, *D'Orb.*	Pullenia, *P. & J.*	
	sphæroides, *D'Orb*	,,
Textularia agglutinans, *D'Orb.*	Textularia, *Defrance*	
	sagittula, *Defrance*	rare.
	variabilis, *Will.*	frequent.
	pygmæa, *D'Orb.*	rare.
	difformis, *Will.*	,,
	agglutinans, *D'Orb*	,,
	Verneuilina, *D'Orb.*	
	polystropha, *Reuss*	,,
	spinulosa, *Reuss*	very rare.

2. Family—GLOBIGERINIDA—*continued.*

Typical Species.	Genera, Species, and Varieties	Remarks
Bulimina Presli, *Reuss.*	Bulimina, *D'Orb.*	
	pupoides, *D'Orb*.....	frequent.
	marginata, *D'Orb.*	,,
	aculeata, *D'Orb*.....	very rare.
	squamigera, *D' Orb.*	,,
	ovata, *D'Orb.*	frequent.
	elegantissima. *D'Orb*.....	rare.
	Virgulina, *D'Orb.*	
	Schreibersii, *Czjzek*	very rare.
	Bolivina, *D'Orb.*	
	punctata, *D'Orb*..... ...	rare.
	plicata, *D'Orb*.....	frequent.
	costata, *D'Orb*.....	rare.
	Bigenerina, *D'Orb.*	
	digitata, *D'Orb.*	doubtful; broken.
Spirillina vivipara, *Ehrenb.*	Spirillina, *Ehrenberg*	
	margaritifera, *Will*.....	rare.
	vivipara, *Ehrenberg*	,,
	tuberculata, *Brady*	doubtful.
Cassidulina lævigata, *D'Orb.*	Cassidulina, *D'Orb.*	
	lævigata, *D'Orb*.....	rare.
	crassa, *D'Orb*.....	,,
Discorbina turbo, *D'Orb.*	Discorbina, *P.* & *J.*	
	rosacea, *D'Orb.*	frequent.
	globularis, *D'Orb.*	,,
	ochracea, *Will.*	rare.
	Bertheloti, *D'Orb*.....	very rare.
	*biconcava, *P.* & *J*.....	,,
Planorbulina farcta, *F.* & *M.*	Planorbulina, *D'Orb.*	
	Mediterranensis, *D'Orb*.....	frequent.
	Haidingerii, *D'Orb.*	rare.
	*Ungeriana, *D' Orb*	,,
	Truncatulina, *D'Orb.*	
	lobatula, *Walker*.....	abundant.
	refulgens, *Montfort*	very rare.
Pulvinulina repanda, *F.* & *M.*	Pulvinulina, *P.* & *J.*	
	repanda, *F.* & *M.*	very rare.
	Canariensis, *D'Orb*.....	rare.
	auricula, *F.* & *M.*	,,
Rotalia Beccarii, *Linn.*	Rotalia, *Lamk.*	
	Beccarii, *Linn*.....	abundant.
	nitida, *Will*.....	rare.
Tinoporus vesicularis, *P.* & *J.*	Tinoporus, *Montfort*	
	lucidus, *Brady*.....	very rare.
Patellina concava, *Lamk.*	Patellina, *Will.*	
	corrugata, *Will.*	rare.

3. Family—NUMMULINIDA.

Typical Species.	Genera, Species, and Varieties.	Remarks.
Polystomella crispa, *Linn.*	Polystomella, *Lamk.*	
	crispa, *Linn*.....	rare.
	striato-punctata, *F.* & *M*.....	abundant.
	Nonionina, *D'Orb.*	
	scapha, *F.* & *M*.....	rare.
	depressula, *W.* & *J.*	abundant.
	umbilicatula, *Montf*.....	rare.
	turgida, *Will.*	,,
	asterizans, *F.* & *M*.....	,,
	*stelligera, *D'Orb*.....	,,

Note from a Paper on the Microscopic Life of the Mountain Limestone.

Read December, 1877.

BY G. W. SHRUBSOLE, F.G.S.

SACCAMMINA CARTERI (Brady) was first found by Master W. Shepheard in road-metal near Chester, and was recognised and named by Mr. Siddall. In a visit to the Quarry of the Minera Lime Company, with Mr. Siddall, the author observed a band of black limestone, two or three feet in thickness, entirely made up of the above-mentioned Foraminifer, and containing less than 1 per cent. of matter insoluble in acid. This bed occurs near the base of the Carboniferous Limestone.

PROCEEDINGS

OF THE

Chester Society of Natural Science.

No. 2.

TWO SHILLINGS AND SIXPENCE.

CHESTER:

PRINTED AND PUBLISHED FOR THE CHESTER SOCIETY OF NATURAL SCIENCE,
BY G. R. GRIFFITH, GROSVENOR STREET.

1878.