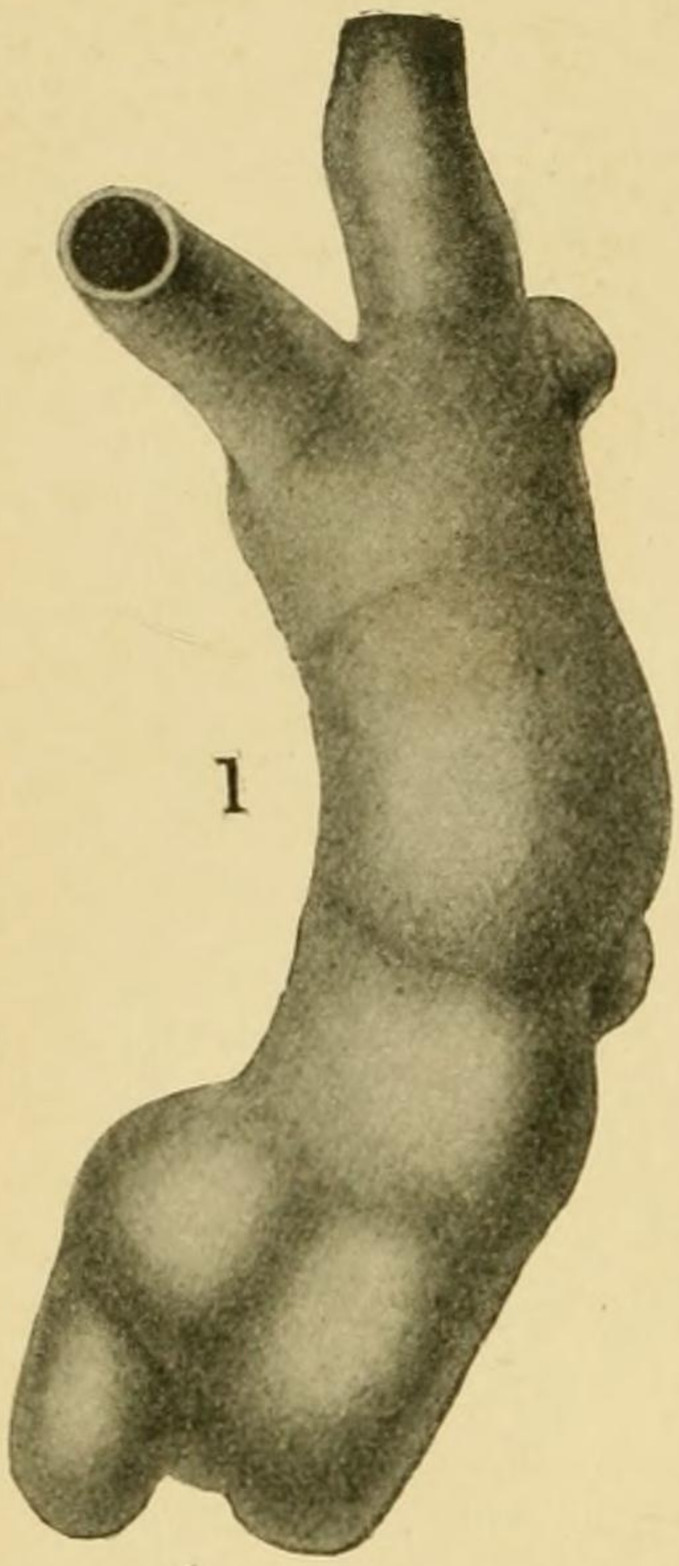

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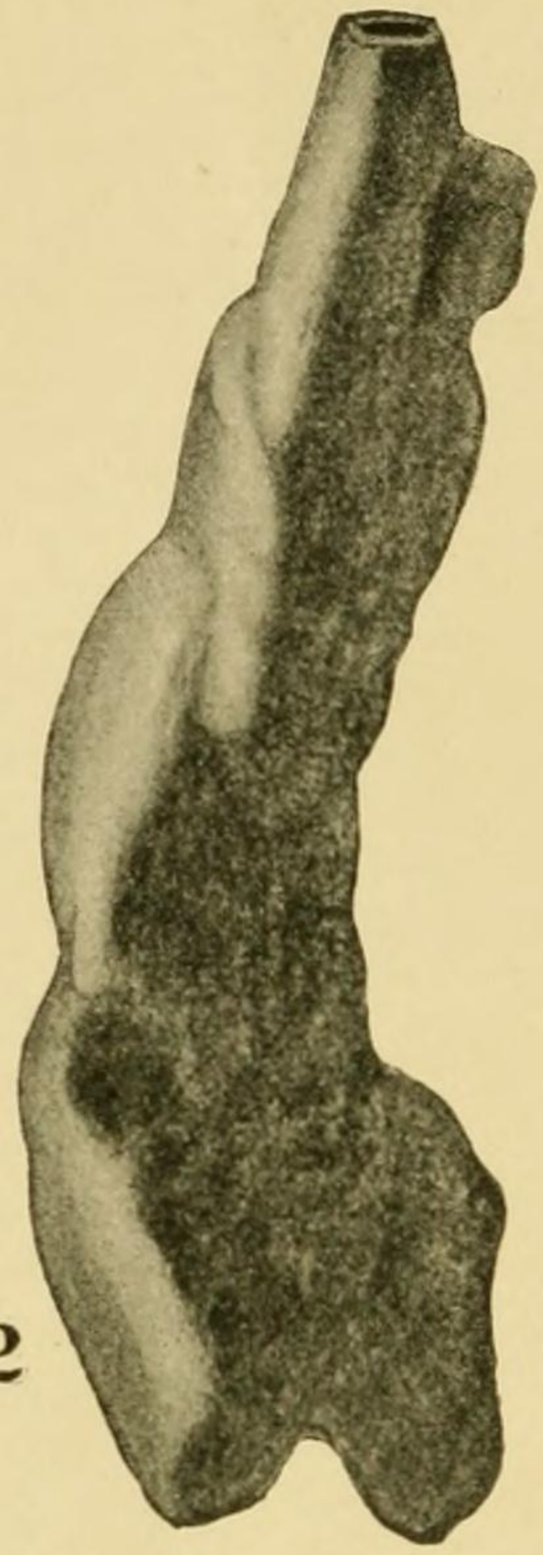

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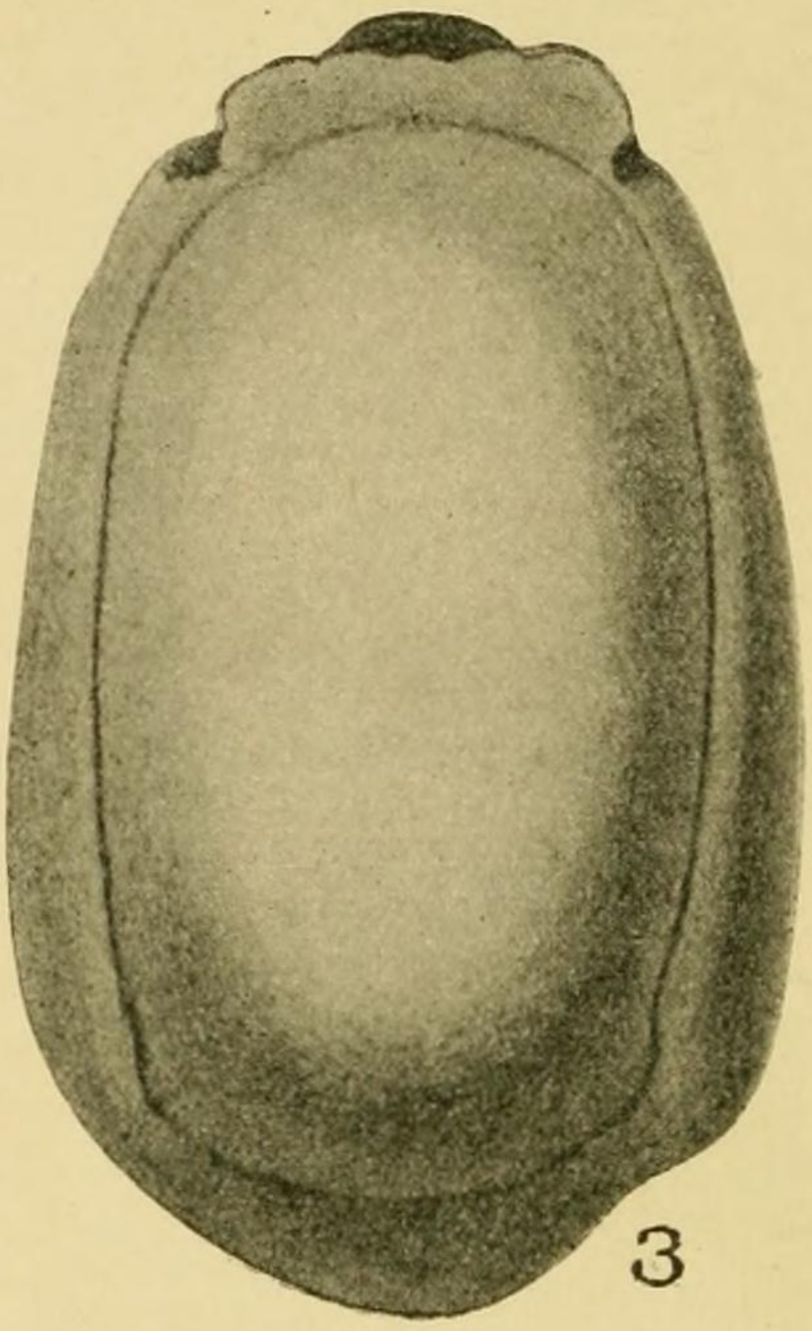

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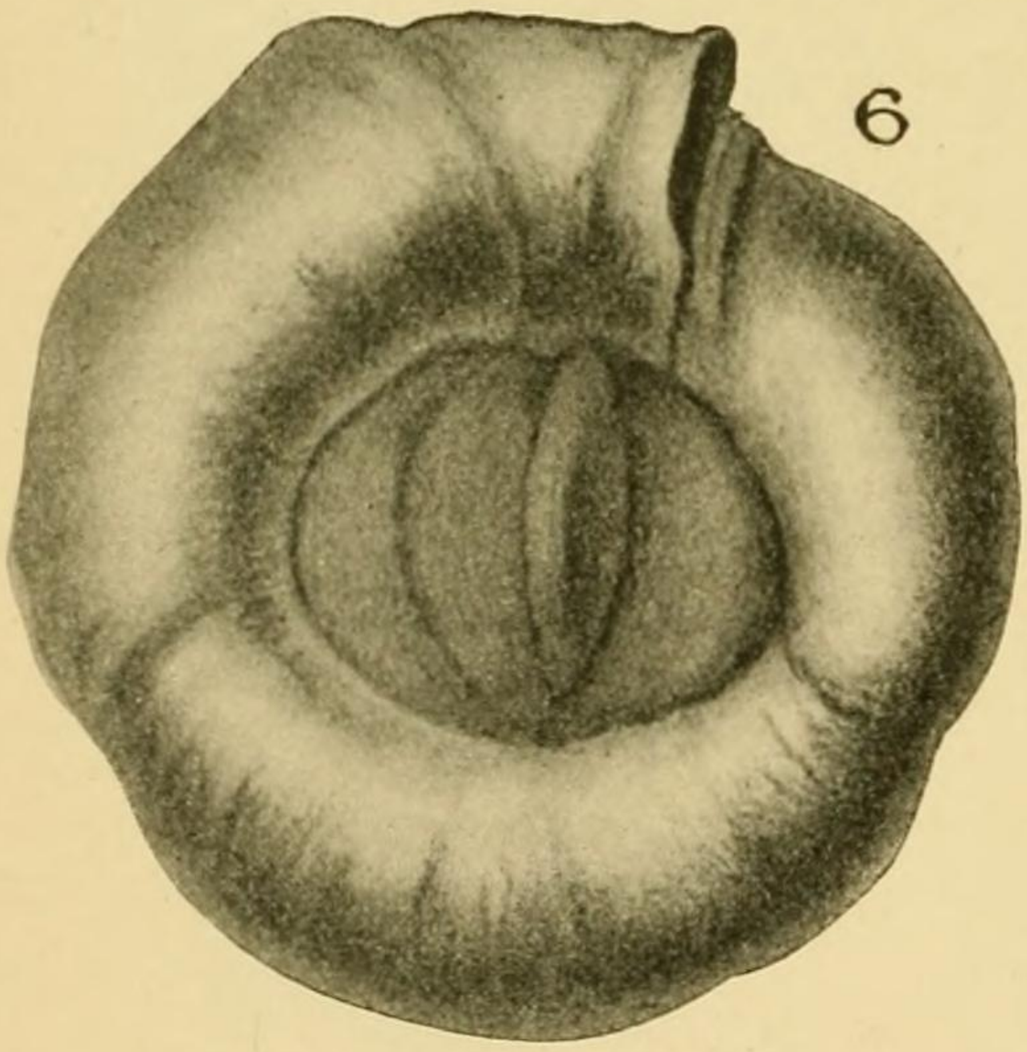

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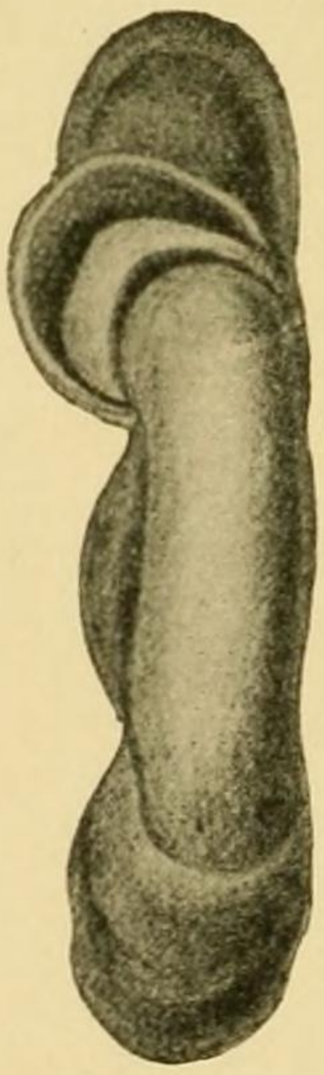

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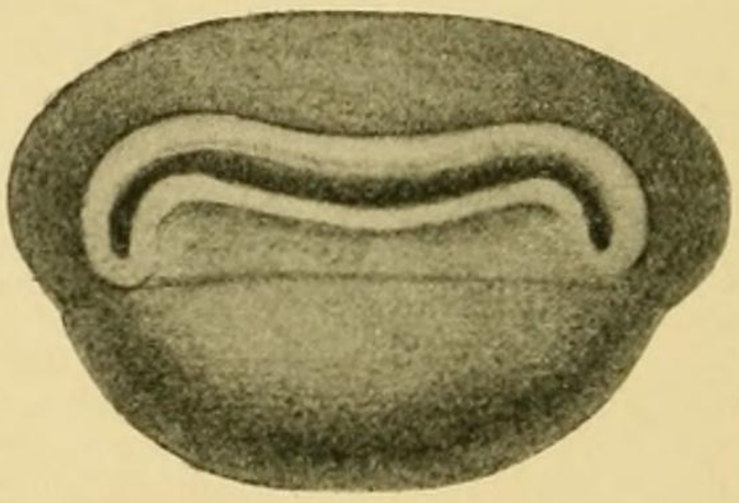

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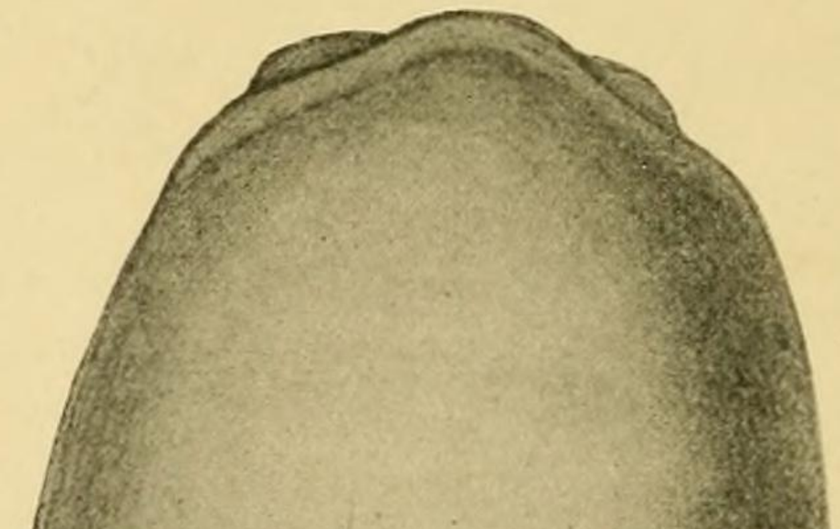

4

FORAMINIFERA OF SOUTH CORNWALL.

III.—*The Foraminifera of the Shore-sands, and Shallow Water Zone of the South Coast of Cornwall.*

By Edward Heron-Allen, F.L.S. F.G.S. F.Z.S. F.R.M.S.,
and Arthur Earland, F.R.M.S.

(*Read November* 17, 1915.)

Plates V. to IX.

The examination of material from one highly prolific dredging off the south coast of Cornwall, and littoral gatherings from ten localities between the Land's End and Plymouth, has proved to be a task of remarkable interest owing to the richness of the marine protozoan fauna, both as regards its abundance and development, and the result of our examinations has been a list of 221 species and varieties for the area under consideration. This list is expanded to 256 by the addition of thirty-five species recorded in the papers of Millett, Worth and Robertson, to which reference is made below, and which we have added in order that this present paper may be regarded as complete up to the time of writing.

The major portion of the ground may be said to have been practically untouched hitherto. The late F. W. Millett published in 1885* a list of 108 species and varieties, but his paper, as the Introduction shows, was in the nature of a popular article, and no authors of species, frequencies or diagnostic observations were

* F. W. Millett, "The Recent Foraminifera of Mount's Bay." Trans. Penzance Nat. Hist. and Antiq. Soc., 1884–5, 3 pp.

EXPLANATION OF PLATE V.

FIGS.

1–2.—*Nubecularia lucifuga* Defrance. Abnormal form with tubular extensions. Fig. 1, upper surface. Fig. 2, under surface (originally attached). × 65.

3–5.—*Biloculina elongata* d'Orbigny. Figs. 3, 4, side views. Fig. 5, oral view. × 65.

6–8.—*Miliolina subrotunda* (Montagu). Abnormal hauerine form. Figs. 6, 7, side views. Fig. 8, edge (oral) view. × 85.

The drawings for the Plates illustrating this paper were made from the specimens by Mr. John R. Ford.

given.* R. H. Worth has contributed a more scientific list of 116 species to a publication of the Plymouth Marine Biological Association,† but this is a list which may be taken to represent only the extreme eastern section of our area. The list is, however, a very valuable one, as it complements the records from our Station I, being principally derived from dredgings made in, and to the south and west of, Plymouth Sound, and around the Eddystone Lighthouse, and may therefore be regarded as primarily dealing with Cornish Foraminifera.

Finally, we may mention a list of thirty-five species published by the late David Robertson (without frequencies) in 1869 in the Report of the British Association for that year.‡ All the species recorded occur in our list with the single exception of *Nonionina turgida* Williamson. The only indication of locality is contained in a phrase in the introductory paragraph, "taken in about 40 fms. 7 miles south-east of the Eddystone, and some 14 miles south-east of the Dudman in about the same depth of water." This paper may therefore also be taken to be primarily concerned with our area.§

Lists of Foraminifera from the adjacent shores of Devonshire may be found in E. Parfitt's paper "On the Protozoa of Devonshire," ‖ in which seventy-one species are recorded from Exmouth, Plymouth Sound, Eddystone, Brixham, Salcombe Bay, and Torbay; and R. H. Worth has contributed a list of thirty species to E. J. Allen and R. A. Todd's paper, "The Fauna of the Salcombe Estuary."¶

The shore-gatherings forming the subject of the present paper have been made, as will be seen by the List of Stations, over a period of more than twenty years, and have been supplemented by

* Among the Millett MSS. which have come into our possession is a "List of Recent Foraminifera of Marazion, Mounts Bay, supplied to Prof. Jas. Clark, 4th March 1906." This is primarily founded upon the 1884–5 paper, but a few species are added, including *Placopsilina varians* (Carter), [see No. 46 *Iridia diaphana* Heron-Allen and Earland and note thereon], and *Lagena faba* Balkwill and Millett. This latter species does not appear in our list, nor in those to which we have otherwise referred. We have indicated the species thus added to Millett's 1884–5 list by the sign (M. 1906).

† R. H. Worth, in "Plymouth Marine Invertebrate Fauna," Journ. Mar. Biol. Assoc., vol. vii. 1904, pp. 174–85.

‡ "Report of the Committee appointed to explore the Marine Fauna and Flora of the South Coast of Devon and Cornwall." Rep. Brit. Ass. (Exeter, 1869), London, 1870, p. 91. "Foraminifera," by David Robertson.

§ In Jones and Parker's paper "On some Recent and Fossil Foraminifera Dredgings in the English Channel" (Ann. and Mag. Nat. Hist. Ser. 4, vol. xvii. 1876, pp. 252–7), a list is given of thirty-two species from a dredging made by Dr. S. P. Woodward and Mr. McAndrew in 60 fms. 40 miles south of the Scilly Islands. This is hardly related to our area, but all the species named occur under one name or another, in our list, with the exception of *Polymorphina horrida* Reuss, *P. costata* Egger. and *Nodosaria raphanus* (Linné).

‖ Trans. Devon. Assoc. Adv. Science, Lit. and Art, 1869, p. 16.

¶ Journ. Mar. Biol. Assoc. (Plymouth), vol. vi. (1900), p. 182.

a certain number of specimens found upon dilapidated type-slides from the Millett Collection (which now forms part of our own), and by a tube of floatings from the same source, made from shore-sand collected at Fowey. The material may therefore be said to be virtually complete and representative, and it presents one or two points which are worthy of note.

With the exception of our recently recorded genus and species *Iridia diaphana* * no Astrorhizidæ were found. The family is normally rare in shore-gatherings, and the material examined contained but few Molluscan or other fragments upon which the adherent forms might have been found, but the otherwise extremely rich dredging off Newlyn (Station I) was noteworthy for a like absence of these Arenacea.

The material from the area in general was, as might have been expected from the geological features of the neighbouring shores, more free from derived fossils than is usually the case in British shore-gatherings; but at Station III (Marazion) chalk fossils were found of the species *Anomalina ammonoides* (Reuss) and *Textularia globulosa* Ehrenberg, and at Station VII (Veryan Bay) Eocene fossils of the species *Bulimina elongata* d'Orbigny, and *Discorbina bertheloti* d'Orbigny. How these specimens arrived in these localities, whether washed by tides from as far east as the Isle of Wight or derived from a submarine outcrop, it is impossible to conjecture, though the Chalk fossils may have been derived from Beer Head, South Devon. The same problem arises in connexion with a single fine and typical example of *Faujasina carinata* d'Orbigny, a common fossil in the Pliocene of St. Erth, Cornwall, which occurred in the shore-sand at Station II (Penzance), and which we figure (Pl. IX, figs. 6–8). How this specimen from an inland and purely local deposit can have found its way to the shore-sand of Penzance is entirely obscure.

At Marazion several specimens of the fresh-water Rhizopod *Difflugia pyriformis* Perty were found, which we have dealt with, sub *Reophax difflugiformis*.

Three forms are recorded as new to Britain, *Cristellaria hauerina* d'Orbigny, *Polymorphina complexa* Sidebottom, and *Discorbina bertheloti* var. *baconica* Hantken; and recorded for the second time as British are *Haplophragmium runianum* H-A. & E., *Discorbina chasteri* var. *bispinosa* H-A. & E., and *Pulvinulina patagonica* var. *scitula* Brady.

Excepting in the case of the latter species, we have not given the usual synonymies or references in this paper, but we have given in every case a reference to easily accessible papers in which the synonymies and references are either historically important, or fairly full and brought up to date, and with a view to concentrat-

* H-A. & E., 1914, F.K.A., pp. 371, et seq.

ing them we have as far as possible referred either to Brady's 'Challenger' Report, in which all important historical references are given down to the year 1884, or to our Kerimba Monograph (Part II., 1915), in which the most useful references since 1884 are given in some fullness.

The material from Station III presents a certain specialized interest from the fact that it was derived from (*a*) the shore-sand and (*b*) the apertural fringes of tubes of the marine worm *Terebella conchilega*; and though the material (*a*) was practically unlimited, whilst the material (*b*) consisted of the fringes of only twelve tubes, (*a*) yielded sixty-nine species, of which no less than sixty-three were found in (*b*). The only suggestion we can make to account for the profusion of Foraminifera on the fringes is that the fringes are extruded above the sand in a more or less viscous condition, and that the gentle rising of the tide in calm weather floats up against them the Foraminifera lying on the surface of the sand before the heavier sands themselves are disturbed. It is a noteworthy fact that the portions of the tubes themselves lying below the surface of the sand are practically devoid of Foraminiferal shells.*

List of Stations and Material Examined.

I. Mounts Bay. Dredging 35 to 40 fms. 4 to 5 miles off Newlyn. June 14, 1914. Bulk of material, unlimited.

II. Penzance. Shore-sand. A series of scrapings made in May 1904. Bulk of material, unlimited.

III. Marazion.

(*a*) Shore-sand. Scrapings made May 1904. Bulk, 1 quart.
(*b*) ,, ,, The fringes of twelve tubes of *Terebella conchilega*. (May 1904.)
(*c*) ,, ,, Several damaged type-slides from the Millett Collection.

IV. Mullyon. Shore-sand. Collected August 1892. Bulk, unlimited.

* Cf. a paper on this subject by Prof. Hennessy, F.R.S., in Proc. Roy. Irish Acad. Sci., i. (1871) p. 153, "On the Flotation of Sand by the Rising Tide in a Tidal Estuary." He points out that "the particles of sand, shell, etc., which had become perfectly dry and sensibly warm under the rays of the sun, were gently uplifted by the calm, steadily rising water, and then floated as easily as chips or straws." (See on this subject also A. T. Watson, on "The Tube-building Habits of *Terebella littoralis*," Journ. R. Micr. Soc., 1890, p. 635, pl. xix.)

V. St. Mawes, Falmouth.

(*a*) Shore-sand from a landing cove immediately to the east of "The Haven." Bulk, 2 quarts.

(*b*) Washings from green algæ and rock scrapings from the rocks under St. Mawes Castle (West). Bulk, 1 quart. Collected August 1913.

VI. Falmouth. Kilgerran Bay, E. of Greeb Point. Shore-sand and washings from green algæ. Bulk, 1 quart. Collected August 1913.

VII. Veryan Bay. Pendower Sands. Shore-sand. Bulk, 1 quart. Collected August 1910 and August 1913.

VIII. Fowey.

(*a*) Par Sands. Shore-sand and washings from green algæ. Bulk, 1 quart. Collected August 1913.

(*b*) A small tube of floatings. Date unknown. Bulk, 1 cc. From the Millett Collection.

IX. Plymouth (S.-W.). Whitsand Bay. Shore-sand. Bulk, 400 cc. Collected by Dr. J. H. Orton (Marine Biol. Lab., Plymouth, Oct. 1914). (Floated Foraminifera, 3 cc.)

X. Mevagissey. Shore-sand. Bulk, 130 cc. (Floated Foraminifera, 1 cc.) Collected in January 1913 by Mr. Howard Dunn. The occurrence of species at this station is indicated by the figure X, but the frequencies are not added, the sample being of insufficient bulk to give reliable indications.

In the following list c. = common, f. = frequent, r. = rare, v.r. = very rare.

(M.) signifies that the species was recorded by Millett in his 1884–5 paper.

(P.) signifies that the species is recorded by Worth in the "Plymouth Invertebrate Fauna."

(R.) signifies that the species was recorded in 1869 by Robertson in the British Association Report, 1869.

An asterisk after these letters (M.*, etc.) signifies that the species was recorded in these author's papers, but has not been found by us.

SYSTEMATIC LIST OF SPECIES.

SUB-KINGDOM **PROTOZOA.**

CLASS RHIZOPODA.

ORDER *FORAMINIFERA.*

Family MILIOLIDÆ.

1. *Nubecularia lucifuga* Defrance, pl. V. figs. 1, 2. (Refs., B. 1884, F.C. p. 134; H-A. & E. 1915, F.K.A. p. 549.) At Station I, extremely well-grown specimens, including a remarkable individual which we figure, in which the final chamber is separated into two distinct tubular outgrowths, bearing the apertures, suggesting Roboz' figures of *Calcituba polymorpha.** Distribution: Station I, r.; Stations II, V, v.r. (M.)
2. *Biloculina depressa* d'Orbigny. (Refs., B, 1884, F.C. p. 145.) I, v.c.; II, III, IV, V, IX, v.r. (M.) (P.)
3. *B. ringens* (Lamarck). (Refs., H-A. & E. 1915, F.K.A. p. 550.) (P.*)
4. *B. elongata* d'Orbigny, pl. V. figs. 3–5. (Refs., B. 1884, F.C. p. 144.) We figure a large specimen from Station I as *B. elongata* owing to its general contour. It might, however, on account of its large aperture, have been equally well recorded as *B. ringens* d'Orb. Worth records *B. ringens* var. *patagonica* Williamson, which is a synonym of *B. elongata* d'Orb. (M.) (P.) (R.)
5. *B. irregularis* d'Orbigny. (Refs., B. 1884, F.C. p. 140.) I, v.r.
6. *B. tubulosa* Costa. (Refs., B. 1884, F.C. p. 147.) (P.*) Worth records this with some reservation, but it is a well-marked form and not uncommon in moderately deep water off the S.-W. of Ireland.
7. *Spiroloculina grata* Terquem. (Refs., B. 1884, F.C. p. 155; H-A. & E. 1915, F.K.A. p. 552.) Single specimens at I, IV, V, VIII.
8. *S. excavata* d'Orbigny. (Refs., B. 1884, F.C. p. 151; H-A. and E. 1915, F.K.A. p. 554.) I, II, III, v.r.; IV, VII, VIII, v.r.; V, f.; X. (P.)
9. *S. dorsata* Reuss. (Refs., H-A. & E. 1915, F.K.A. p. 554.) The specimens are very weak and hardly distinguishable from *S. planulata.* (M., P. and R. as *S. limbata.*) I, v.r.
10. *S. planulata* (Lamarck). (Refs., B. 1884, F.C. p. 148.) I, II, III, VII, VIII, v.r. (M.) (P.) (R.)

10*a*. *S. fragilissima* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 587.) (P.*) A tropical form.

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* Z. v. Roboz, *Calcituba polymorpha*, g. n. et sp. n., Sitzb. Ak. Wiss. Wien., lxxxviii. (1883) p. 420.

11. *Miliolina circularis* (Bornemann.) (Refs., H-A. & E. 1915, F.K.A. p. 557.) Universally distributed. At many stations the specimens were very thin-shelled and translucent. Chitinous tests at Stations III and V. (P.)

12. *M. circularis* var. *sublineata* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 558.) I, v.r.

13. *M. labiosa* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 559.) I, v.r.

14. *M. subrotunda* (Montagu), pl. V. figs. 6–8. (Refs., B 1884, F.C. p. 168; H-A. & E. 1915, F.K.A. p. 559.) Universally distributed. At many of the stations very thin and translucent specimens. At Station III, where the species was well represented, there were a few individuals of a hauerine type, which we figure. (M.) (P.) (R.)

15. *M. seminuda* (Reuss). (Refs., H-A. & E. 1915, F.K.A. p. 560.) Generally distributed. Best at V, and most frequent at IX.

16. *M. sub-orbiculuris* (d'Orbigny). (Refs., H.-A. & E. 1898, etc., S.B. 1911, p. 304.) VI, v.r.

17. *M. trigonula* (Lamarck). (Refs., B. 1884, F.C. p. 164.) As a rule very small specimens. II, III, V, VII, IX, v.r. (M.) (P.)

18. *M. tricarinata* (d'Orbigny). (Refs., B. 1884, F.C. p. 165; H-A. & E. 1915, F.K.A. p. 562.) I, III, v.r.; V, r. (M.) (P.)

19. *M. bosciana* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 566.) Generally distributed.

20. *M. oblonga* (Montagu). (Refs., B. 1884, F.C. p. 160; H-A. & E. 1915, F.K.A. p. 566.) Universally distributed. At Stations I, II, V and VII, Williamson's stoppered or operculate variety (W. 1858, R.F.G.B. p. 86, pl. vii. figs. 186, 187) occurs in company with the normal milioline type of Montagu. At the remaining stations the normal type only was found. (M.) (P.) (R.)

21. *M. pygmæa* (Reuss). (Refs., H-A. & E. 1915, F.K.A. p. 567.) V, f. (M. as *M. tenuis* (Czjzek), and M. 1906 as *Sigmoilina tenuis*.)

22. *M. rotunda* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 568.) A single typical specimen at Station II.

23. *M. seminulum* (d'Orbigny). (Refs., B. 1884, F.C. p. 157.) Universally distributed. An unusual form of distortion was observed at Station IV, the last two chambers being formed with their axes at right angles to that of the earlier chambers, thus projecting from the middle portion of the shell and presenting the aperture of the antepenultimate chamber in the middle of the test. (M.) (P.) (R.)

24. *M. candeiana* (d'Orbigny). (Refs., H-A. & E. 1913, C.I. p. 29, and 1916, F.W.S. p. 212, pl. xxxix, figs. 19–27.) This very obscure species is found in great numbers at Station I, and presents a greater range of variation than we have observed elsewhere. In the early stages it is often distinctly spiroloculine in the arrangement of its chambers, the milioline form not being assumed until the specimens have attained a considerable size (five to six chambers). Its affinities still remain very uncertain, and, as we have observed elsewhere, the type specimens on which the species was originally recorded as British are nowhere to be found. I, v.c.; II, f.; IV, V, VI, IX, v.r. (M.)

25. *M. auberiana* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 571.) Universally distributed.

26. *M. fusca* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 576.) Frequent and finely developed at V, single specimens only at III and VI. (And on Millett's slides III*c*.)
27. *M. contorta* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 576.) Generally distributed, and presenting every variation from very rounded to acutely angular forms.
28. *M. sclerotica* (Karrer). (Refs., H-A. & E. 1915, F.K.A. p. 577.) Generally distributed, and the same remarks as in the previous species apply as to variation. As to the difficulty of separating these two species, see our Clare Island Monograph (H-A. & E. 1913, C.I. p. 30). (M.)
29. *M. stelligera* (Schlumberger). (Refs., H-A. & E. 1913, C.I. p. 31.) I, II, III, IV, VIII, and IX, v.r.
30. *M. ferussacii* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 578.) Common at Station I, where it presents a great range of variation and attains a large size. The largest specimens are so flattened as to be almost spiroloculine. II, III, VII, VIII, IX, v.r.
31. *M. agglutinans* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 575.) (P. ✱)
32. *M. lævigata* (d'Orbigny). (Refs., H-A. & E. 1916, F.W.S. p. 214.) A good range from adelosine to mature individuals. Frequent at V*b*, I, II, VII, VIII, IX, r.; X.
33. *M. bicornis* (Walker & Jacob). (Refs., B. 1884, F.C. p. 171; H-A. & E. 1915, F.K.A. p. 580.) Very poorly represented, the specimens being but feebly striate. I, r.; II, III, v.r.; V, f. Adelosine stages at III and V. (P.)
34. *M. pulchella* (*bicornis*) var. *elegans* Williamson (W. 1858, R.F.G.B. p. 88, pl. viii, fig. 195.) This appears to be merely a regular and delicately striate variety of *M. bicornis*. (P. ✱)
35. *M. boueana* (d'Orbigny). (Refs., B. 1884, F.C. p. 173.) (P. ✱) Another and more compact form of *M. bicornis*.
36. *M. brongniartii* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 580.) Large and typical at several stations, especially at Station IV, and on the whole much more representative than its ally, *M. bicornis*. Universally distributed. (M.)
37. *M. pulchella* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 578.) (M. ✱) Very rarely found in shore-sands, and as a British form very rare even in dredgings.
38. *Massilina secans* (d'Orbigny). (Refs., B. 1884, F.C. p. 167; and H-A. & E. 1915, F.K.A. p. 582.) Universally distributed. (P.) (M.)
39. *M. secans* var. *tenuistriata* Earland. (Refs., H-A. & E. 1915, F.K.A. p. 582.) II, III, V, VII, v.r.
40. *M. secans* var. *denticulata* Costa. (Refs., H-A. & E. 1908, etc.; S.B. 1910, p. 694.) Single typical specimens at II and V.
41. *Opthalmidium carinatum* (Balkwill & Wright). (Refs., H-A. & E. 1913, C.I. p. 34.) I, f.; II, v.r.
42. *Planispirina cliarensis* Heron-Allen and Earland. (H-A. & E., C.I. p. 35, pl. ii, figs. 7, 8.) A single individual at Station V of this species, which we recorded for the first time, from Clare Island.
43. *Cornuspira foliacea* (Philippi). (Refs., B. 1884, F.C. p 199; H-A. & E. 1915, F.K.A. p. 592.) Occurs of a large size at Station I both of the original type of Philippi and in Williamson's evolute form. (W. 1858, R.F.G.B. p. 91, pl. vii, figs. 199, 200.) A single specimen at Station VIII. (M.) (P.) (R.)

44. *C. selseyensis* Heron-Allen & Earland. (Refs., H-A. & E. 1915, F.K.A. p. 592.) I, f.; II, IX, r.; III, c.; IV*b*, VIII*b*, v.r.

45. *C. involvens* (Reuss). (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 318; and 1915, F.K.A. p. 593.) Generally distributed, but never common. (M.) (P.)

Family ASTRORHIZIDÆ.

46. *Iridia diaphana* Heron-Allen & Earland. (H-A. & E. 1914, F.K.A. p. 371; and 1915, p. 608.) Occurs at Station I, young individuals only in the hemispherical attached condition, and at Station V fully grown forms were found.

Iridia diaphana H-A. & E.

The synonomy of this species, which is apparently of world-wide distribution, and represents one of the simplest and most primitive forms of Arenaceous Foraminifera, is rapidly growing, and, under the International Rules of Zoological Nomenclature,* becomes with each newly-discovered record more complicated. Owing to the wide variability of the test, and the differing degrees of importance assigned by earlier authors to certain features in the construction of the shell,† it appears, in one or other of its life-stages, to have been described under more than one name.

We have already dealt with the matter at some length elsewhere,‡ in connexion with an abnormal form growing between sand-grains, and described by Rhumbler in 1905 as *Vanhoefenella gaussi*,§ and which we figured in our Kerimba Monograph; ‖ but as regards the British specimens, the present appears to be a favourable opportunity for reviewing the situation.

In order to deal with the matter fully, we must go back to 1854, when Schultze instituted the genus *Squamulina*,¶ which is thus described :—" Shell resembling a flat plano-convex lens with the plane side firmly attached, calcareous, enclosing a simple undivided space. A large aperture on the convex side; no fine perforations." He includes the genus, with the genera *Gromia* and

* See Report of the IX^{e} Congrès International de Zoologie, Monaco, Mars, 1913.

† For the tests of this organism one is tempted to make use of the German equivalent " house " (*Gehäuse*).

‡ H-A. & E. 1915, F.K.A. pt. 2, p. 608.

§ H-A. & E., in Proc. Zool. Soc. (Lond.) 1915, p. 296. Rhumbler's original description was published in Verh. d. Deutsch. Zool. Ges. 1905, p. 105, fig. 9, and he gives a further description and figures in his " Foraminiferen des Plankton Expedition der Humboldt Stiftung," iii. L.C., Kiel and Leipzig, pt. 1, 1909, p. 216, text-fig. 57.

‖ H-A. & E., 1914, F.K.A. pl. xxxvi. fig. 10.

¶ S. 1854, O.P. p. 56, pl. vi. figs. 16, 17.

Lagynis, in a family, Lagynidæ. *Squamulina lævis*, the type, is thus described :—"Shell irregularly circular, very flat, the convex half thick, exteriorly smooth; the plane side very thin, and with difficulty separable from the foreign bodies to which it is firmly attached. The yellowish animal protrudes numerous pseudopodia (*Fortsätze*) from a large eccentrically placed aperture. Greatest diameter 0·26 mm." Bütschli in 1889 * places the genus with *Nubecularia*, following Carpenter, who placed it with the Miliolidæ.†

Carter in 1870,‡ disregarding the *calcareous* definition of *Squamulina*, placed two new species in the genus, *S. scopula*—which is only a synonym for *Haliphysema tumanowiczii* Bowerbank—and *S. varians*, which is described as "white, more or less circular, plano-convex, raised or depressed, . . . presenting all kinds of forms." Carter's figures are very diagrammatic and not of much use for identification purposes, but his species *S. varians* appears to be a composite of two distinct forms, which he describes as the "elevated convex form" and the "amœboid form." There is no evident connexion between the two, and the magnifications attached to his figures are opposed to any such connexion. The "amœboid form" is unquestionably the same organism as that subsequently recorded and described by us, doubtfully, from Bognor and Selsey Bill as *Thurammina papillata* Brady (?) §. and later assigned by us to the new genus *Iridia* H-A. & E.‖

The "elevated convex form," although suggestive of the hemispherical early stage of *Iridia* recorded and figured, also doubtfully, by us from Selsey Bill as *Webbina hemispharica* J. P. & B.,¶ differs in many material points :—(1) its far greater convexity: it is more than a hemisphere; (2) its extraordinarily symmetrical and prominent aperture, which is funnel-shaped, and described as widening outwards, sometimes crescentic and lateral, at others produced in a circular form on a short neck; (3) its rough spicular exterior; (4) its basal flange of attachment, to which Carter appears to attach considerable importance; (5) its very thick shell-wall; and (6) its large size as compared with the young stage of *I. diaphana*.

Brady, in his "Synopsis,"** includes Carter's species under *Placopsilina* as *P. varians* (Carter), and as a synonym includes *P. kingsleyi* Siddall.†† He says: "I am not prepared to say what

* O. Butschli, in Bronn's "Klassen und Ordnungen des Thierreichs," edn. 1889, i. p. 188.

† C. P. & J. 1862, I.F. p. 67, pl. i. fig. 22 (after Schultze).

‡ C. 1870, S. pp. 310 and 321, pl. v. figs. 1–5.

§ E. 1905, F.B.S. p. 201, pl. xi. figs. 6, 7; pl. xiv. figs. 1–3; and H-A. & E. 1908, etc., S.B. 1909, p. 323.

‖ H-A. & E. 1914, F.K.A. pt. 1, p. 371, pl. xxxvi.

¶ H-A. & E. 1908, etc.; S.B. 1909, p. 325, pl. xv. fig. 14.

** B. 1887, S.B.R.F. p. 890.

†† S. 1886, F.L.M.B.C. p. 54, pl. i. fig. 1.

is the precise position and relationship of this organism, but I believe Mr. Siddall's specimens to belong to the species described many years ago by Mr. Carter under the name *Squamulina varians* and treated by him as a near ally of *Haliphysema tumanowiczii*, with which it is often found associated." * The Siddall Collection is now in our possession, but the type of *P. kingsleyi* is missing. Siddall's only description of the type is "a double-chambered form which seems intermediate between *P. bulla* Brady and *P. cenomana* d'Orbigny." The figure is extremely poor, but suggests the latter species. The type of Siddall's other record "*Placopsilina* spp. d'Orb.," dredged by Mr. A. O. Walker off Hilbre Island, is in the collection and is obviously an attached Gromia.

In any case, Brady's allocation of Carter's *S. varians* to *Placopsilina* will not hold, the generic differences being too great. Millett records *Placopsilina varians* (Carter) in a MS. list of "Recent Foraminifera of Marazion, Mounts Bay, supplied to Prof. Jas. Clark, 4th March, 1906." This specimen is not, of course, in the Millett Collection now in our possession, but another mount labelled "*P. varians*, Broadsand, Torbay," is in the collection, which is *Iridia diaphana* of the same form as the Bognor and Selsey specimens. There is also a slide labelled "*P. bulla* ? *Webbina hemisphærica*" (no locality) which is clearly the young, depressed, hemispherical, early stage of our species.

Carter's allocation of his species to Schultze's genus cannot stand, owing to the admitted differences in the nature of the test. The specimens cannot be placed with *Placopsilina*, having nothing in common with that genus except the rough exterior of the test, and, moreover, possessing certain generic features such as the chitinous lining and basal membrane of attachment which are not found in *Placopsilina*.

Carter's specimens must therefore be assigned to our genus *Iridia*, which is based on these special features. The "elevated convex form," which appears to be quite distinctive, must retain Carter's specific name and be known as *I. varians* (Carter), and his "amœboid form," which is identical with our type species, must become *I. diaphana*.†

Since the above was written our views have been confirmed by the finding of numerous specimens, identical in size, construction and appearance with Carter's *I. varians*, growing on the roots of *Laminaria* at l'Etacq in the N.W. of Jersey in company with both species of *Haliphysema*.

* This is undoubtedly the case. A slide in the Millett Collection now in our possession contains an algal fragment covered with specimens of *H. tumanowiczii* and its basal plates, and also undoubted specimens of the organism under consideration.

† H-A. & E. 1914, F.K.A. pl. xxxvi. figs. 6–12.

47. *Hyperammina vagans* Brady. (Refs, H. A. & E. 1915, F.K.A. p. 610.) A single specimen at VIII*a*.

48. *Haliphysema ramulosa* Bowerbank. (Refs., B. 1884, F.C. p. 283) (M. 1906.)

49. *H. tumanowiczii.* (Refs., B 1884, F.C. 281.) Both of these species were found upon Laminarian roots from Marazion (Station III) in the Millett Collection. We were not able to collect any suitable material for such sessile forms, and did not observe any detached fragments, but there is no doubt that they are to be found all along the south Cornish coast in suitable localities. (M.) (P.)

Family LITUOLIDÆ.

50. *Reophax difflugiformis* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 612.) Typical specimens from Station I. On the slides from Marazion (Station III*c*) in the Millett Collection are several specimens which appear from the large and broad aperture to be *Difflugia pyriformis* Perty* rather than *R. difflugiformis.* If so, they are no doubt fresh-water specimens washed down by land water. (M.)

51. *R. scorpiurus* Montfort. (Refs., B. 1884, F.C. p. 291.) (M. ✱) Very rare in shore-sands.

52. *R. findens* (?) (Parker). (Refs., H-A. & E. 1913, C.I. p. 44.) (M. ✱) It is more than likely that this record, to which Millett appends a note of interrogation, was *R. moniliforme* Siddall (S. 1886, F.L.M.B.C. p. 54, pl. i. fig. 2). This latter species was included under *R. findens* in Siddall's River Dee paper (Proc. Chester Nat. Sci. Pt. 2, 1878, p. 42), and *R. moniliforme* was not separated by him until 1886. Millett's Marazion specimen is unfortunately lost.

53. *R. scottii* Chaster. (Refs., H-A. & E. 1913, C.I. p. 44.) The specimens (from Station I) are small compared with the Scottish types and more strongly constructed, fine sand being used in addition to the usual mica flakes, but in the number and shape of the chambers the specimens are quite typical.

54. *Haplophragmium runianum* Heron-Allen & Earland. (H-A. & E. 1916, F.W.S. p. 224, pl. xl, figs. 15–18.) A few typical specimens from Station V of this form recently described by us from the West of Scotland.

55. *H. fontinense* Terquem. (Refs., H-A. & E. 1908, etc.; S.B. 1910, p. 405.) (P. ✱)

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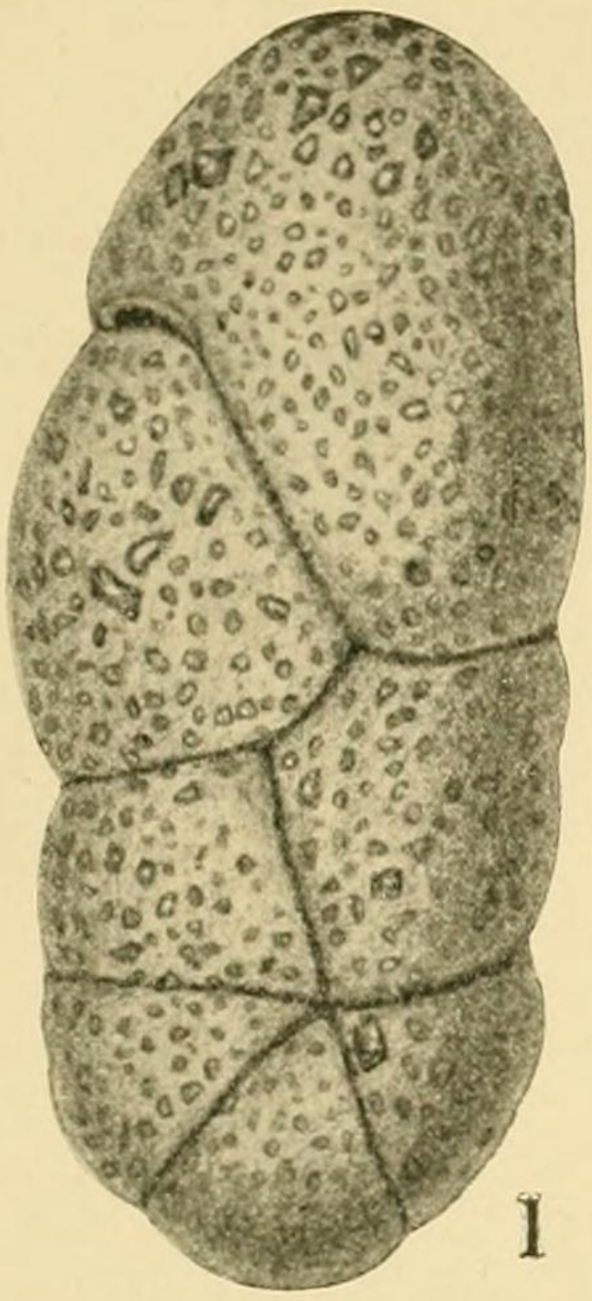
* Cf. J. Leidy, Fresh-water Rhizopods of North America. Washington, 1879, p. 98, pl. x.

EXPLANATION OF PLATE VI.

FIGS.
1–3. —*Haplophragmium canariense* var. *variabilis* nov. Figs. 1, 2, side views Fig. 3, edge view. × 110.
4–6. —*Trochammina squamata* (Jones & Parker). Double specimens. Figs. 4, 5, side views. Fig. 6, edge view. × 150.
7–10.—*Spiroplecta wrightii* Silvestri. Figs. 7–9, side views. Fig. 10, edge view × 65.



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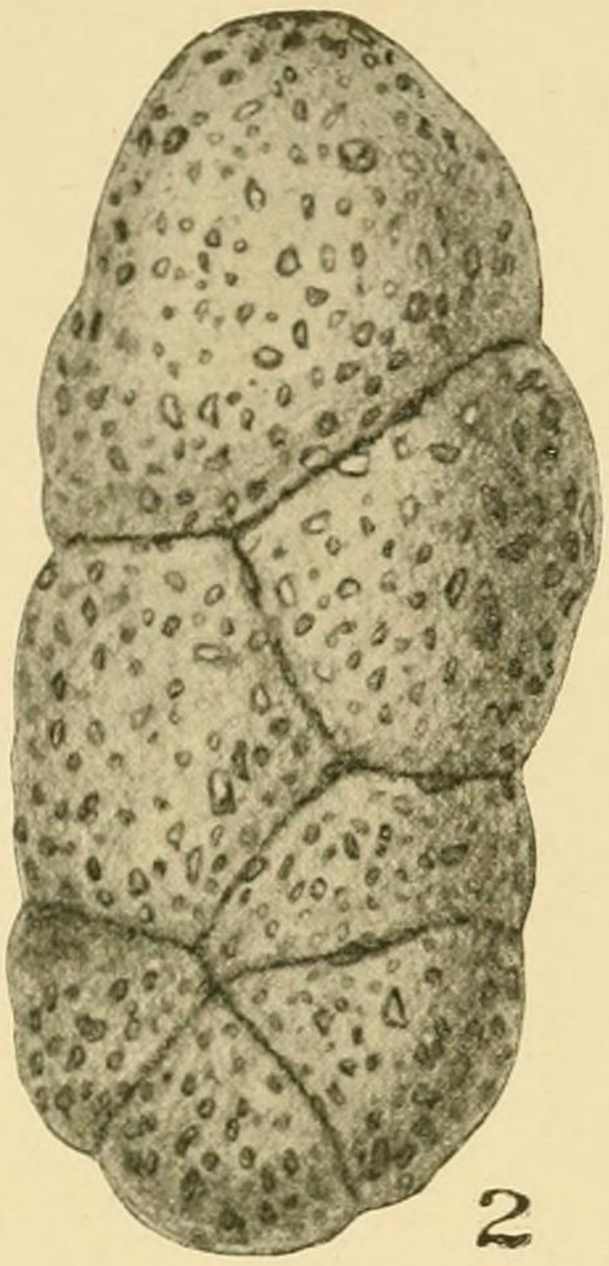

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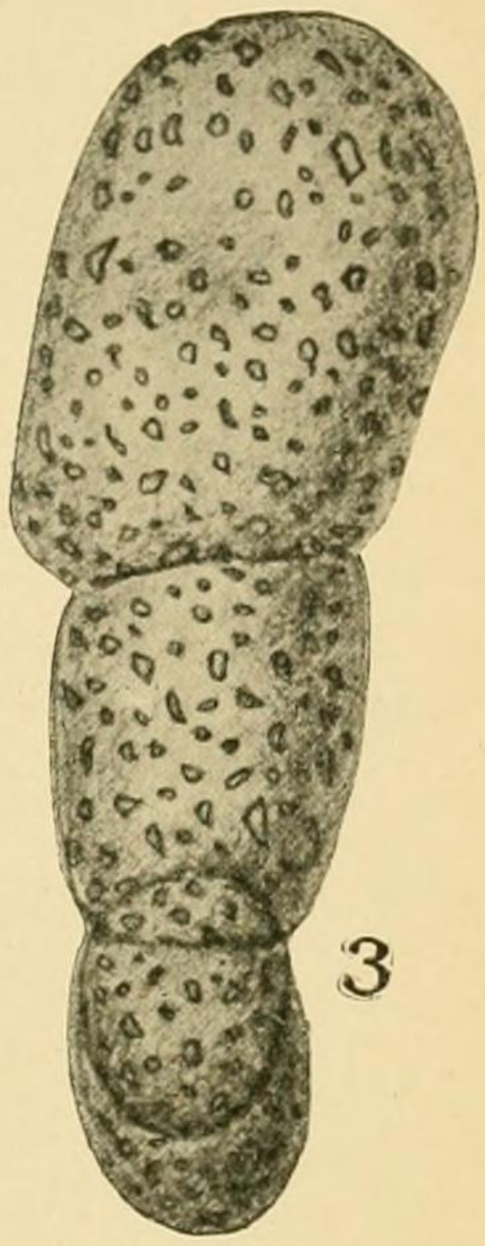

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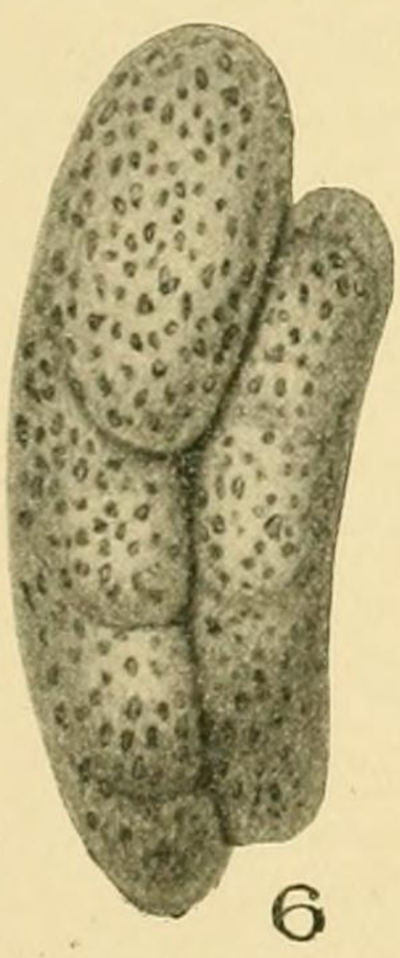

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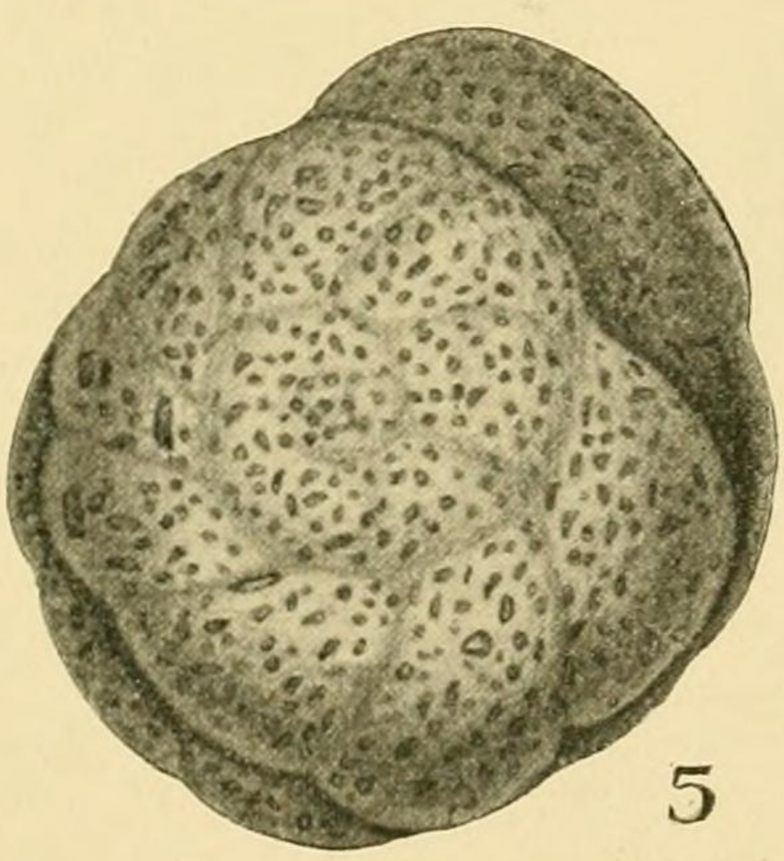

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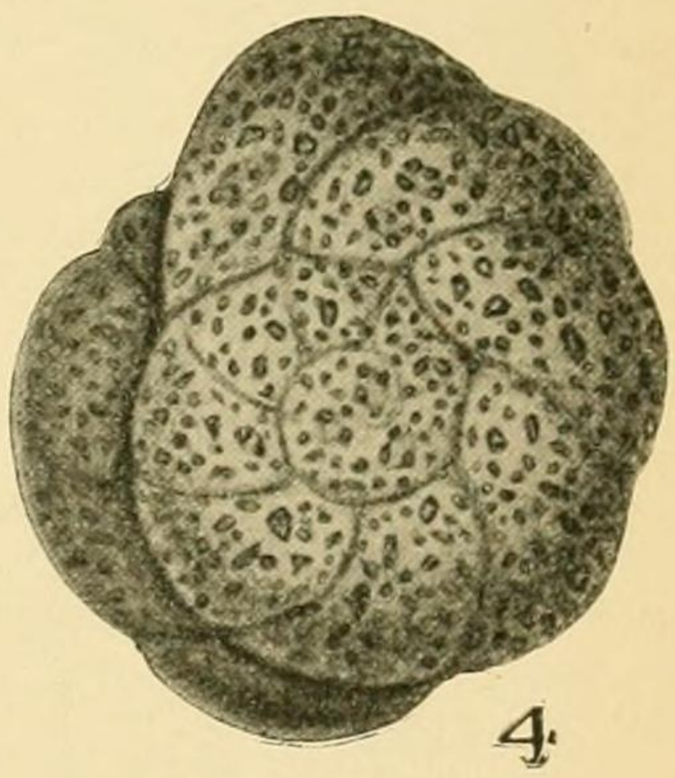

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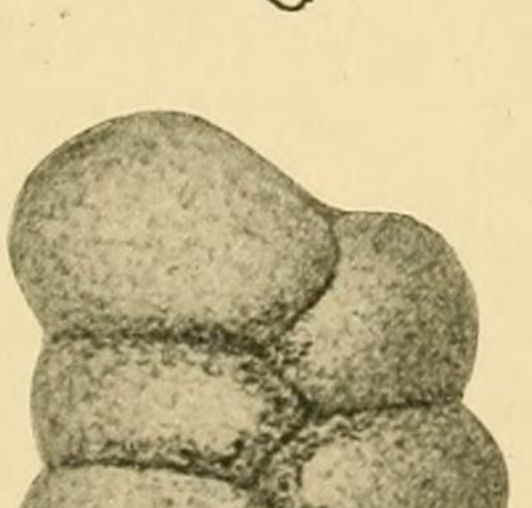
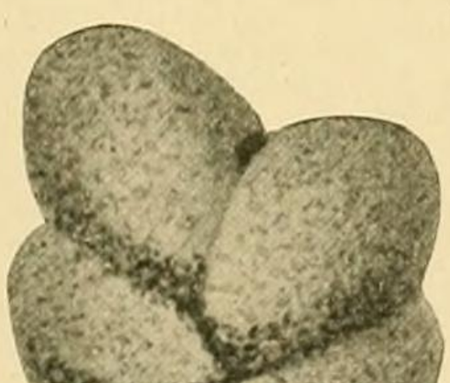
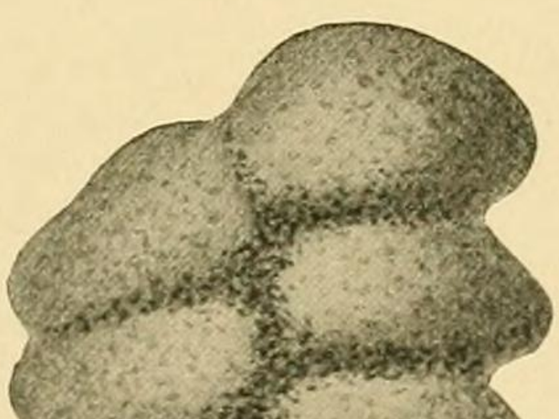
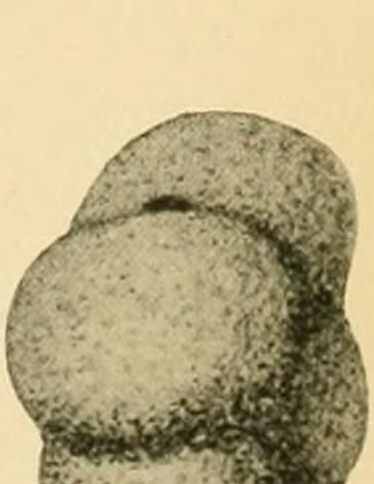








7 8 9 10

FORAMINIFERA OF SOUTH CORNWALL.

[*Face p.* 40.

56. *H. canariense* (d'Orbigny). (Refs., B. 1884, F.C. p. 310; and H-A. & E. 1915, F.K.A. p. 614.) Universally distributed and exhibiting all the typical variations of the species. (R.) (P) (M.)

57. *H. canariense* var. *variabilis* nov. (Plate VI, figs. 1–3.) At Station I. abnormal individuals in which the original evolute spiral is followed by a succession of three or more chambers arranged on a textularian plan similar to some individuals of *Truncatulina variabilis* d'Orbigny, such as have been figured by Brady (B 1884, F.C. pl. xciii. fig. 7), and Sidebottom (S. 1904, etc., R.F.D. 1909, p. 3, pl. ii, figs. 1–3). The occurrence of this dimorphous form in *Haplophragmium* and *Truncatulina* is additional proof, if such be required, of the artificial nature of the distinctions between the perforate and arenaceous Foraminifera. We have recorded this variety, but without naming it, from the West of Scotland. (H-A. & E. 1916, F.W.S. p. 223.)

58. *H. globigeriniforme* (Parker & Jones.) (Refs., H-A. & E. 1915, F.K.A. p. 614.) I, r.; II, IV, VI, v.r. (M.) (P.)

58A. *Placopsilina varians* (Carter). See note to No. 46, *Iridia diaphana* H-A. & E.

59. *Ammodiscus incertus* (d'Orbigny). (Refs., B. 1884, F.C. p. 330.) I, III, v.r. (P.)

60. *A. gordialis* (Jones & Parker). (Refs., H-A. & E. 1915, F.K.A. p. 618.) I, III, IV, V, VII, VIII*a*, v.r. (M.) (P.)

61. *Trochammina squamata*. (Plate VI, figs. 4–6.) (Jones & Parker.) (Refs., H-A. & E. 1915, F.K.A. p. 619.) I, f.; II, V, IX, v.r.; X. At Station I, where the species was frequent, double or "budding" specimens, some of which we figure, were found, a phenomenon with which we have dealt elsewhere (H-A. 1915, R.P.F. pp. 246–7). (M.)

62. *T. ochracea* (Williamson). (Refs., H-A. & E. 1915, F.K.A. p. 619.) I, IV, V*a*, VIII*a*, IX, v.r. (M.) (P.)

63. *T. plicata* (Terquem). (Refs. H-A. & E. 1915, F.K.A. p. 619.) I, r.; II, v.r. (M.)

64. *T. inflata* (Montagu). (Refs., B. 1884, F.C. p. 338; H-A. & E. 1915, F.K.A. p. 620.) III, v.r.; V, f.; X. (M.) (P.) (R.)

65. *T. inflata* var. *macrescens* Brady. (Refs., H-A. & E. 1913, C.I. p. 52.) Single individuals at Stations V*b* and IX.

66. *T. rotaliformis* Wright. (Refs., H-A. & E. 1915, F.K.A. p. 620.) I, f.; II, III, V, v.r.

Family TEXTULARIIDÆ.

67. *Textularia sagittula* Defrance. (Refs., B. 1884, F.C. p. 361, pars.; H-A. & E. 1915, F.K.A. p. 625.) Extremely rare compared with the abundance of its isomorph, *Spiroplecta wrightii*, q.v. I, IV, VII, v.r. (R.) (P.) (M.)

68. *T. agglutinans* d'Orbigny. (Refs., B. 1884, F.C. p. 363; H-A. & E. 1915, F.K.A. p. 626.) I, r. (P.)

69. *T. agglutinans* var. *porrecta* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 627.) (P.*)

70. *T. candeiana* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 627.) I, r.

71. *T. gramen* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 627.) Generally distributed. Nearly all the specimens show characteristics intermediate between *T. gramen* and *T. conica*. (M.) (P.)

72. *T. conica* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 629.) Universally distributed.

73. *T. trochus* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 630.) The specimens are large and quite typical. I, r.; IV, f. (P.)

74. *Verneuilina polystropha* (Reuss). (Refs., B. 1884, F.C. p. 386.) Curiously rare in these gatherings. I, II, VIII *b*, IX, v.r.; V, f.; X. (M.) (P.)

75. *Spiroplecta wrightii* Silvestri. Plate VI. figs. 7–10. (Refs H-A. & E. 1915, F.K.A. p 634.) Extraordinarily abundant at Station I, and subject to remarkable variations, one of the most notable, which we figure, being the transition in the latter half of the shell to inflated chambers presenting a lobulate marginal edge. The marginal edge is, however, rounded, and in this respect differs from specimens of *S. wrightii* which we possess in the Millett Collection from the Gulf of Oman, in which the marginal edge of such chambers is produced to a sharp point, suggesting the *Textularia mariæ* of d'Orbigny (d'O. 1846, F.F.V. p. 246, pl. xiv. figs. 29–31), which, however, is described as having a punctate shell. I, v.c.; II, f.; IV, VII, v.r.

76. *Gaudryina filiformis* Berthelin. (Refs. H-A. & E. 1915, F.K.A. p. 634.) I, V, IX, v.r.

77. *G. rudis* Wright. (Refs., H-A. & E. 1916, F.W.S. p. 232.) I, f.; IV, v.r. (M.)

78. *Valvulina fusca* (Williamson). (Refs., B. 1884, F.C. p. 392.) Specimens both free and attached at Station I.

79. *Clavulina obscura* Chaster. (Refs., H-A. & E. 1913, C.I. p. 59.) I, c.; IV, IX, v.r.

80. *Bulimina pupoides* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 637.) Generally distributed. (R.) (P.) (M).

81. *B. elongata* d'Orbigny. (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 333.) I, VII, v.r. At Station VII a specimen was found, apparently a derived Eocene fossil.

82. *B. elegans* d'Orbigny. Plate VII. fig. 1. (Refs., H-A. & E. 1915, F.K.A. p. 638.) Generally distributed. At Station VIII an abnormal specimen was found, which we figure, in which a second individual had budded at mid-growth from another, the budded individual being developed on very much more robust lines than the original or parent shell. (P.)

83. *B. elegans* var. *exilis* Brady. (Refs., H-A. & E. 1916, F.W.S. p. 234.) (P. ✱)

84. *B. marginata* d'Orbigny. (Refs, H-A. & E. 1908, etc.; S.B. 1911, p. 312.) I, II, IV, VIII, IX, v.r. (M.) (P.)

85. *B. aculeata* d'Orbigny. (Refs., B. 1884, F.C. p. 406.) (M.✱) This is a doubtful record for a shore-sand, and was probably *B. marginata* with a terminal spine, which is not uncommon in these gatherings. (P.✱) This is more likely to be a reliable record, as Worth's specimens were dredged from moderately deep water.

86. *B. fusiformis* Williamson. (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 312.) Remarkably fine and well-developed specimens. I, IV, f.; VIII, v.r.

87. *B. ovata* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 638.) I, IV, v.r. (M.) (R.)

88. *B. elegantissima* d'Orbigny. (Refs., B. 1884, F.C. p. 402; H-A. & E. 1915, F.K.A. p. 639.) I, VIII*b*, v.r. At Station IV paired or "budded" individuals were found. (Cf. H-A. 1915, R.P.F. p. 248, pl. xv. fig. 28*a–f*.) (M.) (P.)

89. *B. minutissima* Wright. (Refs., H-A. & E. 1913, C.I. p. 62.) I, II, v.r.

90. *B. subteres* Brady. (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 314.) I, v.r.

91. *B. squammigera* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 642.) I, v.r.

92. *B. convoluta* Williamson. (Refs., H-A. & E. 1915, F.K.A. p. 641.) A few typical specimens of the very elongate type at Station I.

93. *Virgulina schreibersiana* Czjzek. (Refs., H-A. & E. 1915, F.K.A. p. 642.) I, II, v.r. (M.) (P.)

94. *Bolivina punctata* d'Orbigny. (Refs., B. 1884, F.C. p. 417.) Universally distributed. (M.) (R.) (P.)

95. *B. nobilis* Hantken. (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 335.) II, v.r.

96. *B. textilarioides* Reuss. (Refs., H-A. & E. 1915, F.K.A. p. 645.) I, III, V*b*, VIII*b*, v.r. (P.)

97. *B. lævigata* (Williamson). (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 335.) I, II, III, IX, v.r. The best specimens at Station IX. (M.)

98. *B. dilatata* Reuss. (Refs., H-A. & E. 1915, F.K.A. p. 645.) I, II, f.; III, IV, IX, v.r. (P.) In Millett's list he records *Textularia pygmæa* d'Orbigny (Modèle No. 7), which is obviously a *Bolivina*; and Millett, in Parker, Jones, and Brady's "Monograph of the Foraminifera of the Crag" (Pal. Soc. 1866–97), identifies it as *B. dilatata*, which does not appear in his Mount's Bay list.

99. *B. ænariensis* (Costa). (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 334.) Single specimens from Station IX and from the worm tubes at Station III*b*. (P.)

100. *B. difformis* (Williamson). (Refs., H-A. & E. 1915, F.K.A. p. 645.) I, II, r. (M sub. *Textularia*.) (P.)

101. *B. tortuosa* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 645.) I, v.r.

102. *B. variabilis* (Williamson). (Refs., H-A. & E., 1915, F.K.A. p. 647.) Generally distributed.

103. *B. plicata* d'Orbigny. (Refs., H.A. & E. 1908. etc.; S.B. 1909, p. 335.) Generally distributed. (M.)

104 *B. inflata* Heron-Allen & Earland. (Refs., H-A. & E. 1915, F.K.A. p. 648) I, II, IV, V*b*, VI, VIII, v.r

This specific name illustrates very well some of the difficulties with which the Rules of Nomenclature are intended to deal. Since we described the species in our Clare Island Monograph (H-A. & E. 1913, C.I.) we have discovered that Andreæ in 1884 used the same trivial name for a form which he called *Textularia inflata*. Since Andreæ's specimen was undoubtedly a *Bolivina*, it might have been called *B. inflata*, but it is, as a matter of fact, identical with the previously described *B. punctata*, of which the name would therefore become a synonym. This, however, cannot prejudice our subsequent use of the name *B. inflata*, since Andreæ's name was from the first a homonym of *Textularia inflata* Ehrenberg, 1854. Consequently there would never have been any such collocation as *B. inflata* (Andreæ), and therefore there is nothing of which *B. inflata* H-A. & E. can be a homonym.

105. *Cassidulina lævigata* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 652.) (M.✱)

106. *C. crassa* d'Orbigny. (Refs., B. 1884, F.C. p. 429.) I, c.; II, f.; IV, Vb, IX, v.r. (M.) (P.) Millett records *C. oblonga* Reuss; this is virtually *C. crassa*, from which it differs very little, if at all.

107. *C. subglobosa* Brady. (Refs., H-A. & E. 1913, C.I. p. 70.) I, c.; III, f.; Vb, IX, v.r.

108. *C. bradyi* Norman. (Refs., H-A. & E. 1915, F.K.A. p. 653.) (P.✱)

109. *C. nitidula* (Chaster). (Refs., H-A. & E. 1915, F.K.A. p. 653.) Common at Station I, the specimens being large and finely typical.

Family LAGENIDÆ.

110. *Lagena globosa* (Montagu). (Refs., B. 1884, F.C. p. 452; H-A. & E. 1915, F.K.A. p. 654.) Very abundant, universally distributed, and the specimens often attaining a very large size. There is always some uncertainty whether these abnormally large specimens are true *Lagenæ*, or primordial chambers of *Polymorphinæ*. As they are often more or less compressed, or irregular in shape, it seems probable that they are not *Lagenæ*. Individuals of true *L. globosa* with double apertures were recorded at Stations I and VIII*a*, and feebly sulcate specimens at Stations I and V. (M.) (P.) (R.)

111. *L. hispida* Reuss. (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 319.) (P.✱)

112. *L. aspera* Reuss. (Refs., H-A. & E. 1915, F.K.A. p. 655.) Two quite typical specimens from Station I. (M.) (P.)

113. *L. lineata* (Williamson). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 320; and 1915, F.K.A. p. 656.) I, c.; II, IV, VIII, IX, v.r. Subject to extraordinary variations at Station I, where it was abundant. At this station, elongate, curved, and pedunculate forms occurred, and also an individual with two separate terminal portions. The specimens also present an extraordinary range in their surface markings, from practically a smooth surface to coarse striæ, whilst always preserving the general characteristics of the species. (P.) (M. as *L. caudata* Parker & Jones.) (M. 1906 = *L. lineata* (Williamson).)

114. *L. hexagona* (Williamson). (Refs., B. 1884, F.C. p. 472.) Generally distributed. (M.) (P.)

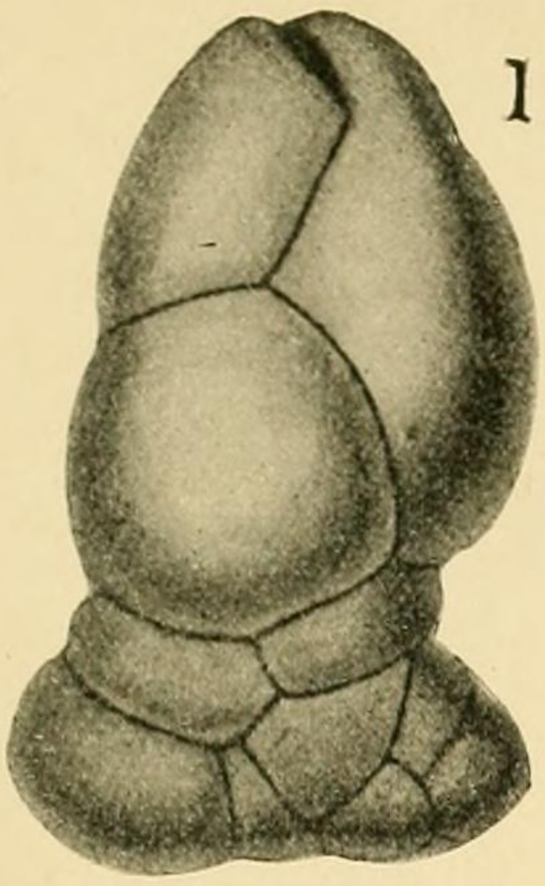
115. *L. reticulata* (Macgillivray). (Refs., H-A. & E. 1915, F.K.A. p. 656.) I, IX, v.r.; II, f. (M. 1906.)

116. *L. squamosa* (Montagu). (Refs., B. 1884, F.C. p. 471.) Generally distributed. (M.) (P.)

EXPLANATION OF PLATE VII.

FIGS.

1. —*Bulimina elegans* d'Orbigny. Double shell. × 110.
2–3. —*Lagena bicarinata* Terquem. Fig. 2, side view. Fig. 3, edge view. × 150.
4. —*Lingulina pellucida* Sidebottom, Side view. × 150.
5–10. —*Cristellaria crepidula* (Fichtel & Moll). Side views. × 75.



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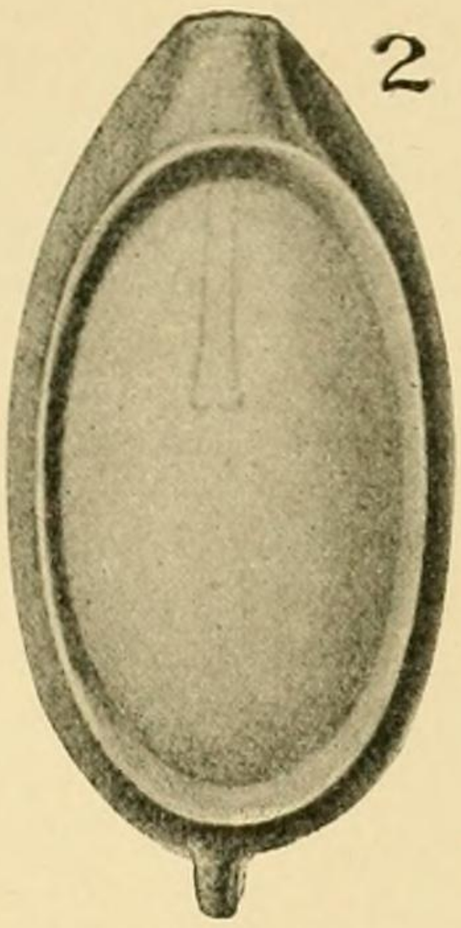

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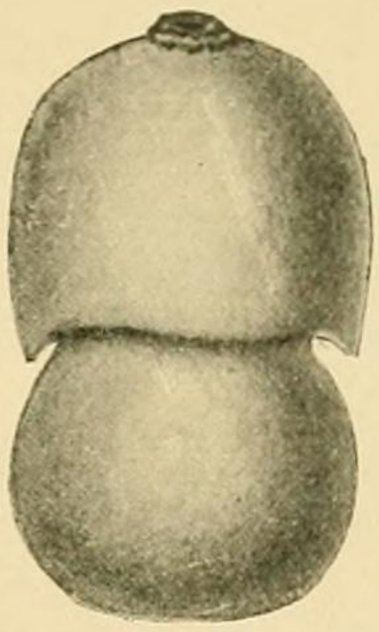

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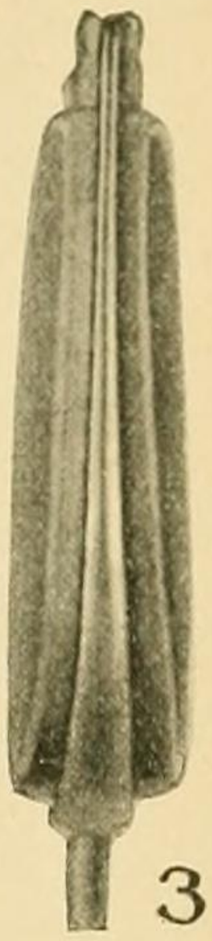

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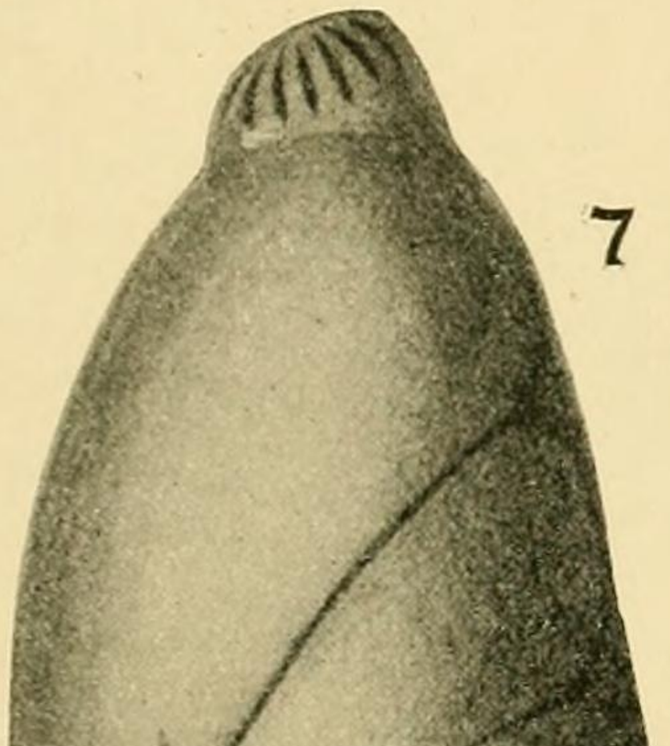

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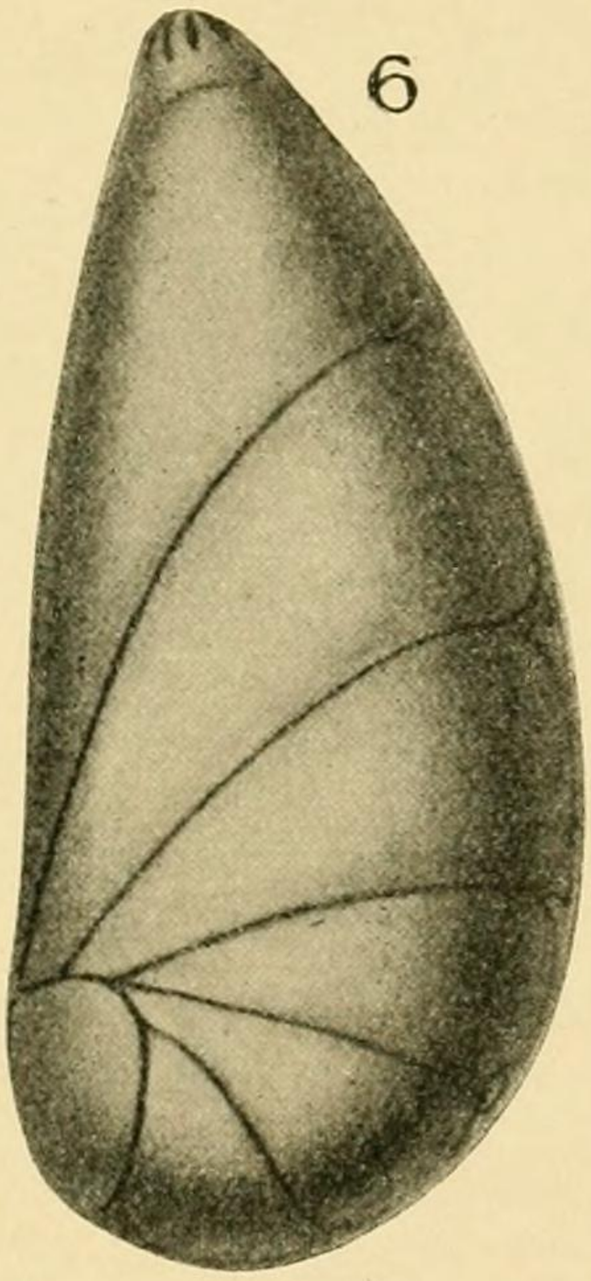

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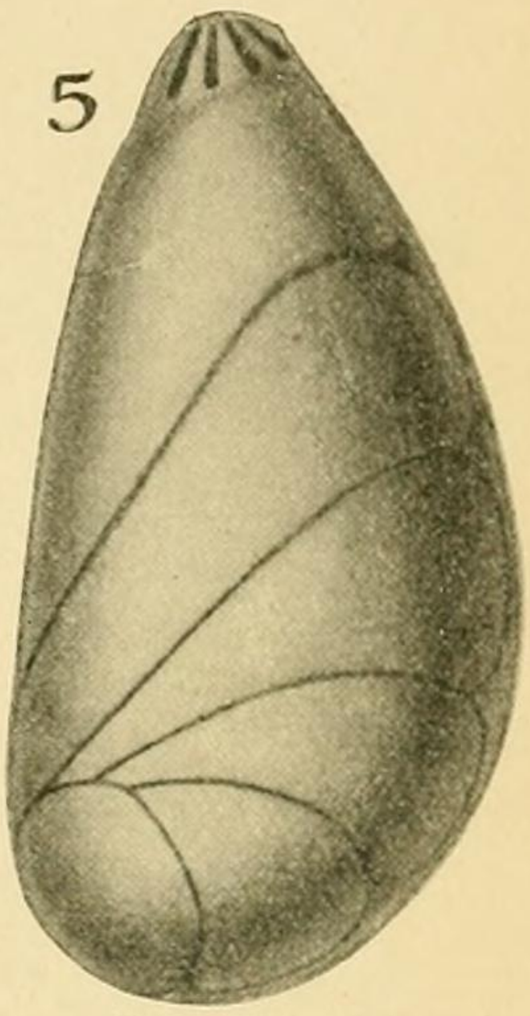

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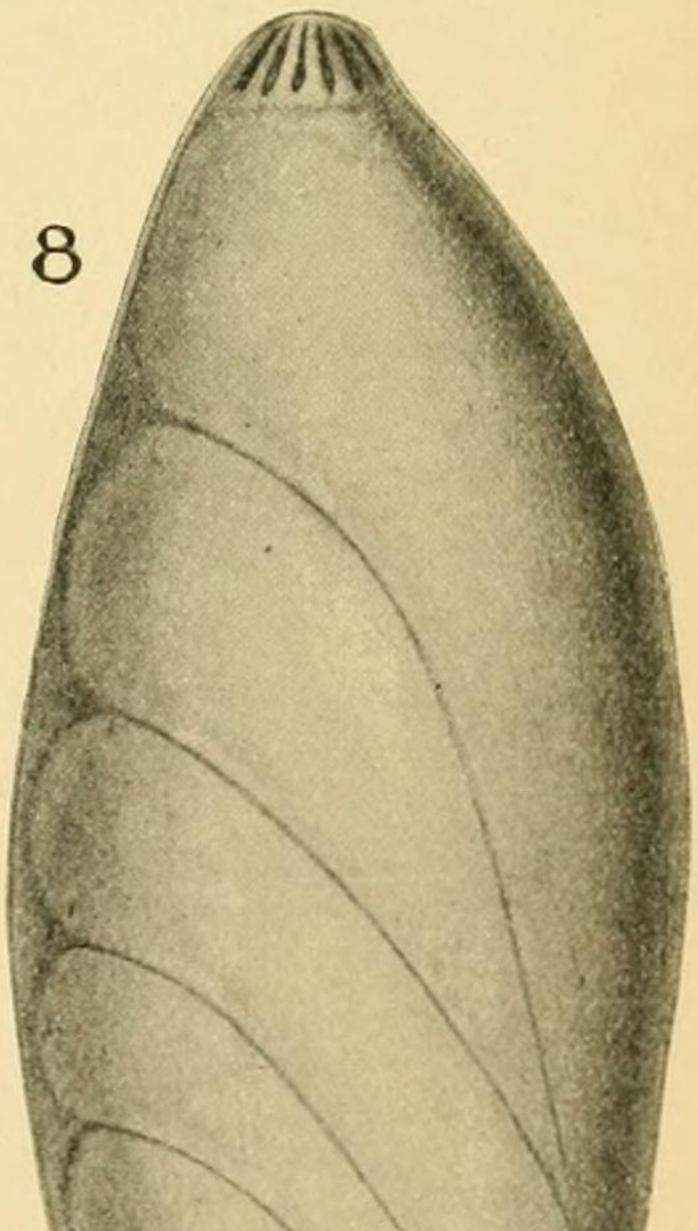

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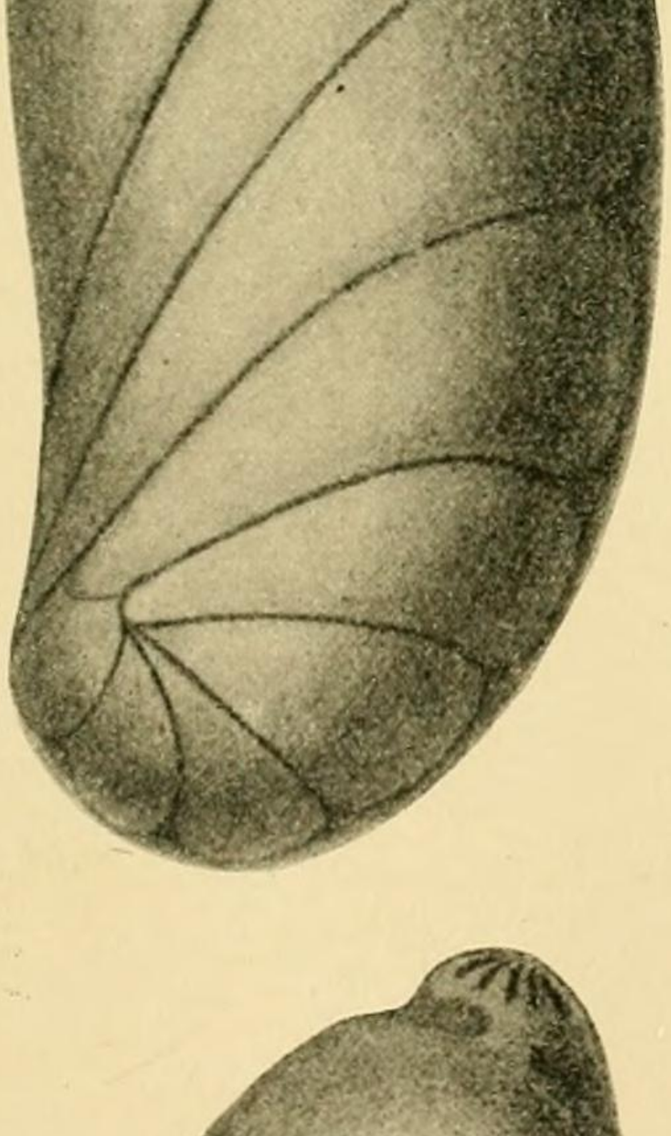


10

FORAMINIFERA OF SOUTH CORNWALL.

[*Face p.* 44.

117. *L. squamosa* var. *montagui* (Alcock). (Refs., H-A. & E. 1913, C.I. p. 76.) I, v.r.; II, f.

118. *L. melo* (d'Orbigny). (Refs., M. 1898, etc.; F.M. 1901, p. 8.) (M.✱) This is an extremely rare form, but Millett was well acquainted with its specific distinctions, and his record is verified by the existence of specimens on his Marazion slides.

119. *L. botelliformis* Brady. (Refs., M. 1898, etc.; F.M. 1901, p. 492.) (P.✱)

120. *L. lævis* (Montagu). (Refs., B 1884, F.C. p. 455.) I, II, v.r. (M.) (P.) (R.)

121. *L. semistriata* Williamson. (Refs., B. 1884, F.C. p. 465.) I, c.; II, f.; IV, v.r.; V*b*, r. (M.) (P.) (R.)

122. *L. perlucida* Williamson. (Refs., H-A. & E. 1913, C.I. p. 78.) I, v.r.

123. *L. striata* (d'Orbigny). (Refs., B. 1884, F.C. p. 460.) I, II. v.r. (M.) (P.) (R.)

124. *L. curvilineata* Balkwill & Wright. (Refs., H-A. & E. 1913, C.I. p. 78.) (M.✱) This species was recorded in 1885 from the Irish Sea (B. & W. 1885, D.I.S. p. 338, pl. xiv. figs. 21–24), but it appears in Balkwill & Millett's Galway paper in 1884 (B. & M. 1884, F.G. p. 27, pl. ii. fig. 3), and in the Revision (1908). The Galway figure is not true, *L. curvilineata* (which is near *L. striata* in the character of its markings), but is a distorted *L. sulcata*. Such specimens are not uncommon in these gatherings (see No. 126), and no doubt the Mount's Bay and Galway specimens were similar. Millett's Malay figure (M. 1898, etc., F.M. 1901, p. 488, pl. viii. fig. 5) represents the same unsatisfactory form.

125. *L. distoma* Parker & Jones. (Refs., B. 1884, F.C. p. 461.) (P.✱)

126. *L. sulcata* (Walker & Jacob). (Refs., B. 1884, F.C. p. 462.) Generally distributed. As is usually the case in shore-sands the species is very variable and subject to distortion. Compressed and inæquilateral specimens occur, and also individuals in which the sulci are irregularly spiral in their arrangement. We have not separated Williamson's var. *interrupta* (W. 1858, R.F.G.B. p. 7, pl. i. fig. 11), in which alternate sulci are discontinuous, which occurs at several stations. (M.) (P.) Worth separates Williamson's var. *interrupta* as a distinct variety.

127. *L. lyellii* (Seguenza). (Refs., H-A. & E. 1915, F.K.A. p. 659.) I, v.r. (M.)

128. *L. williamsoni* (Alcock). (Refs., H-A. & E. 1915, F.K.A. p. 659.) Generally distributed. (M.)

129. *L. costata* (Williamson). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 321.) I, v.r. (M. 1906.)

130. *L. clavata* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 660.) I, II, III, v.r. (M.) (P.)

131. *L. gracillima* (Seguenza). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 319). I, v.r. (M.) (P.)

132. *L. gracilis* (Williamson). (Refs., H-A. & E. 1916, F.W.S. p. 248.) I, v.r. (P.)

133. *L. lævigata* (Reuss). (Refs., B. 1884, F.C. p. 473; H-A. & E. 1915, F.K.A. p. 661.) I, IV, VIII*a*, f.; II, III, v.r. (M. 1906.)

134. *L. acuta* (Reuss). (Refs., H-A. & E. 1915, F.K.A. p. 661.) I, r.; II, f. (M.)

135. *L. millettii* Chaster. (Refs., H-A. & E. 1913, C.I. p. 83.) I, v.r.

136. *L. lucida* (Williamson). (Refs., H-A. & E. 1915, F.K.A. p. 661.) Generally distributed. Trigonal forms occur, and at Station I an abnormal specimen quadrangular in section. (M.) Millett also records *L. trigono-oblonga* (no author) which was probably a trigonal specimen of *L. lucida*. Such trigonal forms were recorded by Seguenza as *Trigonulina oblonga* (S. 1862, F.M.M.M. p. 74, pl. ii. figs. 56 and 58). The institution of a new species *L. trigono-oblonga* is therefore clearly superfluous. (Cf. also J. Wright, Recent Foraminifera of Down & Antrim, Proc. Belfast, Nat. Field Club, 1876–7, App. IV, p. 104, pl. iv. fig. 8.)

136A. *L. faba* Balkwill & Millett. (Refs., H-A. & E. 1913, C.I. p. 84.) (M. 1906.)

137. *L. annectens* Burrows & Holland. (Refs., H-A. & E. 1915, F.K.A. p. 662.) I, r.; VIII*b*, v.r.

138. *L. quadrata* (Williamson). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 321.) I, r.; IV, V*a*, v.r. (M.) (P.)

139. *L. quadrata* var. *semi-alata* Balkwill & Millett. (B. & M. 1884, F.G. p. 31, pl. ii. fig. 9.) (M. ✱)

140. *L. malcomsonii* Wright. (Refs., H-A. & E. 1915, F.K.A. p. 662.) I, v.r.

141. *L. marginata* (Walker & Boys). (Refs., B. 1884, F.C. p. 476.) Generally distributed. (M.) (P.) Millett also records as a new species *L. trigono-elliptica*. (Cf. B. & M. 1884, F.G. p. 81, and Revision (1908), p. 8, pl. iii. fig. 8.) It is merely a trigonal form of *L. marginata*, and is so recorded in the Revision. He also records *L. trigono-marginata* from Mounts Bay as a distinct species, and Worth (P.) records it from the Plymouth area.

142. *L. marginata* var. *inæquilateralis* Wright. (Refs., H-A. & E. 1913, C.I. p. 85.) I, V, r.

143. *L. unguis* Heron-Allen & Earland. (H-A. & E. 1913, C.I. p. 86, pl. vii. figs. 1–3). I, III, v.r.

144. *L. marginato-perforata* Seguenza. (Refs. H-A. & E. 1915, F.K.A. p. 663.) IX, v.r.

145. *L. lagenoides* (Williamson). (Refs., H-A. & E. 1915, F.K.A. p. 665.) I. f.; II, IV, v.r. (M.) (P.)

146. *L. lagenoides* var. *tenuistriata* Brady. (Refs., H-A. & E. 1916, F.W.S. p. 252.) (M. 1906.) I, v.r. (M. as *L. tenuistriata*.)

147. *L. ornata* (Williamson). (Refs., H-A. & E. 1913, C.I. p. 88.) I, v.r. (P.)

148. *L. formosa* Schwager. (Refs., H-A. & E. 1913, C.I. p. 88.) At Station I a very few specimens of this form, hitherto only found in British waters by us at Clare Island.

149. *L. bicarinata* (Terquem). Plate VII, figs. 2, 3. (Refs., H-A. & E. 1915, F.K.A. p. 665.) I, f.; II, v.r. Very fine specimens, including pedunculate individuals, which we figure, at Station IV.

150. *L. rizzæ* (Seguenza). (Refs., H-A. & E. 1915, F.K.A. p. 666.) I, II, VIII*a*, v.r.

151. *L. orbignyana* (Seguenza). (Refs., B. 1884, F.C. p. 484; H-A. & E. 1915, F.K.A. p. 666.) Universally distributed and generally abundant. Nearly all the specimens are of an equally biconvex type, but a form with compressed parallel faces occurs in company with the other at Stations II and V, at which stations trigonal specimens occurred, all of the biconvex type. (M.) (P.)

152. *Nodosaria radicula* (Linné), (Refs., B. 1884, F.C. p. 495.) One small but typical specimen at Station I.

153. *N. calomorpha* Reuss. (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 322.) (P. ✱)

154. *N. scalaris* (Batsch). (Refs., B. 1884, F.C. p. 510.) I, r.; II, III, VIII*a*, v.r. (M.) (P.)

155. *N. proxima* Silvestri. (Refs., H-A. & E. 1915, F.K.A. p. 669.) A single typical specimen at Station I.

156. *N. pyrula* d'Orbigny. (Refs., B. 1884, F.C. p. 497.) I, II, V, v.r. The species is mainly represented by fragments, but some of these must have formed part of specimens of very large size. (M.) (P.)

157. *N. communis* d'Orbigny. (Refs., B. 1884, F.C. p. 504.) I, v.r. (M.) (P.) (R.)

158. *N. obliqua* (Linné). (Refs., B. 1884, F.C. p. 513.) (M.*)

159. *Lingulina pellucida* Sidebottom. Plate VII, fig. 4. (Refs., H-A. & E. 1913, C.I. p. 96.) A single specimen at Station I, which is probably referable to this species, although the earlier of the two chambers is larger than is represented in Sidebottom's original figure, or in our subsequent Clare Island record. The present is the second British record, and the third British locality in which it has been found, the other being a 'Goldseeker' dredging in the Moray Firth. Millett, in his Malay Papers, figures (M. 1898, etc.; F.M. 1902, p. 523, pl. xi. fig. 15), a biloculine *Lingulina* which he called *L. limbata*, and, referring in the text to Sidebottom's Delos form *L. pellucida*, states that he has specimens and drawings of that form, and that it is closely allied to his own species *L. limbata*, but not identical. He appears, however, to have altered his mind on this point subsequently, as the Delos specimens of *L. pellucida* Sidebottom in his collection are identified by him as *L. limbata* Millett. We do not agree with this later view of Millett's; the two forms appear to be quite distinct, though no doubt closely allied.

160. *Marginulina costata* (Batsch). (Refs., B. 1884, F.C. p. 528.) A single good specimen from Station I.

161. *Vaginulina legumen* (Linné). (Refs., B. 1884, F.C. p. 530.) I, V, VII, VIII*b*, v.r.

162. *Cristellaria crepidula* (Fichtel & Moll). Plate VII, figs. 5–10, and Plate VIII, fig. 1. (Refs., B. 1884, F.C. p. 542.) This is the most representative Cristellarian in the district, and at Station I specimens were not only numerous, but presented extreme varieties. Many of the forms figured by Burrows and Holland (B. & H. 1897, P.B. p. 39, pl. i. figs. 1–21) occur at this station, and it would have been possible to have compiled quite a long list of varietal names, but where the range of individuals is so great in a single locality it seems undesirable to do this. Zoologically they are all referable to the single type, and we figure some of the more striking forms. At the remaining stations (shore-sands) all the individuals were of the normal type, though varying greatly in size. I, f.; II, r.; III, IV, V, v.r. (M.) (P.) (R.)

163. *C. italica* (Defrance). (Refs., B. 1884, F.C. p. 544.) (P. *) A deep-water species.

164. *C. haueriana* d'Orbigny. (d'O. 1846, F.F.V. p. 84, pl. iii. figs. 24, 25.) Plate VIII, figs. 2–4. (New to Britain.) At Station I a single typical specimen of the evolute or uncoiled type of this very variable species. Although not previously recorded in Britain (at any rate as a recent form), there can be no question as to the recent character of this specimen, the shell being in the most perfect hyaline condition. The *C. rhomboidea* of Czjzek (C. 1848, F.W.B. p. 141, pl. xii. figs. 21–23) is another form of this protean species.

165. *C. rotulata* (Lamarck). (Refs., B. 1884, F.C. p. 547.) Generally distributed. The specimens are larger and better developed than is usual in shore-sands. (M.) (P.) (R.)

166. *C. vortex* (Fichtel & Moll.) (Refs., B. 1884, F.C. p. 548.) (P. ✱) A Mediterranean and tropical species.

167. *Cristellaria cultrata* (Montfort). (Refs., B. 1884, F.C. p. 550.) I, II, V, VII, v.r. The same observation applies to this species as to No 165.

168. *Amphicoryne falx* (Jones & Parker). (Refs., M. 1898, etc.; F.M. 1903, p. 260.) (P. ✱)

169. *Polymorphina sororia* Reuss. (Refs., H-A. & E. 1915, F.K.A. p. 673.) I, c.; III, Va, v.r.; IV, r.

170. *P. amygdaloides* Reuss. (Refs., B. 1884, F.C. p. 560.) I, r.

171. *P. lactea* (Walker & Jacob). (Refs., B. 1884, F.C. p. 559.) Generally distributed. (R.) (P.) (M.)

172. *P. concava* Williamson. (Refs., H-A. & E. 1913, C.I. p. 102.) I, f.; VII, v.r. With a few exceptions all the specimens were free. (M.)

173. *P. oblonga* Williamson. (Refs., H-A. & E. 1915, F.K.A. p. 672.) At Station I it is frequent and attains a comparatively gigantic size, the largest *Polymorphina* found in the gatherings. There is a tendency in the larger specimens to the formation of the last chambers on a plane differing from that of the preceding ones. (M.) (P.) (R.)

174. *P. complexa* Sidebottom. Plate VIII, figs. 5–7. (New to Britain.) (Refs., H-A. & E. 1915, F.K.A. p. 673.) At Station I, a single specimen, which we figure, which appears to be referable to Sidebottom's species, though differing by the absence of the cribrate aperture which characterized the Delos forms. The specimen has the characteristic overlapping sutural margins, but no visible apertures.

175. *P. gibba* d'Orbigny. (Refs., B. 1884, F.C. p. 561.) I, IV, V, VI, VII, v.r. (M.) (P.)

176. *P. æqualis* (M. ✱) This is probably intended for *P. æqualis* (d'Orbigny) (d'O. 1846, F.F.V. p. 227, pl. xiii. figs. 11, 12, Reuss's Model No. 52), which is a compressed form of *P. gibba*.

177. *P. myristiformis* Williamson. (Refs., H-A. & E. 1908, etc; S.B. 1909, p. 434.) Very abundant and large at Station I, presenting great variation, including the quasi-bilocular form figured by us from Clare Island. Much smaller and more normal at Stations II and IV. (M.) (R.)

178. *P. communis* d'Orbigny. (Refs., B. 1884, F.C. p. 568.) I, VI, VII, VIII, v.r. (M.)

EXPLANATION OF PLATE VIII.

FIGS.

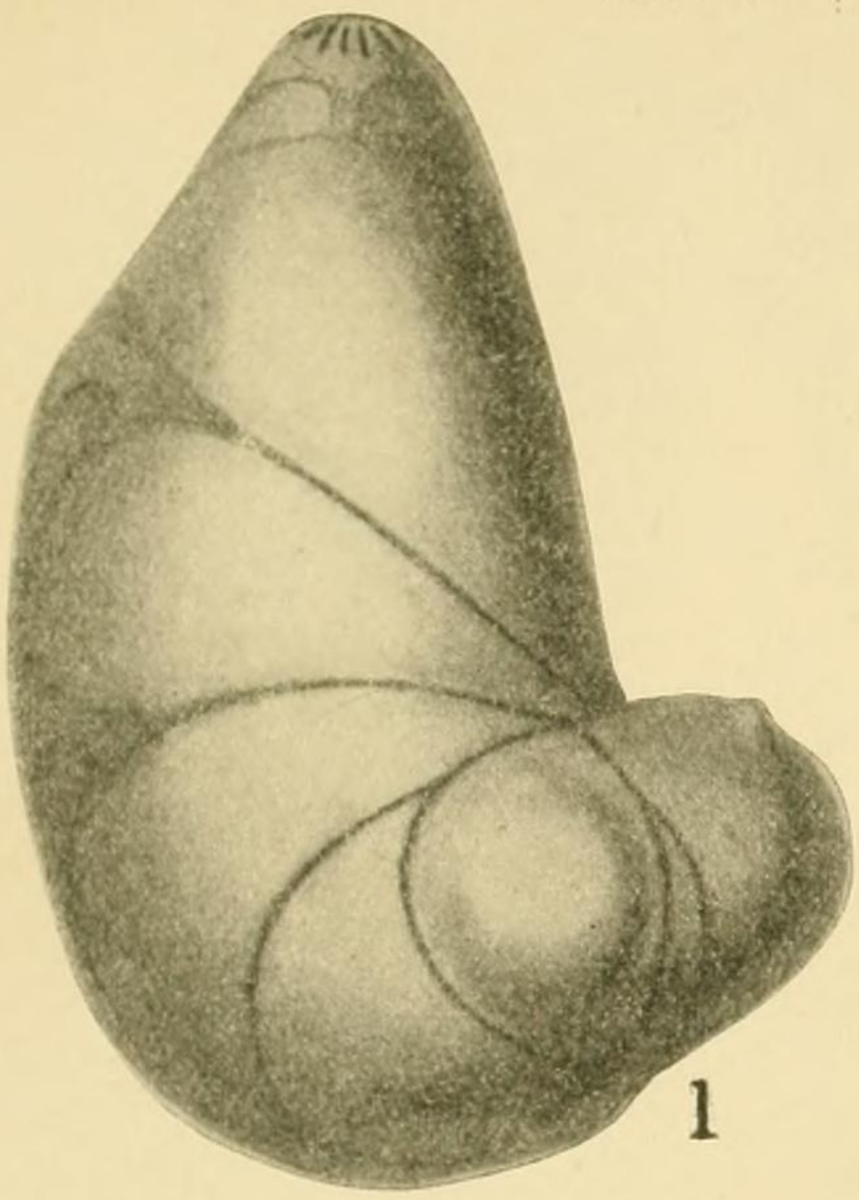
1.—*Cristellaria crepidula* (Fichtel & Moll). Abnormal specimen with two primordial chambers. × 75.

2–4.—*C. hauerina* d'Orbigny. Figs. 2, 3, side views. Fig. 4, edge (oral) view. × 85.

5–7.—*Polymorphina complexa* Sidebottom. Figs. 5, 6, side views. Fig. 7, edge view. × 135.

8–9.—*Discorbina globularis* (d'Orbigny). Fusion of two individuals. Fig. 8, superior view. Fig. 9, inferior view. × 110.

10–12.—*D. bertheloti* var. *baconica* Hantken. Fig. 10, superior view. Fig. 11, inferior view. Fig. 12, edge view. × 135.



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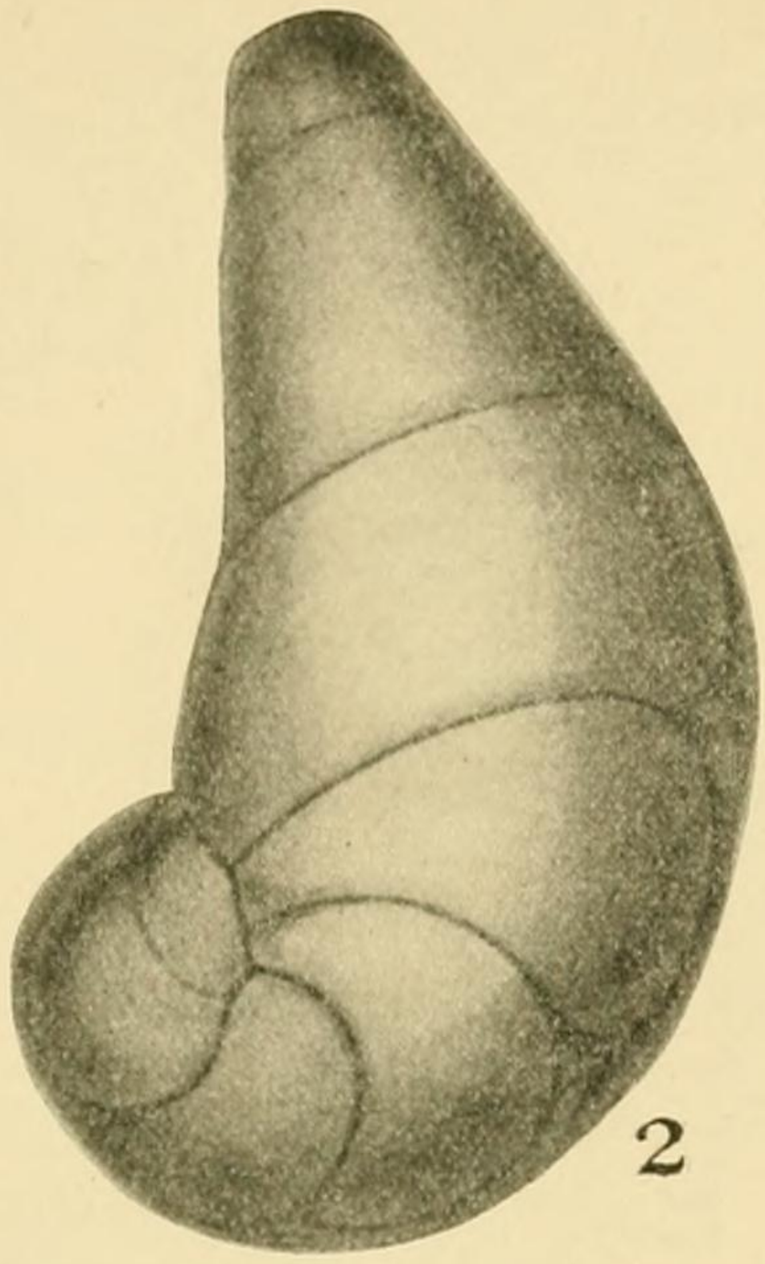

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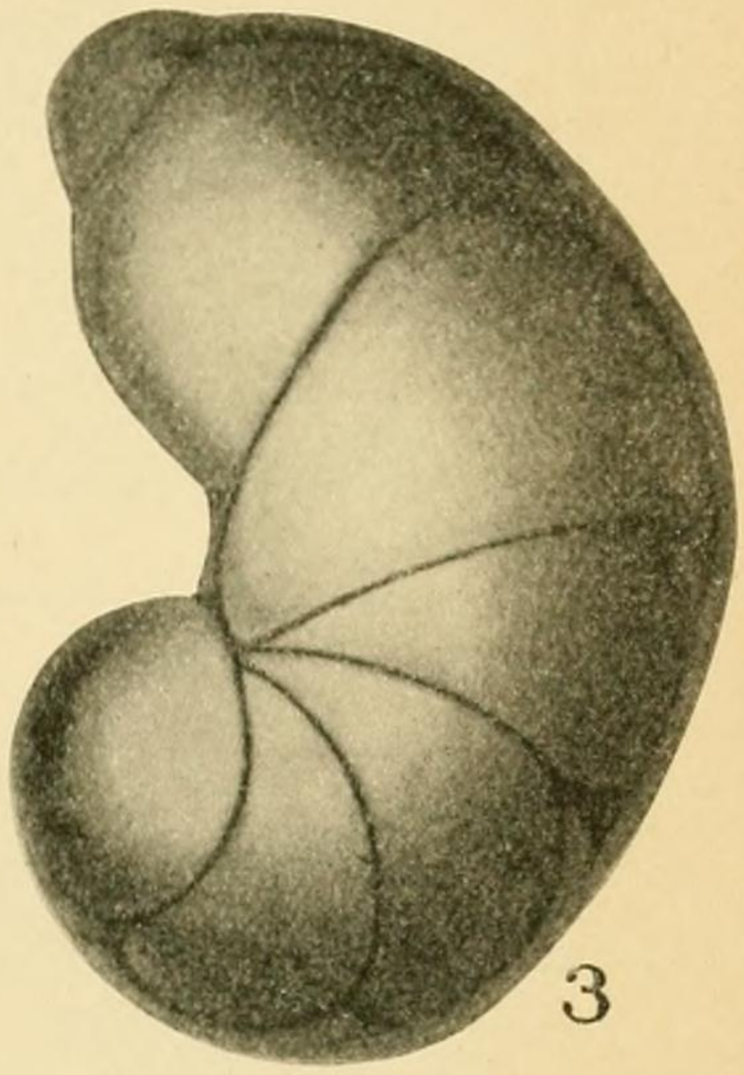

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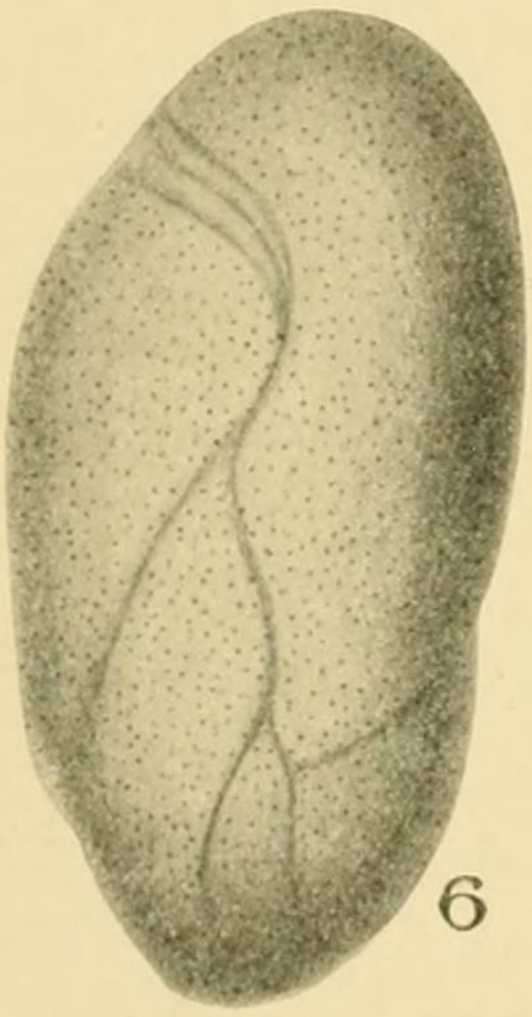

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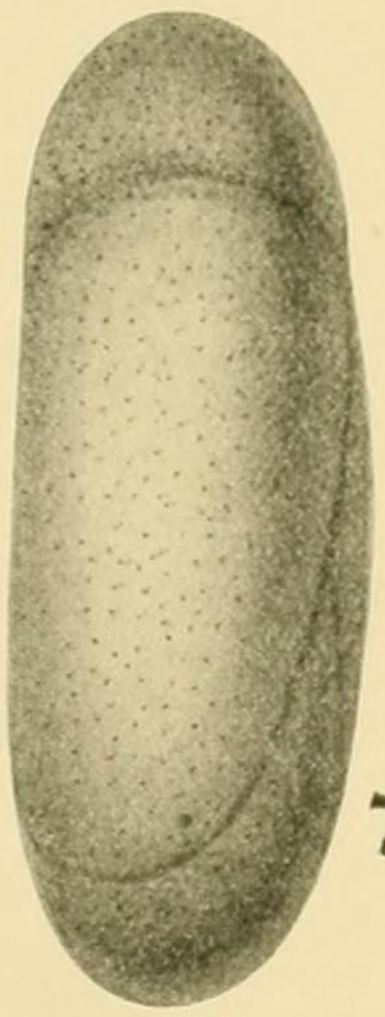

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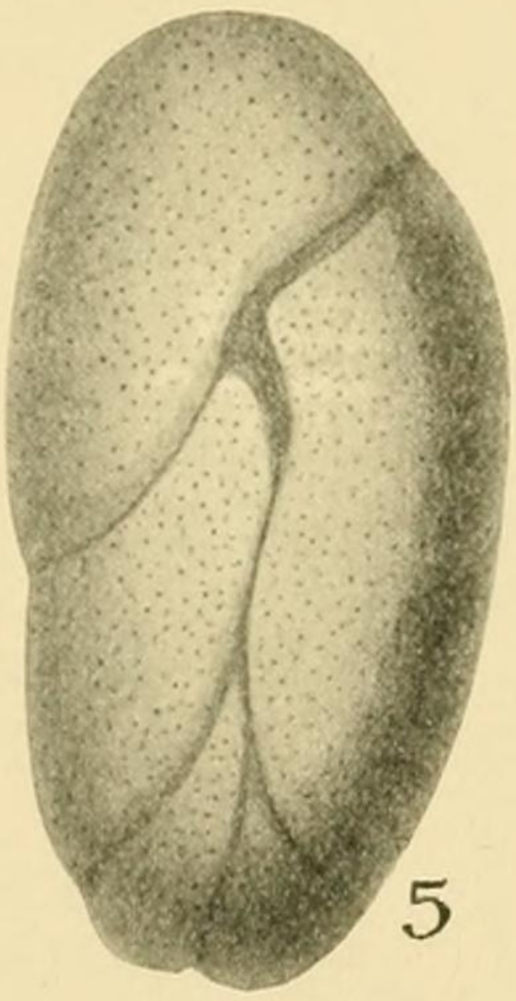

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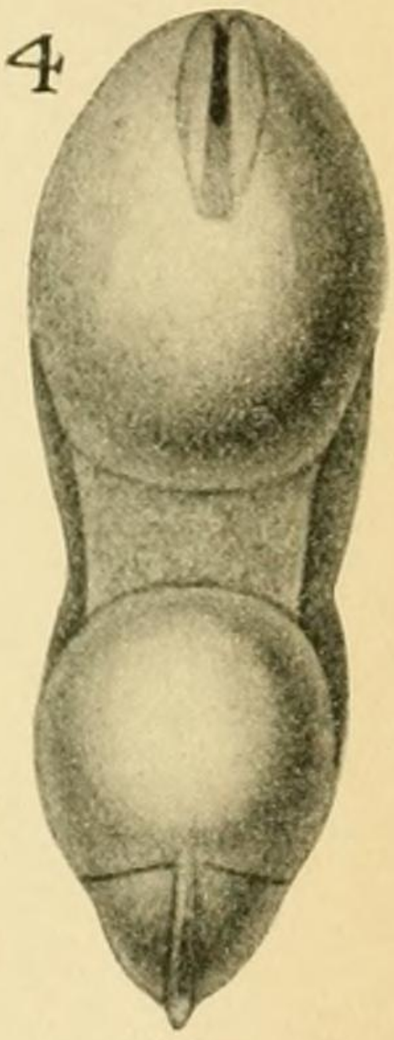

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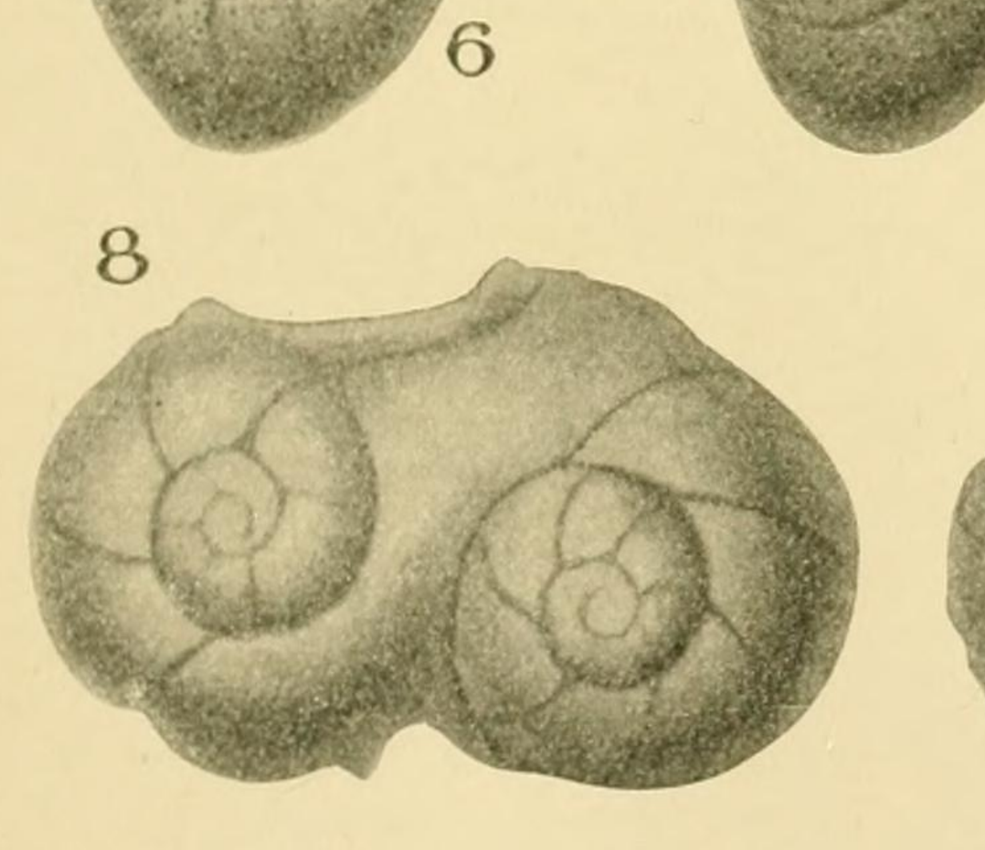

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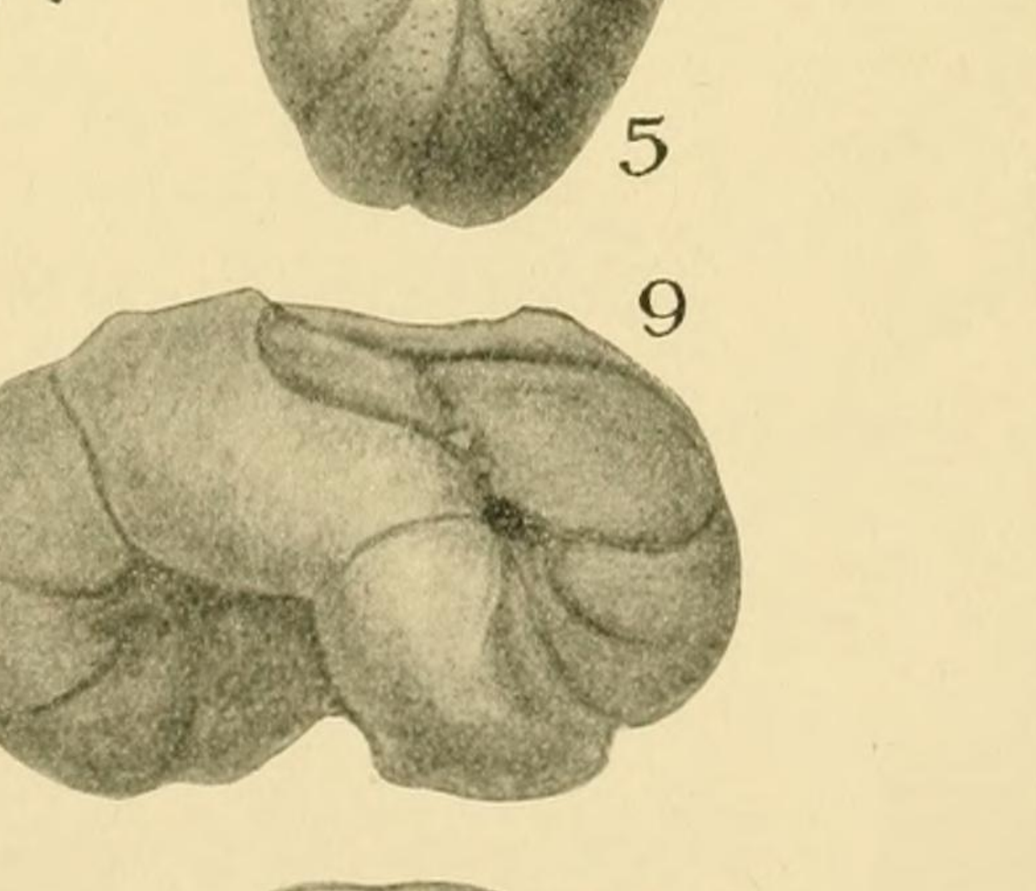

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FORAMINIFERA OF SOUTH CORNWALL.

[*Face p.* 48.

179. *P. problema* d'Orbigny. (Refs., B. 1884, F.C. p. 568). I, II, v.r.

180. *P. rotundata* (Bornemann). (Refs., B. 1884, F.C. p. 570.) I, V, v.r.

181. *P. compressa* d'Orbigny. (Refs., B. 1884, F.C. p. 565; H-A. & E. 1915, F.K.A. p. 672.) Generally distributed, and frequently common. (M.) (P.) (R.)

NOTE.—It is noteworthy that in spite of the abundance of the genus *Polymorphina* in the gatherings, no fistulose specimens were found.

182. *Uvigerina angulosa* Williamson. (Refs., H-A. & E. 1915, F.K.A. p. 676.) Generally distributed. (P.) (M.)

Family GLOBIGERINIDÆ.

183. *Globigerina bulloides* d'Orbigny. (Refs., B. 1884, F.C. p. 593.) I, II, r.; IV, V*b*, v.r. (M.) (P.)

184. *G. inflata* d'Orbigny. (Refs., B. 1884, F.C. p. 601.; H-A. & E. 1915, F.K.A. p. 679.) I, II, III, v.r. (M.) (P.)

185. *G. rubra* d'Orbigny. (Refs., H-A. & E. 1915, F.K.A. p. 679.) I, c.; IV, v.r.

NOTE.—The Globigerinidæ are very sparingly represented, and the specimens were uniformly weak and small.

186. *Orbulina universa* d'Orbigny. (Refs., B. 1884, F.C p. 608.) Specimens of the small thick-walled type at Station I only. (P.) (R.)

187. *Sphæroidina dehiscens* Parker & Jones. (Refs., B. 1884, F.C. p. 621.) (P. ✱) A tropical form, but a single specimen has been previously recorded from the Dee Estuary (S. 1886, F.L.M.B.C. p. 58).

Family ROTALIDÆ.

188. *Spirillina vivipara* Ehrenberg. (Refs., H-A. & E. 1915, F.K.A. p. 683.) I, II, c.; III, V*b*, v.r.; IV, r. (R.) (P.) (M.) Extremely variable both in size and general characteristics.

189. *S. obconica* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 683.) I, v.r.

190. *S. obconica* var. *carinata* Halkyard. (Refs., H-A. & E. 1913, C.I. p. 108.) I, II, r.

191. *S. limbata* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 684.) I, II, v.r.

192. *S. limbata* var. *denticulata* Brady. (Refs., H-A. & E. 1913, C.I. p. 109.) I, r.

193. *S. margaritifera* Williamson. (Refs., H-A. & E. 1915, F.K.A. p. 685.) I, f. (M.) (P.) (R.)

194. *Patellina corrugata* Williamson. (Refs., H-A. & E. 1915, F.K.A. p. 686.) Generally distributed, often abundant and of large size. Both the circular and the oval types described by us from Clare Island (H-A. & E. 1913, C.I. p. 110) occur. (M.) (P.) (R.)

195. *Discorbina nitida* (Williamson). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 328.) Universally distributed and often attaining a large size, especially at Station V. Every degree of variation in the height of the spire and the development of the marginal edge occurs. In some cases the entire absence of carina and a tendency to inflation

of the chambers results in a lobulate peripheral outline. We are figuring this type from the West of Scotland. (H-A. & E. 1916, F.W.S. p. 269, pl. xlii. figs. 29, 30.) (M. and P. as *Rotalia nitida*.)

196. *D. millettii* Wright. (Refs., H-A. & E. 1913, C.I. p. 121.) I, f.; II c.; III, V*b*, VII, VIII, v.r.

197. *D. prægeri* Heron-Allen & Earland. (Refs., H-A. & E. 1915, F.K.A. p. 692.) I, c.; III, V*a*, r.; IV, VI, IX, v.r.

198. *D. rosacea* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 692.) Generally distributed. (M.) (P.)

199. *D. peruviana* (d'Orbigny). (Refs., H-A. & E. 1913, C.I. p. 122.) I, v.c.; II, c.; IV, f.; III, r.; VIII*a*, v.r.

200. *D. mamilla* (Williamson). (Refs., H-A. & E. 1915, F.K.A. p. 693.) Universally distributed.

201. *D. planorbis* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 693.) I, III, VII, r.; II, v.c.; V*a*, VIII*b*, v.r.; X.

202. *D. turbo* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 693.) I, III, VII, IX, v.r.

203. *D. baccata* Heron-Allen & Earland. (Refs., H-A. & E. 1916, F.W.S. 271.) Single specimens at Stations I, II, and VIII*a*, common at Station V, and rare but very fine at Station IX.

204. *D. orbicularis* (Terquem). (Refs., H-A. & E. 1915, F.K.A. p. 693.) Generally distributed. (M.) (P.)

205. *D. mediterranensis* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 693.) Universally distributed. At Station IV the specimens constituted 95 p.c. of the material.

206. *D. irregularis* Rhumbler. (Refs., H-A. & E. 1913, C.I. p. 120.) I, v.r.; II, c; III, V*a*, f.; IV, v.c.; VIII*a*, r.

207. *D. globularis* (d'Orbigny). Plate VIII, figs. 8, 9. (Refs., B. 1884, F.C. p. 643; H-A. & E. 1915, F.K.A. p. 694.) Universally distributed. A very curious twinned specimen, which we figure, was found at Station II. This is evidently due to the fusion of two individuals which had grown side by side attached to a common host. (M.) (P.) (R.)

208. *D. tuberculata* Balkwill & Wright. (Refs., H-A. & E. 1915, F.K.A. p. 695.) A single typical specimen from Station I.

209. *D. polyrraphes* Reuss. (Refs., H-A. & E. 1913, C.I. p. 128.) I, f.

210. *D. chasteri* Heron-Allen & Earland. (Refs., H-A. & E. 1915, F.K.A. p. 697.) I, c.; IV, V, VIII*a*, v.r. Both the circular and oval types occur, the former predominating.

211. *D. chasteri* var. *bispinosa* Heron-Allen & Earland. (H-A. & E. 1913, C.I. p. 129, pl. xiii. fig. 4.) I, v.r.

212. *D. vesicularis* (Lamarck). (Refs., B. 1884, F.C. p. 651.; H-A. & E. 1915, F.K.A. p. 697.) V, VIII, v.r.

213. *D. bertheloti* d'Orbigny. (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 327.) I, II, VII, v.r. At Station VII, a large infiltrated fossil specimen similar to the Eocene specimens from Selsey Bill, and probably derived from the same source as the *Bulimina elongata* noticed *supra*. (P.)

214. *D. bertheloti* var. *baconica* Hantken. Plate VIII, figs. 10–12. (New to Britain.) (Refs., B. 1884, F.C. p. 651.) I, v.r.

215. *D. pustulata* Heron-Allen & Earland. (Refs., H-A. & E. 1915, F.K.A. p. 701.) Moderately frequent and quite typical at Station I.

216. *D. parisiensis* (d'Orbigny). (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 443.). (M.*) (P.*)

217. *D. wrightii* Brady. (Refs., H-A. & E. 1915, F.K.A. p. 702.) A single typical specimen at Station IX.

218. *D. obtusa* (d'Orbigny). (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 442.) I, II, VII, v.r.

219. *Planorbulina mediterranensis* d'Orbigny. (Refs., B. 1884, p. 656.) Universally distributed. (M.) (P.) (R.)

220. *Truncatulina refulgens* (Montfort). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 335.) Generally distributed.

221. *T. lobatula* (Walker & Jacob). Plate IX, fig. 1. (Refs., B. 1884, F.C. p. 660.) Universally distributed, and often very common. At Station IV an abnormal specimen was found, which we figure, consisting of two individuals fused together, apex to base, so that the two plane surfaces of the bases are visible in the associated pair. (M.) (P.) (R.)

222. *T. variabilis* d'Orbigny. (Refs., B. 1884, F.C. p. 661; H-A. & E. 1915, F.K.A. p. 706.) Generally distributed with *T. lobatula* where that species is common.

223. *T. haidingerii* d'Orbigny. (Refs., B. 1884, F.C. p. 663; H-A. & E. 1915, F.K.A. p. 708.) I, III, v.r.

224. *T. ungeriana* (d'Orbigny). (Refs., B. 1884, F.C. p. 664; H-A. & E. 1915, F.K.A. p. 708.) Generally distributed.

225. *T. reticulata* (Czjzek). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 336.) At Station V*b*, two typical examples of this form, which is extremely rare in British gatherings.

226. *Pulvinulina repanda* (Fichtel & Moll). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 340.) I, f.; IV, v.r. (P.)

227. *P. repanda* var. *concamerata* (Montagu). (Refs., H-A. & E. 1908, etc.; S.B. 1911, p. 340.) IV, v.r.

228. *P. punctulata* (d'Orbigny). (Refs., H-A. & E. 1908, etc.; S.B. 1909, p. 683.) The specimens are larger and better developed than are usually found in British shallow waters. I, f.; II, r.

229. *P. concentrica* Parker & Jones. (Refs., H-A. & E. 1915, F.K.A. p. 714.) I, V, v.r.; II, r.

230. *P. auricula* (Fichtel & Moll). (Refs., H-A. & E. 1915, F.K.A. p. 714.) I, c.; IV, v.r. (M.)

231. *P. oblonga* (Williamson). (Refs., H-A. & E. 1915, F.K.A. p. 714.) I, c.; II, IV, v.r.

231A. *P. haliotidea* Heron-Allen & Earland. (Refs., H-A. & E. 1913, C.I. p. 136.) III*c*, v.r.

232. *P. menardii* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 715.) (P.*) Normally a tropical Atlantic and Pacific form.

233. *P. patagonica* var. *scitula* Brady. Plate IX, figs. 2–5.
Rotalina patagonica d'Orbigny, 1839, F.A.M. p. 36, pl. ii. figs. 6–8.
Pulvinulina scitula Brady, 1882, B.K.E. p. 716.
P. scitula Balkwill & Millett, 1884, F.G. p. 85; pl. iv. fig. 12.
P. patagonica. Ibid. Revision, 1908, p. 4.
Discorbina sp. (?). Halkyard, 1889, R.F.J. p. 70, pl. ii. fig. 11.
P. patagonica Heron-Allen & Earland, 1913, C.I. p. 137, pl. xiii. figs. 5, 6.

A few specimens of the form which we figured from Clare Island under this name at Station I. The fiindng of these additional

specimens does not throw much light on the difficulties with which we were confronted in dealing with the single individual from the Irish coast. While still of opinion that it is a *Pulvinulina*, its identity with d'Orbigny's type *Rotalina patagonica* (d'O. 1839, F.A.M. p. 36, pl. ii, figs. 6–8) appears rather more doubtful. Halkyard figures under the name *Discorbina* sp. (H. 1889, R.F.J. p. 70, pl. ii. fig. 11) some individuals which are unquestionably the same as our form. He states that his specimens had been submitted to Brady, who had identified them with "a weak depaupérated form figured by O. Terquem in his Dunkerque Monograph, which paper I have not seen, and therefore cannot give the specific name which M. Terquem gives to this Foraminifer." The only form of Terquem which can be compared with our type is his *Rotalina excavata* (T. 1875, etc. A.P.D. p. 123, pl. xv. fig. 5). This has a similarly large loop-like or pulvinuline aperture, but is much higher in the dome and has more visible chambers. Brady, in 1882 (*ut supra*), describes under the name *Pulvinulina scitula* sp. n., "A variety of *P. canariensis* (d'Orbigny) differing from the typical form in its relatively small size and compact habit of growth. The margin is rounded instead of sharp, and the peripheral ends (*sic* = edges) of the chambers are only slightly convex instead of standing out prominently, as in *P. canariensis*. Notwithstanding its small minute dimensions, it generally attracts attention by its glistening white appearance. Longer diameter, 0·01." Halkyard's types, which are preserved in the University Museum at Manchester, have been examined by us, and prove to be identical with our form.

No figure was published by Brady, but the description of its appearance leaves very little doubt in our minds that this is the Clare Island form. Balkwill and Millett, in their original Galway paper (*ut supra*), figure a specimen of *P. scitula* which is stated to have been identified by Brady, and which, broadly speaking, is intermediate between *P. patagonica* (typical) and our Clare Island figure. In the revision of the Galway paper by Millett (Penzance, 1908) the name *P. scitula* is withdrawn and *P. patagonica* substituted, with a statement that the form had been figured as *P. scitula* "on the faith of Brady, but subsequently he convinced himself that it was identical with *P. patagonica*."

The Clare Island and Cornish specimens are so distinctive as compared with d'Orbigny's original figure, that it seems desirable that Brady's name should be revived as a variety of *P. patagonica*, and we have accordingly adopted this course.

234. *P. karsteni* (Reuss). (Refs., H-A. & E. 1916, F.W.S. p. 276, pl. xlii. figs. 34–37.) I, c.; II, v.r. We have discussed the question of the British records of this species in our West of Scotland paper. The specimens in the Millett Collection entirely confirm the views we have there set forth.

235. *P. elegans* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 717.) One minute specimen at Station II.

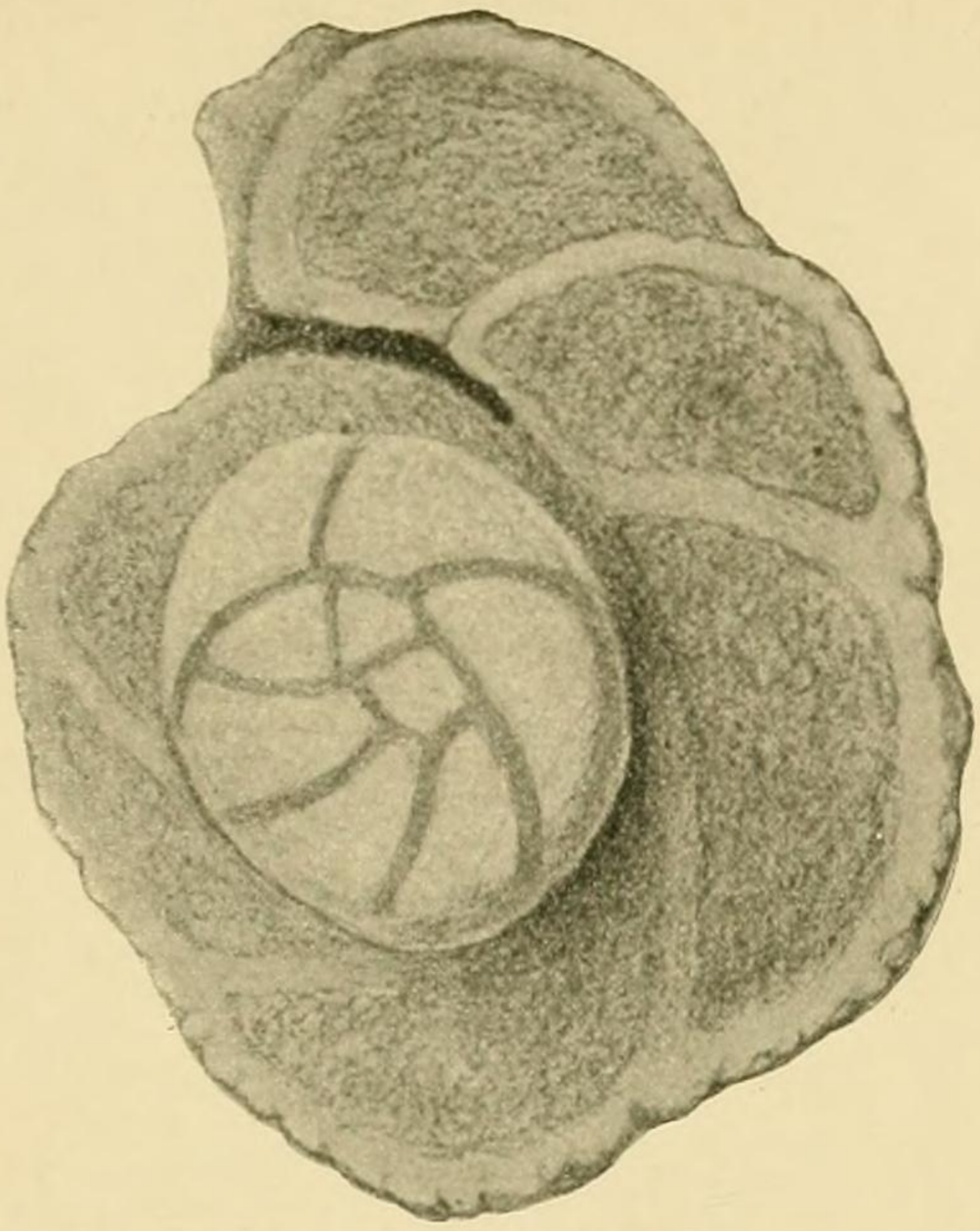
EXPLANATION OF PLATE IX.

FIGS.

1.—*Truncatulina lobatula* (Walker & Jacob). Double shell. × 110.

2–5.—*Pulvinulina patagonica* var. *scitula* Brady. Fig. 2, superior view. Figs. 3, 4, inferior views. Fig. 5, edge (oral) view. × 135.

6–8.—*Faujasina carinata* d'Orbigny. Fig. 6, inferior view. Fig. 7, superior view. Fig. 8, edge (oral) view. × 110.



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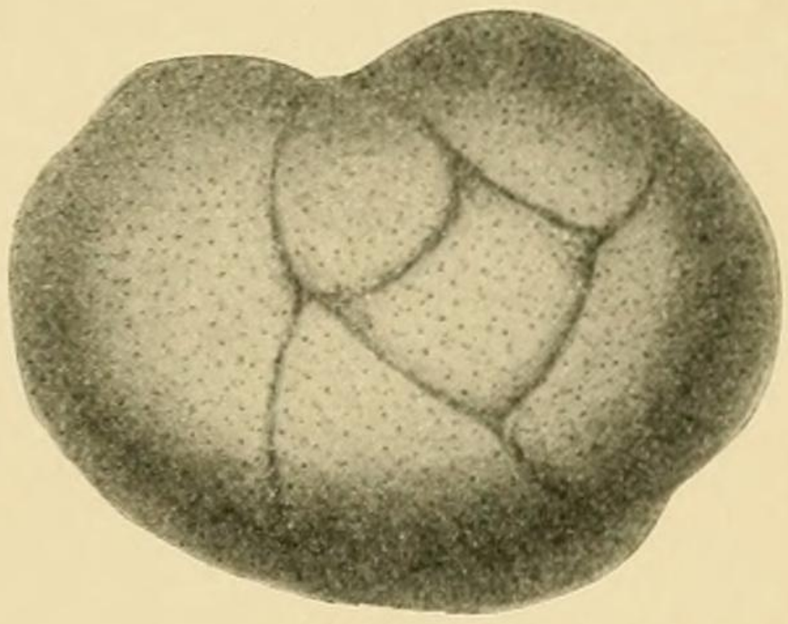

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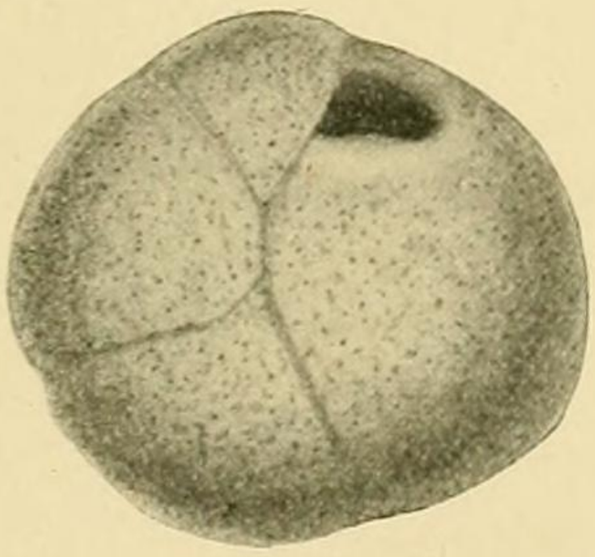

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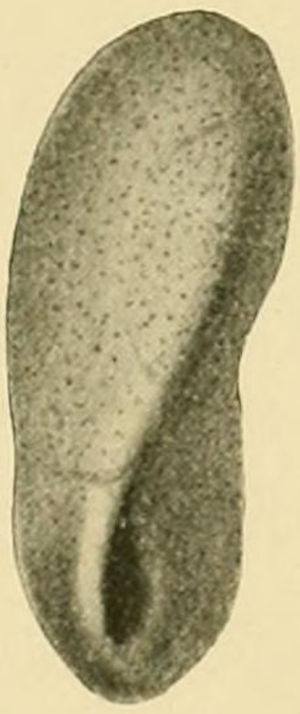

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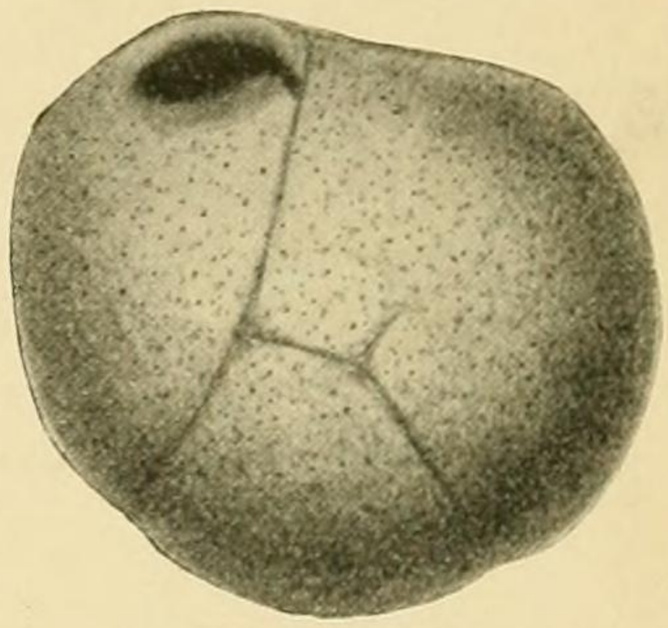

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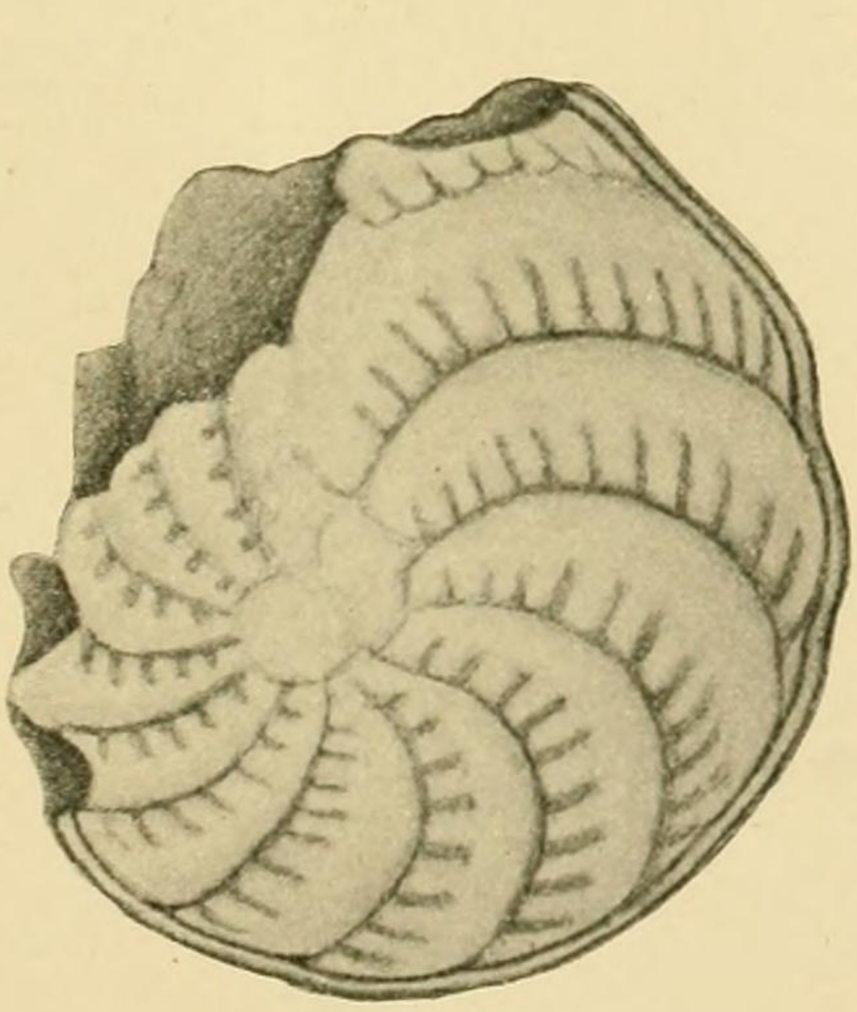

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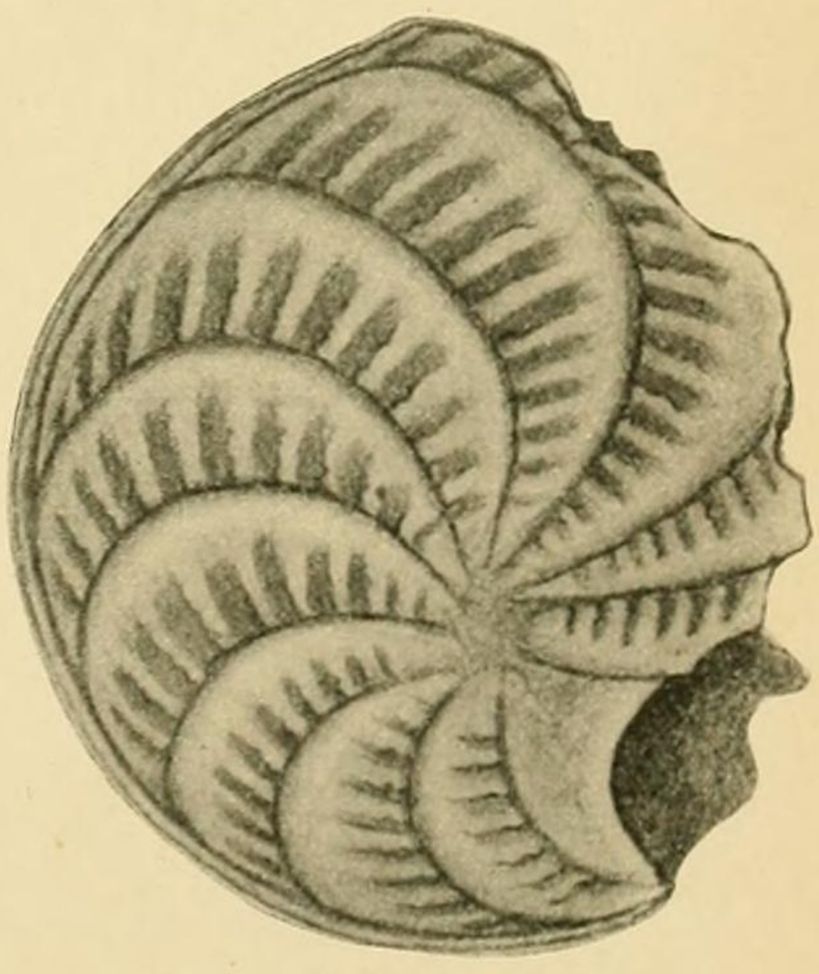

7

FORAMINIFERA OF SOUTH CORNWALL.

[*Face p.* 52.

236. *Rotalia beccarii* (Linné). (Refs., B. 1884, F.C. p. 704.) Universally distributed. (R.) (P.) (M.)
237. *R. orbicularis* (d'Orbigny). (Refs., H-A. & E. 1915, F.K.A. p. 718.) V, VIII*b*, v.r.; IX, v.c.
238. *R. perlucida* Heron-Allen & Earland. (Refs., H-A. & E. 1915, F.K.A. p. 718.) I, v.r.
239. *Gypsina globulus* (Reuss). (Refs., H-A. & E. 1915, F.K.A. p. 727.). One typical specimen of this species so rarely recorded in British waters at Station IV.
240. *G. vesicularis* (Parker & Jones). (Refs., H-A. & E. 1915, F.K.A. p. 726.) A few specimens at the same station.
241. *G inhærens* (Schultze). (Refs., H-A. & E. 1915, F.K.A. p. 724.) One of the commonest forms in the area, both free and attached. (M.)

Family NUMMULINIDÆ.

242. *Nonionina depressula* (Walker & Jacob). (Refs., B. 1884, F.C. p. 725; H-A. & E. 1915, F.K.A. p. 730.) Universally distributed. There is less variation in this species throughout the area than usually occurs. Nearly all the stations present a typical form with somewhat turgid chambers and depressed sutural lines. (M.) (P.)
243. *N. umbilicatula* (Montagu). (Refs., H-A. & E. 1915, F.K.A. p. 730.) (M. ✱) (P. ✱)
244. *N. asterizans* (Fichtel & Moll). (Refs., H-A. & E. 1915, F.K.A. p. 730.) Generally distributed. All of the type with the solid umbilical stud. (R.)
245. *N. stelligera* d'Orbigny. (Refs., B. 1884, F.C. p. 728.) I, v.r. Typical specimens. (M.) (P.)
246. *N. scapha* (Fichtel & Moll). (Refs., H-A. & E. 1915, F.K.A. p. 731.) A single specimen at Station II, of a very compressed type, suggesting *N. sloanii* d'Orbigny (d'O. 1839, F.C. p. 46, pl. vi. figs. 18 and 18*b*). (P.)
247. *N. turgida* (Williamson). (Refs., H-A. & E. 1915, F.K.A. p. 731.) (M. 1906 ✱) (P. ✱) Also recorded by Robertson in his Brit. Assoc. List, 1869.
248. *N. pauperata* Balkwill & Wright. (Refs., H-A. & E. 1915, F.K.A. p. 732.) I, c.; II, f.; IV, VI, VIII*a*, IX, v.r.; X. This form, usually very rare, is widely distributed in the area, is frequent at Stations I and II, and attains an unusually large size.
249. *Polystomella striato-punctata* (Fichtel & Moll). (Refs., B. 1884, F.C. p. 733.) Universally distributed, most of the usual types being represented. (M.) (P.)
250. *P. striato-punctata* var. *selseyensis* Heron-Allen & Earland. (Refs., H-A. & E. 1915, F.K.A. p. 733.) III*b*, VII, r.; VIII*b*, c.; IX, f.
251. *P. arctica* Parker & Jones. (Refs., B. 1884, F.C. p. 735.) (P. ✱) A cold-water and arctic form. Recorded by us from Clare Island (H-A. & E. 1913, C.I. p. 146). Worth's record would appear to be the southernmost occurence of the species recorded.
252. *P. crispa* (Linné). (Refs., B. 1884, F.C. p. 736.) Universally distributed. (M.) (P.)
253. *P. faba* (Fichtel & Moll). (Refs., H-A. & E. 1916, F.W.S. p. 281, pl. xliii. figs. 11–19.) X.

254. *P. subnodosa* (Münster). (Refs., H-A. & E. 1915, F.K.A. p. 733.) (P. ✱) Wright has recorded this from south-west Ireland as "frequent."

255. *P. macella* (Fichtell & Moll.) (Refs., B. 1884, P.C. p. 737.) Universally distributed. (P.)

256. *Operculina ammonoides* (Gronovius). (Refs., H-A. & E. 1908, etc. S.B. 1911, p. 697.) • II, v.r.

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CONTAINING ITS TRANSACTIONS AND PROCEEDINGS

AND

A SUMMARY OF CURRENT RESEARCHES RELATING TO

ZOOLOGY AND BOTANY

(principally Invertebrata and Cryptogamia)

MICROSCOPY, &c.

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