XI.—*On the Recent and Fossil Foraminifera of the Shore-sands at Selsey Bill, Sussex.*—II.*

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and Arthur Earland.

(*Read April* 21*st*, 1909.)

Plates XV., XVI.

In the first paper of this series, which we had the honour to read before this Society in June, 1908, we gave a short account of the nature, position, and extent of the deposits, both recent and fossil, which we had searched, particularly with reference to the newly discovered Rotalian genus *Cycloloculina*. A reference to that paper will demonstrate to the Rhizopodist of what extraordinarily diversified materials the shore-sands of Selsey Bill are composed, and it will cease to be surprising under the circumstances that so wide a range of Foraminifera should be discoverable in them, both as regards number of genera and of species, and as regards periods of geological time.

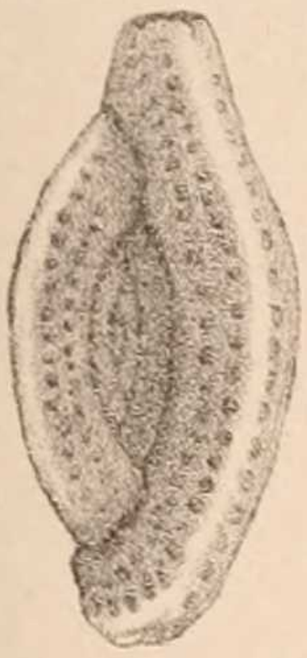
In the foremost place, of course, we find the ordinary shallow-water littoral species in their usual profusion when sought for under favourable conditions, the extremely flat and far-reaching

* The first of this series of papers was published in the Society's Journal, 1908, pp. 529–543, under the title of "*On Cycloloculina*, a New Generic Type of the Foraminifera; with a Preliminary Study of the Foraminiferous Deposits and Shore-sands of Selsey Bill."

EXPLANATION OF PLATE XV.

Fig. 1.—*Spiroloculina pertusa* Terquem.
,, 2.—*S. foveolata* Egger.
,, 3—*Miliolina parisiensis* d'Orbigny, sp.
,, 4.—Ditto.
,, 5.—Ditto.
,, 6.—*Miliolina saxorum* Lamarck, sp.
,, 7.—Ditto.
,, 8.—*Articulina foveolata* sp. n.
,, 9.—*Cornuspira selseyensis* sp. n.
,, 10.—Ditto.
,, 11.—Ditto. Oral aspect.
,, 12.—*Saccammina sphærica* M. Sars.
,, 13.—Ditto.
,, 14.—*Webbina hemisphærica* Jones, Parker, and Brady.
,, 15.—*Bigenerina selseyensis* sp. n.
,, 16.—Ditto.
,, 17.—Ditto. Oral aspect.

All figures magnified 50 diameters.



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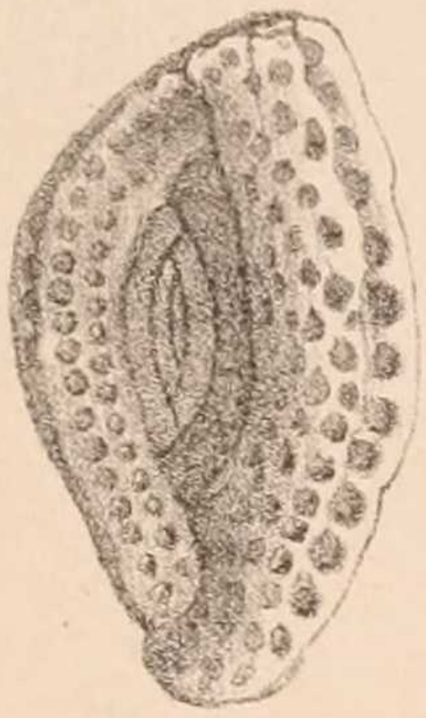

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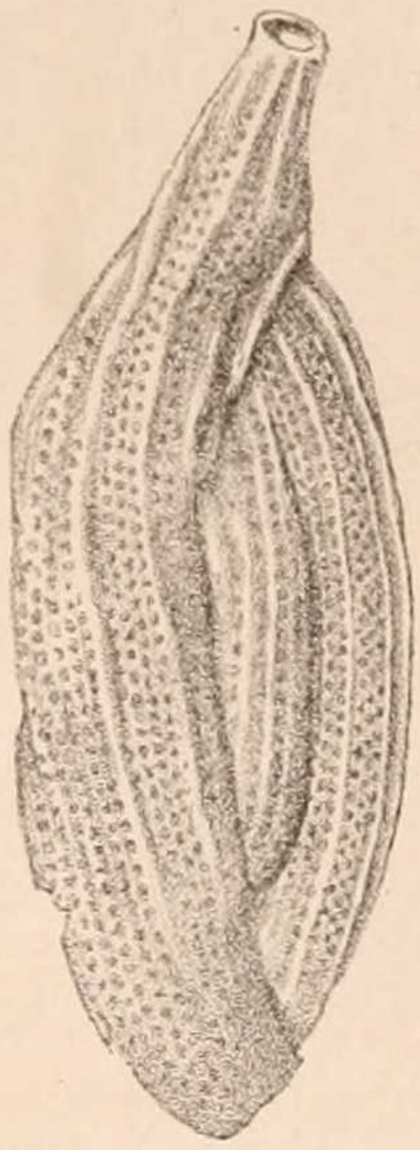

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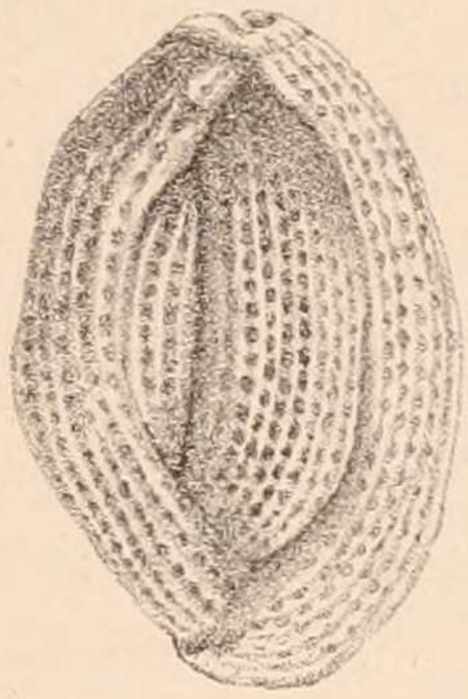

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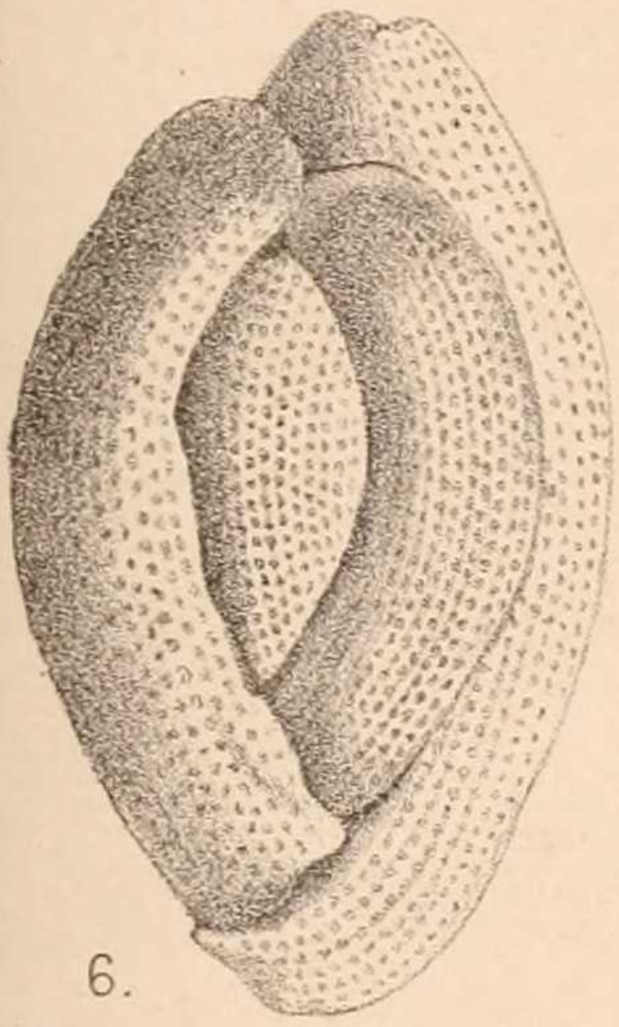

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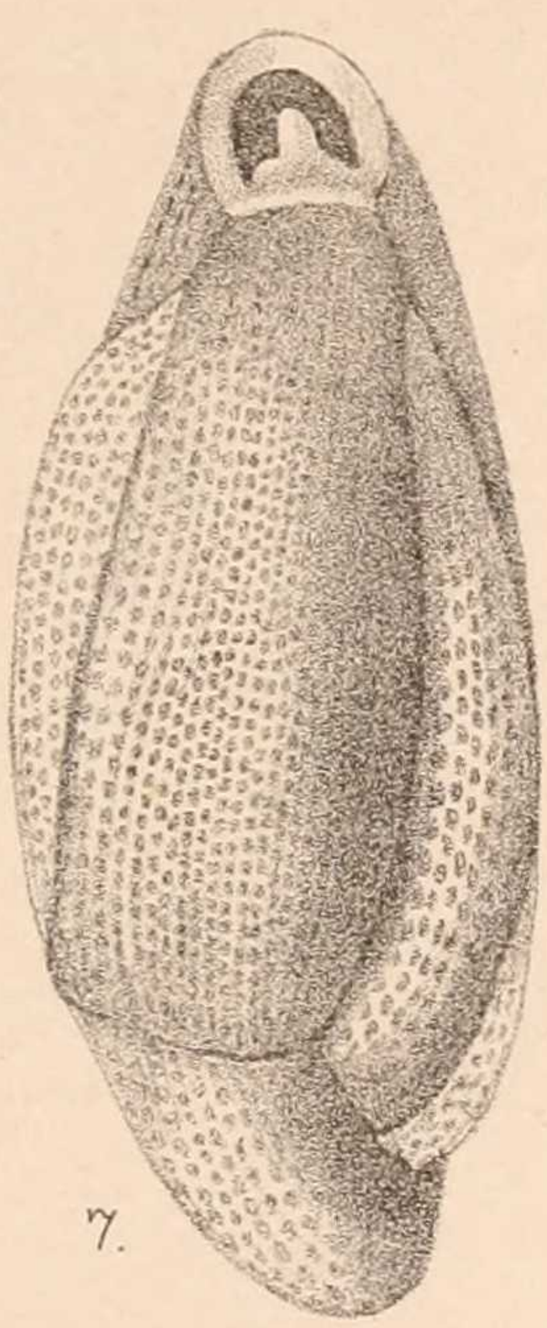

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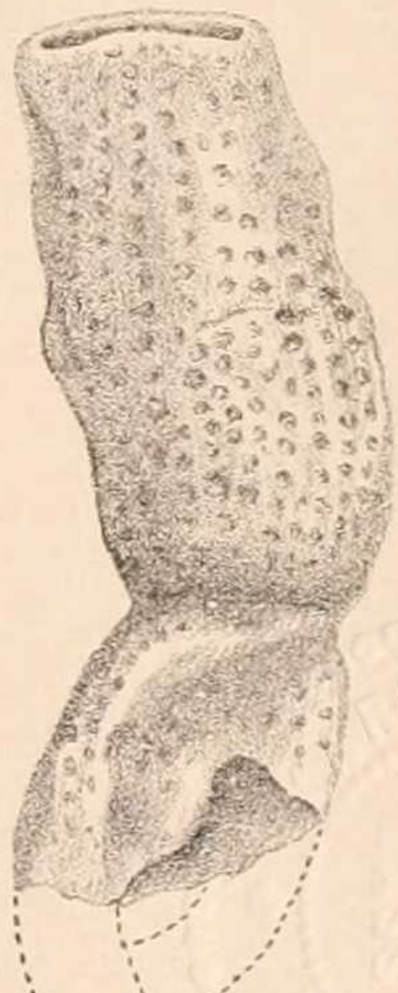

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West, Newman lith.

sands of the west shore of the Bill lending themselves with peculiar adaptability as the resting place of the shells between high- and low-water marks. In addition to this we have to bear in mind that the peninsula, which is formed of brick-earth and glacial drift of varying thicknesses, resting upon the western extremity of the old raised beach which extends from Brighton to Havant,* is bedded upon and entirely surrounded by clay reefs ("clibs" as they are locally called) of Lower Eocene date. These are the celebrated Bracklesham beds which extend in a circle, almost like the outer reef of a coral island, from West Wittering and Chichester Harbour on the west, to Pagham on the east, and the various bands of these beds, known as they are by their characteristic fossils as, for instance, the *Turritella* bed, the *Nummulite* bed, the *Cardita* bed, the *Myliobatis* (or Palate) bed and so on, are seen to dip below the peninsula, and to make their reappearance in their regular order upon the other side. Beyond Pagham comes the whole range of the London Clay beds (upon which the Bracklesham beds rest), cropping out upon the shore as the Barn Rocks, and the Bognor Rocks. Beyond Bognor again the Upper Chalk appears on the shore. Thus we have, added to the usual littoral species of Foraminifera, a vast number of fossil species derived from the Bracklesham Beds and the London Clay, of the neighbourhood, whilst the travelling shingle, bringing with it eastward the flints of the Upper Chalk, smashes a due proportion of them, containing cavities once occupied by *Siphonia* and other sponges, but now filled with the casts of Chalk Foraminifera, which disperse upon our shore-sands, and join in the extremely mixed bathing which is enjoyed by the Rhizopodal fauna of our singularly favoured peninsula.

In the Catalogue of Foraminifera which mainly constitutes this and the succeeding papers of our series, little or no attempt is made to describe the particular species from any particular gathering at any precisely noted spot upon the shores of Selsey Bill. This is for two or three reasons; first, that the main body of shells described came from a large mixed gathering of 1000 c.c. taken during a series of walks of two and a half miles from the extreme point of the Bill, eastwards, up to Thorney Farm in Bracklesham Bay; second, that for ordinary purposes of study this may fairly be taken to be one locality; and, third, it was not until we began seriously to search for the source of origin of the genus *Cyclo-loculina* that we began to make strictly localised gatherings at distances from about a quarter to half a mile apart round the peninsula. When, therefore, in the notes that accompany the catalogue of species, no precise locality is mentioned, it may be taken to have been picked out of the 1000 c.c. above referred to.

A certain number of the fossil forms now described will be found

* Bibliography (1908), p. 542, No. II.

to be referred to the Chalk, but a more systematic examination and description of the Chalk Foraminifera to be found in these sands, is reserved for a future and special paper of their own in this series.

Before beginning the Catalogue we may perhaps be allowed to call attention to certain idiosyncrasies of these sands. Foremost among these, of course, is the fact that highly varying forms of the same species are to be found together at all points of the shore. Next, that besides the new genus *Cycloloculina* in its two species *annulata* and *polygyra*, there are to be found in these sands a notable number of species among the recent forms that are entirely new to the student of the Foraminifera, whilst some forms are recorded as fossils that have never before been found excepting in recent gatherings, and, we may probably say, *vice versâ*. Lastly, the shore-sands furnish specimens of some few species that one would never expect to find in a littoral gathering at all; forms having been encountered whose hitherto recognised habitat has been the profundities of great oceans, whilst others are of species hitherto regarded as brackish water, or estuarine, species.

The shore-sands of the British Islands have not hitherto received that systematic attention from Rhizopodists to which their interest entitles them, but in connection with the deposits now under consideration we may mention that a short list of the Foraminifera of this district was contributed by Mr. F. W. Millett, F.R.M.S., to Mr. Alfred Bell's paper "Notes on a Post-Tertiary Deposit in Sussex" in the Yorkshire Philosophical Society's Report, 1892. This list was subsequently supplemented by a privately circulated note issued by Mr. Millett, entitled "The Foraminifera of a Post-Tertiary Deposit in Sussex," from which we learn that the material examined consisted of about three ounces of coarse sand, and at the end of which the author remarks: "It is evident that the deposit contains Foraminifera derived from the Eocene, and possibly from the Cretaceous, formations, mixed with a large number of recent specimens, the remainder being composed of Tertiary forms, to which, under the circumstances, it would be difficult to assign the exact horizon. Some of the species are represented by specimens both recent and fossil. This note, necessary to explain the incongruous concourse of species, was omitted from Mr. Bell's communication to the Society."

The appended list contained fifty-six species, of which in the subjoined catalogue will be found all but four, which will, no doubt, come to light at an early date.

It is the circumstances recorded in this brief introduction which have led, and encouraged, us to take the district very seriously, and to devote to the examination of its shore-sands an amount of close attention which, we trust, Rhizopodists will agree with us, has not been unworthily or unprofitably applied.

SUB-KINGDOM **PROTOZOA**.

CLASS RHIZOPODA.

ORDER *FORAMINIFERA*.

Family II. MILIOLIDÆ..

Sub-family 1. **Nubecularinæ.**

Nubecularia Defrance.

1. *Nubecularia lucifuga* **Defrance.**

Nubecularia lucifuga Defrance, 1825, Dict. Sci. Nat., vol. xxv. p. 120; Atlas Zooph., pl. xliv. fig. 3.
Ditto. (Defrance) Brady, 1884, Forams. 'Challenger,' p. 134, pl. i. figs. 9–16.
Ditto. (Defrance) Brady, 1887, Synopsis of British Recent Foraminifera.
Ditto. (Defrance) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 191, pl. xi. figs. 1–3, and pl. xiv. fig. 2.
Ditto. (Defrance) Sidebottom, 1904, Mem. and Proc. Manchester Lit. and Phil. Soc., vol. xlviii. No. 5, p. 2, pl. ii. figs. 1–4.

Frequent, both recent and fossil. The fossil specimens are of the massive labyrinthic type, whereas the recent ones are of the depressed encrusting type. Some of the recent specimens show the regular truncatuline arrangement of the chambers figured by Sidebottom from the Delos specimens.

Recorded by Millett—rare.

Sub-Family 2. **Miliolininae.**

Biloculina d'Orbigny.

2. *Biloculina ringens* **Lamark sp.**

Miliolites ringens Lamarck, 1804, Ann. du Muséum, vol. v. p. 351, No. 1, vol. ix. pl. xvii. fig. 1.
Biloculina ringens (Lamarck) Brady, 1884, Foram. 'Challenger,' p. 142, pl. ii. figs. 7, 8.
Ditto. (Lamarck) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil only. The specimens are apparently derived from at least two different deposits, probably a clay and a shell sand.

Millett's record, "very common."

3. *Biloculina sphæra* **d'Orbigny.**

Biloculina sphæra d'Orbigny, 1839, Foram. Amér. Mérid., p. 66, pl. viii. figs. 13-16.
Biloculina sphæra (d'Orbigny) Brady, 1864, Trans. Linn. Soc. Lond., vol. xxiv. p. 466, pl. xlviii. fig. 1 *a*, *b*.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 141, pl. ii. fig. 4 *a*, *b*.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

One small specimen from opposite Thorney Coastguard Station. Apparently a recent specimen, although the form is usually a deep-water type round our coasts.

Spiroloculina d'Orbigny.

4. *Spiroloculina limbata* d'Orbigny.

Spiroloculina limbata d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 299, No. 12.
Ditto. Bornemann, 1855, Zeitschr. deutsch. geol. Gesell., vol. vii. p. 348, pl. xix. fig. 1.
Spiroloculina depressa (d'Orbigny) Williamson, 1858, Rec. Foram. Gt. Britain, p. 82, pl. vii. fig. 177.
Spiroloculina limbata (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 150, pl. ix. figs. 15–17.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. The fossil specimens are from at least two different deposits—a clay with pyritic infiltrations, and probably a clean shell sand.

5. *Spiroloculina excavata* d'Orbigny.

Spiroloculina excavata d'Orbigny, 1846, Foram. Foss. Vienne, p. 271, pl. xvi. figs. 19–21.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 151, pl. ix. figs. 5, 6.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil only. The specimens are well developed and typical, some of them showing signs of pyritic internal casts, which points to a clay as their source of origin.

6. *Spiroloculina incerta* Terquem.

Spiroloculina incerta Terquem, 1882, Mém. Soc. Géol. France, ser. 3, vol. ii. Mém. III. p. 161, pl. xvi. figs. 29 *a*, *b*.

Fossil only. Terquem's description agrees very well with our specimens. Only the last two chambers are visible, the earlier ones being concealed by a deposit of shell-substance. The aperture, which is upon a produced phialine neck, is very characteristic.

7. *Spiroloculina tenuis* Czjzek sp.

Quinqueloculina tenuis Czjzek, 1847, Haidinger's Naturw. Abhandl., vol. ii. p. 149, pl. xiii. figs. 31-34.
Spiroloculina tenuis (Czjzek) Brady, 1884, Foram. 'Challenger,' p. 152, pl. x. figs. 7–11.
Miliolina tenuis (Czjzek) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil only. This species has already been recorded from Tertiary deposits by Czjzek, Reuss, and Karrer.

Recorded by Millett, "very rare."

8. *Spiroloculina tenuiseptata* Brady.

Spiroloculina tenuiseptata Brady, 1884, Foram. 'Challenger,' p. 153, pl. x. figs. 5, 6.
Ditto. (Brady) Egger, 1893, Abhandl. d. k. bayer. Akad. d. Wiss., Cl. II. vol. xviii. p. 223, pl. i. figs. 48, 49.
Ditto. (Brady) Millett, 1898, Malay Forams., Journ. R. Micr. Soc. p. 265.

The specimens are undoubtedly fossils and apparently derived

from a clay. Brady's specimens are all from tropical or sub-tropical localities, and so far as we are aware the species has not previously been recorded in the fossil state.

9. *Spiroloculina grata* Terquem.

Spiroloculina grata Terquem, 1878, Mém. Soc. Géol. France, ser. 3, vol. i. p. 55, pl. x. figs. 14*a*–15*b*.
Ditto. (Terquem) Brady, 1884, Foram. 'Challenger,' p. 155, pl. x. figs. 16, 17, 22, 23.
Spiroloculina nitida (d'Orbigny), (striate variety) Millett, 1898, Malay Forams. Journ. R. Micr. Soc. p. 266.

The specimens observed are all fossil. Terquem's specimens were Tertiary fossils from Rhodes. Its recent habitat is the shallow water of tropical seas.

Recorded by Millett, "very rare."

10. *Spiroloculina foveolata* Egger. Plate XV. fig. 2.

Spiroloculina foveolata Egger, 1893, Abhandl. d. k. bayer. Akad. d. Wiss., Cl. II. vol. xviii. p. 224, pl. i. figs. 33, 34.
Spiroloculina nitida (reticulate variety) (Egger) Millett, 1898, Journ. R. Micr. Soc., p. 266.

One very well preserved fossil. Egger's specimen was from Mauritius and Millett's from the Malay Archipelago. It has apparently never been recorded as a fossil.

11. *Spiroloculina pertusa* Terquem. (Pl. XV. fig. 1).

Spiroloculina pertusa Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. Mém. III. p. 160, pl. xvi. fig. 27 *a*, *b*.

Fossil. A single specimen only of this pretty form, which agrees in every respect with Terquem's figure.

Miliolina Williamson.

12. *Miliolina seminulum* Linné sp.

Serpula seminulum Linné, 1767, Syst. Nat. 12th ed. p. 1264, No. 791.
Ditto. 1788, 13th (Gmélin's) ed. p. 3739, No. 2.
Miliolina seminulum (Linné) Brady, 1884, Foram. 'Challenger,' p. 157, pl. v. fig. 6 *a*, *b*, *c*.
Ditto. (Linné) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Linné) Goës, 1894, Arctic and Scandinavian Forams., p. 108, pl. xviii. figs. 838–838 *n*, and pl. xix. figs. 840–3.

Fossil and recent. This usually abundant species is poorly represented in these sands in either the fossil or the recent state. Goës (*suprâ*) furnishes an extensive series of figures of this species and its allies.

Recorded by Millett, "very common."

13. *Miliolina oblonga* Montagu sp.

Vermiculum oblongum Montagu, 1803, Test. Brit., p. 522, pl. xiv. fig. 9.
Miliolina oblonga (Montagu) Brady, 1884, Foram. 'Challenger,' p. 160, pl. v. fig. 4 *a*, *b*.
Ditto. (Montagu) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Montagu) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 110, pl. xx. figs. 850–850*f*.

Fossil and recent. The specimens are for the most part typical. Several fossil specimens have also been found intermediate in character between *Miliolina oblonga* and *M. linneana*, the markings being too weak to allow of their being allotted to the latter form.

Recorded by Millett, "common."

14. *Miliolina auberiana* d'Orbigny sp.

Quinqueloculina auberiana d'Orbigny, 1839, Foram. Cuba, p. 157, pl. xii. figs. 1–3.
Miliolina auberiana (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 162, pl. v. figs. 8, 9.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foram., p. 109, pl. xix. figs. 844 *a–d*.

Recent only. Common in these shore-sands, as at Bognor, in the neighbourhood, but not otherwise widely distributed in this country.

15. *Miliolina pygmæa* Reuss sp.

Quinqueloculina pygmæa Reuss, 1850, Denkschr. d. k. Akad. Wien., vol. i. p. 384, pl. i. fig. 3 *a*, *b*.
Quinqueloculina lucida Karrer, 1868, Sitzungsb. d. k. Akad. Wiss. Wien., vol. lvii. p. 147, pl. ii. fig. 7.
Miliolina pygmæa (Reuss) Brady, 1884, Foram. 'Challenger,' p. 163, pl. cxiii. fig. 16 *a*, *b*.

Fossil only. From the appearance of the specimens they would appear to have been derived from a clay.

16. *Miliolina trigonula* Lamarck sp.

Miliolites trigonula Lamarck, 1804, Ann. du Muséum, vol. v. p. 351, No. 3.
Ditto. Lamarck, 1822, Anim. sans Vert., vol. vii. p. 612, No. 3.
Miliolina trigonula (Lamarck) Brady, 1884, Foram. 'Challenger,' p. 164, pl. iii. figs. 14–16.
Ditto. (Lamarck) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Lamarck) Goës, 1894, Artic and Scandinavian Foraminifera, p. 115, pl. xxii. fig. 870.

Fossil and recent. The species is of frequent occurrence in the fossil, and abundant in the recent state.

Recorded by Millett, "common."

17. *Miliolina tricarinata* d'Orbigny sp.

Triloculina tricarinata d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 299, No. 7; Modèle No. 94.
Miliolina tricarinata (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 165, pl. iii. fig. 17 *a*, *b*.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, pp. 114–15, pl. xxi. figs. 866–9.

Fossil and recent. The specimens though small are typical. This species is never of frequent occurrence in shore gatherings, whereas its near ally *M. trigonula* is usually abundant.

Bell records this form in his paper.

18. *Miliolina subrotunda* Montagu sp.

Vermiculum subrotundum Montagu, 1803, Test. Brit., pt. 2, p. 521.
Miliolina subrotunda (Montagu) Brady, 1884, Foram. 'Challenger,' p. 168, pl. v. fig. 10.
Ditto. (Montagu) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Montagu) Goës, 1894, Arctic and Scandinavian Foraminifera, p 109. pl. xix. figs. 846–7 *a–h*.

Recent only. This species exhibits in the specimens found in these sands the usual wide diversities of form. The biloculine, triloculine, and hauerine types are fully represented, the latter being clearly predominant. One specimen presents the feature of being markedly striate, the striæ being in the contrary direction to that usually observable, namely, at right angles to the longitudinal axis of the shell.

Recorded by Millett, "very rare."

19. *Miliolina circularis* Bornemann sp.

Triloculina circularis Bornemann, 1855, Zeitschr. d. deutsch. geol. Gesell., vol. vii. p. 349, pl. xix. fig. 4.
Miliolina circularis (Bornemann) Brady, 1884, Foram. 'Challenger,' p. 169, pl. iv. figs. 3 *a*, *b*, *c*, pl. v. figs. 13, 14 (?).
Ditto. (Bornemann) Millett, 1898, Malay Foram., Journ. R. Micr. Soc., p. 499, pl. xi. figs. 1–3.

Fossil and recent. The fossil specimens are few in number, and from their appearance are probably derived from a clay.

20. *Miliolina bicornis* Walker and Jacob sp.

Serpula bicornis Walker and Jacob, 1798, Adam's Essays, Kanmacher's Edition, p. 633, pl. xiv. fig. 2.
Miliolina bicornis (Walker and Jacob) Williamson, 1858, Recent Foram. Gt. Britain, p. 87, pl. vii. figs. 190-5.
Ditto. (Walker and Jacob) Brady, 1884, Foram. 'Challenger,' p. 171, pl. vi. figs. 9, 11, 12.
Ditto. (Walker and Jacob) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Walker and Jacob) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 113, pl. xxi. figs. 860–861 *e*.

Fossil and recent. The specimens exhibit a wide range in the

character of their markings, from the most delicately striate to the most coarsely costate types, the latter predominating among the fossil forms.

21. *Miliolina scrobiculata* Brady.

Miliolina scrobiculata Brady, 1884, Foram. 'Challenger,' p. 173, pl. cxiii. fig. 15 *a*, *b*, *c*.

Fossil only. Quite a number of small specimens have been observed which agree very clearly with Brady's description and figure. Brady's specimens were from shore-sand at Madagascar and Nares Harbour (Admiralty Islands) in seventeen fathoms, and there appears to be no other record either recent or fossil, but Brady admits that his form is probably only a local variety of *M. bicornis*, and as such it might be expected to occur wherever *M. bicornis* is abundant.

22. *Miliolina pulchella* d'Orbigny sp.

Quinqueloculina pulchella d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 303, No. 42.
Ditto. (d'Orbigny) Parker, Jones, and Brady, 1871, Ann. and Mag. Nat. Hist., ser. 4, vol. viii. p. 250, pl. viii. fig. 19.
Miliolina pulchella (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 174, pl. vi. figs. 13, 14, pl. iii. figs. 10–13.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

One fine recent specimen, from opposite West Street.

23. *Miliolina linneana* d'Orbigny sp.

Triloculina linneiana d'Orbigny, 1839, Foram. Cuba, p. 172, pl. ix. figs. 11–13.
Quinqueloculina josephina d'Orbigny, 1846, Foram. Foss. Vienne, p. 297, pl. xix. figs. 25–27.
Ditto. (d'Orbigny) Costa, 1856, Atti del Accad. Pont., vol. vii. p. 321, pl. xxv. fig. 4.
Miliolina linnæana (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 174, pl. vi. figs. 15–20.
Ditto. (d'Orbigny) Chapman, 1907, Journ. Linn. Soc., Zoology, vol. xxx. May 1907, p. 20, pl. ii. fig. 37.

Fossil only. The specimens exhibit a marked discrepancy in size, the majority being very small. This probably indicates a different source of origin. The species has been recently recorded as a Tertiary fossil by F. Chapman, and according to Brady the geological range of the species extends back to the Miocene beds of the Vienna basin.

24. *Miliolina ferussacii* d'Orbigny sp.

Quinqueloculina ferussacii d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 301, No. 18; Modèle No. 32.
Miliolina ferussacii (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 175, pl. cxiii. fig. 17 *a*, *b*.
Ditto. (d'Orbigny) var. Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. p. 325, pl. xii. figs. 10–12.

Miliolina ferussacii (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Millett, 1898, Malay Foram., Journ. R. Micr. Soc., p. 507, pl. xii. figs. 6, 7.

Fossil only. Some of the specimens closely resemble Brady's figure, but others are very like the figure of *Quinqueloculina stelligera* Schlumberger. We have not, however, seen any specimens of Schlumberger's type with which to compare them.

25. *Miliolina Parisiensis* d'Orbigny sp. Plate XV. figs. 3, 4, 5.

Quinqueloculina Parisiensis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 301, No. 5.
Ditto. (d'Orbigny) Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. p. 181, pl. xix. fig. 21.
Miliolina Parisiensis (d'Orbigny) Millett, 1898, Journ. R. Micr. Soc., p. 504, pl. xii. figs. 1 *a*, *b*, *c*.

Fossil only. F. W. Millett has furnished an exhaustive bibliography of this species in the paper referred to *suprâ*.

26. *Miliolina saxorum* Lamarck sp. Plate XV. figs. 6, 7.

Miliolites saxorum Lamarck, 1804, Ann. Mus., vol. v. p. 352, No. 5, and vol. xix. (1807) pl. 17, fig. 2 *a*, *b*.
Miliolina saxorum (Lamarck) Defrance, 1824, Dict. Sci. Nat., vol. xxxi. p. 69; vol. xxxii. (1824) p. 176; Atlas Conchol., pl. xv. fig. 1.
Quinqueloculina saxorum (Lamarck) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 301, No. 1, pl. xvi. figs. 10–14; Modèle No. 33.
Ditto. (Lamarck) Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. p. 181, pl. xix. fig. 22 *a*, *b*.

Fossil only. The specimens which we have referred to this species are of a flattened contour. The species differs from *M. Parisiensis* in that the pits in that species are intercostal, whereas in *M. saxorum* they are distributed in parallel lines upon the surface of a smooth shell.

Millett's record, "common."

27. *Miliolina contorta* d'Orbigny sp.

Quinqueloculina contorta d'Orbigny, 1846, Foram. Foss. Vienne, p. 298, pl. xx. figs. 4–6.
Quinqueloculina schlerotica Karrer, 1868, Sitz. k. Ak. Wiss. Wien., vol. lviii. Abth 1, p 152, pl iii. fig. 5.
Miliolina contorta (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Halkyard, 1889, Trans. Manchester Micr. Soc., p. 6, pl. i. fig. 4.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 111. pl. xx. figs. 851, 852.
Ditto. (d'Orbigny) Sidebottom, 1904, Mem. Manch. Lit. and Phil. Soc., vol. xlviii. No. 5, p. 13, pl. iv. figs. 7–9.
Ditto. (d'Orbigny) Earland, 1905, Journal Quekett Micr. Club, Ser. 2, vol. ix. No. 57, p. 195.

Fossil and recent. All the four types noted in Earland's paper (*suprâ*) are represented in these sands.

28. *Miliolina agglutinans* d'Orbigny sp.

Quinqueloculina agglutinans d'Orbigny, 1839, Foram. Cuba, p. 168, pl. xii. figs. 11–13.
Miliolina agglutinans (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 180, pl. viii. figs. 6, 7.
Ditto. (d'Orbigny) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. p. 355, pl. xiii. figs. 1–3.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Recent only. The specimens are of a very fine and even texture.

29. *Miliolina fusca* Brady.

Quinqueloculina fusca Brady, 1870, Ann. Mag. Nat. Hist., ser. 4, vol. vi. p. 286, pl. xi. fig. 2.
Miliolina fusca Brady, 1887, Synopsis British Recent Foraminifera.
Miliolina agglutinans (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 110, pl. xix. figs. 848 *f*, *g*, *h*.
Miliolina fusca (Brady) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol ix. No. 57, p. 197.

Recent only. The specimens occur in considerable numbers, as at Bognor. There is a considerable range in form, both spiroloculine, quinqueloculine, and hauerine specimens having been observed.

30. *Miliolina alveoliniformis* Brady.

Miliolina alveoliniformis Brady, 1879, Quart. Journ. Micr. Sci., n.s. vol. xix. p. 54.
Schlumbergerina areniphora Munier-Chalmas, 1882, Bull. Soc. Géol. France, sér. iii. vol. x. p. 425, fig.
Miliolina alveoliniformis (Brady) Brady, 1884, Foram. 'Challenger,' p. 181, pl. viii. figs. 15–20.
Ditto. (Brady) Millett, 1898, Malay Foram., Journ. R. Micr. Soc., p. 510.

Fossil only. A small number of specimens have been obtained from the detritus underlying the Mixon Rocks piled around the base of the Mixon Beacon, which are to all appearance referable to this species. They have no doubt been derived from the breaking down of the *Alveolina* limestone, of which these rocks are mainly formed, and it may be noted that thin sections of the Mixon Rocks exhibit numerous individuals with an arrangement of chambers similar to that in recent specimens of the species. *M. alveoliniformis* has not, so far as we are aware, been recorded in the fossil state, but in the living condition it is essentially a coral-reef type, and may be found in most recent dredgings in which *Alveolina* occurs. Hence its occurrence in an *Alveolina* limestone would not be unexpected.

Sub-genus *Massilina* Schlumberger.

31. *Massilina secans* d'Orbigny sp.

Quinqueloculina secans d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 303, No. 43; Modèle No. 96.
Miliolina secans (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 167, pl. vi figs. 1, 2.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Massilina secans (d'Orbigny) Schlumberger, 1893, Mem. Soc. Zool. France, vol. vi. p. 218, w. c. figs. 31–34, and pl. iv. figs. 82, 83.
Miliolina secans (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p 112, pl. xx. figs. 856–856 *g*.

Recent and fossil; the recent specimens occurring in the usual profusion, and the fossil specimens being very few in number.

Millett's record, "rare."

32. *Massilina secans* var. *tenuistriata* Earland.

Massilina secans var. *tenuistriata* Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 198, pl. xi. fig. 5.

A few specimens of this variety have been observed. It was originally recorded from the immediate neighbourhood of Bognor.

Note.—As usually is the case where a species predominates in a shore-gathering to such an extent as does *M. secans* at Selsey and at Bognor, abnormal and monstrous forms are of frequent occurrence. They have, however, no special value, beyond affording an excellent illustration of the extreme possible variability of form, which has fostered the multiplication of specific names to an extent which is, in the opinion of many rhizopodists, to be greatly deplored.

Sub-family 3. Haueriininae.

Articulina d'Orbigny.

33. *Articulina foveolata* sp. n. Plate XV. fig. 8.

Test elongate, compressed, spathulate, margin somewhat rounded, sutures slightly constricted. Surface covered with rounded shallow pittings arranged in fairly regular lines.

This may be regarded as a close ally of *Articulina lineata* Brady from which it differs principally in the nature of its surface markings.

One specimen only, a fossil, somewhat imperfect. Length of fragment 0·850 mm. Breadth 0·3 mm.

34. *Articulina sulcata* Reuss.

Articulina sulcata Reuss, 1849, Denkschr. d. k. Akad. Wiss. Wien, vol. i. p. 383, pl. xlix. figs. 13–17.
Vertebralina contracta Terquem, 1882, Mém. Soc. Géol. France, ser. 3, vol. ii. Mém. III. p. 45, pl. ii. figs. 19, 20 (perhaps 21, 22).
Articulina sulcata (Reuss) Brady, 1884, Foram. 'Challenger,' p. 183, pl. xii. figs. 12, 13.

Fossil only. One specimen only from the clay above the "Selsey Beds" opposite West Street. Terquem's species (*suprâ*) appears to be the same as Reuss's. He regards figs. 21 and 22 as being young specimens of figs. 19 and 20. Reuss's specimens were figured from the Tertiary beds of Transylvania (Hungary).

Millett's record, "very rare."

Sub-family 4. **Peneroplidinae.**

Cornuspira Schulze.

35. *Cornuspira foliacea* Philippi sp.

Orbis foliaceus Philippi, 1844, Enum. Moll. Sicil., vol. ii. p. 147, pl. xxiv. fig. 26.
Spirillina foliacea (Philippi) Williamson, 1858, Rec. Foram. Gt. Britain, p. 91, pl. vii. fig. 199–201.
Cornuspira foliacea (Philippi) Brady, 1884, Foram. 'Challenger,' p. 199, pl. xi figs. 5–9.
Cornuspira foliacea (Philippi) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil. One large thick-shelled specimen only, approaching the type of *Cornuspira carinata* (Costa) sp.

Bell records this form in his paper on the authority of Chapman.

36. *Cornuspira involvens* Reuss.

Operculina involvens Reuss, 1849, Denkschr. d. k. Akad. Wiss. Wien, vol. i. p. 370, pl. xlv. fig. 20.
Cornuspira involvens (Reuss) Jones, Parker, and Brady, 1866, Monogr. Foram. Crag. (Palæontolog. Soc.) p. 3, pl. iii. figs. 52–4.
Ditto. (Reuss) Brady, 1884, Foram. 'Challenger,' p. 200, pl. xi. figs. 1–3.
Ditto. (Reuss) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Reuss) Rupert Jones, 1895, Monogr. Foram. Crag. (Palæont. Soc.) p. 128, pl. iii. figs. 52–4, woodcuts 11 *a*, *b*.
Ditto. (Reuss) Chapman, 1907, Journ. Linn. Soc., Zoology, vol. xxx. (May) p. 23, pl. ii. fig. 46.

Fossil. The specimens are apparently derived from a clay, being filled for the most part with pyrites.

37. *Cornuspira selseyensis* sp. n. Plate XV. figs. 9, 10, 11.

Cornuspira ? sp. Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 199, pl. xiii. figs. 2–4.

Recent. The form figured by Earland (*suprâ*), occurs fairly frequently both at Bognor and Selsey, and also occurs in many of the "Goldseeker" dredgings, made in the North Sea, though never in any marked abundance. As we have little doubt as to its rhizopodal nature, we have thought it desirable, at this stage, to give it a specific name.

Description.—Test, free; bilaterally complanate, consisting of a conical tube coiled upon itself in one plane, the width of the tube approximately doubling at each convolution. Primordial chamber, large, the number of convolutions usually three and rarely exceeding five. Shell substance, thin, often semi-translucent. Frequently marked with corrugations, which apparently indicate periods of rest in the growth of the shell.

This form may eventually prove to be merely a megalospheric type of *C. involvens* (Reuss).

Peneroplis Montfort.

38. *Peneroplis pertusus* Forskal sp.

Nautilus pertusus Forskal, 1775, Descr. Anim., p. 125, No. 65.
Nautilus planatus var. *a* Fichtel and Moll, 1803, Test. Micr., p. 91, pl. xvi. *a*, *b*, *c*.
Dendritina elegans d'Orbigny, 1846, Foram. Foss. Vienne, p. 135, pl. vii. figs. 5, 6.
Ditto. (d'Orbigny) Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. p. 51, pl. iii. fig. 1 *a*, *b*.
Peneroplis pertusus (Forskal) Brady, 1884, Forams. 'Challenger,' p. 204, pl. xiii. figs. 16, 17.

Fossil only. One specimen only, small.

39. *Peneroplis pertusus* var. *arietinus* Batsch.

Nautilus umbilicatus Linné, 1767, Syst. Nat., 12th ed. p. 1163, 278.
Nautilus semilituus Linné, 1767, Syst. Nat., 12th ed. p. 1163, 280.
Nautilus (*Lituus*) *arietinus* (pars) Batsch, 1791, Conch. Seesandes, p. 4, pl. vi. fig. 15 *c*.
Peneroplis planatus d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 285, No. 1; Modèle No. 48.
Peneroplis petusus (Forskal) Brady, 1884, Foram. 'Challenger,' p. 204, pl. xiii. figs. 18, 19, 22.

Fossil only. One specimen, small.

40. *Peneroplis pertusus* var. *cylindraceus* Lamarck.

Nautilus (*Lituus*) *arietinus* (pars) Batsch, 1791, Conch. Seesandes, p. 4, pl. vi. fig. 15 *d*, *e*, *f*.
Spirolina (*Spirolinites*) *cylindracea* Lamarck, 1804, Ann. du Muséum, vol. v. p. 245, No. 2.
Spirolina cylindracea (Lamarck) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 286, No. 1; Modèle No. 24.
Spirolina austriaca d'Orbigny, 1846, Foram. Foss. Vienne, p. 137, pl. vii. figs. 7–9.
Peneroplis pertusus (Forskal) Brady, 1884, Foram. 'Challenger,' p. 205, pl. xiii. figs. 20, 21.

Fossil only. Numerous fragments, a few typical specimens.

41. *Peneroplis pertusus* var. *carinatus* d'Orbigny.

Peneroplis carinatus d'Orbigny, 1839, Foram. Amér. Mérid., p. 33, pl. iii. figs. 7, 8.
Peneroplis dubius d'Orbigny, 1839, Foram. Cuba, p. 79, pl. vi. figs. 21, 22.
Peneroplis pertusus (Forskal) Brady, 1884, Foram. 'Challenger,' p. 205, pl. xiii. fig. 14.

Fossil only, one small specimen.

Note.—The specimens of *Peneroplis* are, with few exceptions, much worn and broken. They closely resemble in appearance the specimens figured by Terquem in his Memoir on the Foraminifera of the Eocene of the Paris Basin, and have doubtless been derived from shell sands of similar age. All the specimens (except perhaps those of *var. cylindraceus*), are of small size compared with those found in recent sub-tropical gatherings.

Millett's record, "common."

Orbitolites Lamarck.

42. *Orbitolites duplex* Carpenter (*macropora* Ehrenberg sp. ?)

Orbulites macropora (?) Lamarck, 1816, Anim. Sans Vert., vol. ii. p. 197, No. 5 (*fide* Carpenter).
Orbitolites macropora (?) Goldfuss, 1826, Petrefacta Germaniæ, etc., vol. i. p. 41, pl. xii, fig. 8 *a*, *b*.
Orbitolites "duplex type," Carpenter, 1856, Phil. Trans., p. 120, pl. v. fig. 10, pl. ix. fig. 10.
Orbitolites duplex Carpenter, 1883, Report on Genus *Orbitolites*, Zool. 'Challenger' Exp., part xxi. p. 25, pl. iii. figs. 8–14; pl. iv. figs. 6–10; pl. v. figs. 1–13.
Ditto. (Carpenter) Brady, 1884, Foram. 'Challenger,' p. 216, pl. xvi. fig. 7.

Fossil. Fragments only, of frequent occurrence, but owing to the presence of the aperture on many of the fragments it is possible to identify them as belonging to this species. Carpenter supposes the *Orbulites macropora* of Lamarck to be identical with *Orbitolites duplex*, in which case, its geological history will extend back as far as early Tertiary times, otherwise the species is only

known in the shallow waters of tropical seas, where it attains a comparatively large size. All our fragments are apparently from individuals of small size.

Sub-family 5. **Alveolininae.**

Alveolina d'Orbigny.

43. *Alveolina boscii* Defrance sp.

Oryzaria boscii Defrance, 1820, Dict. Sci. Nat. vol. xvi. p. 104.
Alveolina boscii (Defrance) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 306, No. 5; Modèle No. 50.
Alveolina elongata d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 307, No. 6.
Alveolina quoii d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 307, No. 7.
Alveolina boscii (d'Orbigny) Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. p. 50, pl. ii. fig. 30.
Ditto. (Defrance) Brady, 1884, Foram. 'Challenger,' p. 222, pl. xvii. figs. 7–12.

Fossil. One of the chief constituents of the Mixon Rocks, from which detached specimens occur in profusion in the coarser siftings from all the gatherings. The specimens exhibit great diversity of form, ranging from *Alveolina sabulosa* (Montfort) to the slender *A. quoii* (d'Orbigny), and some of them even approach *A. melo* (Fichtel and Moll). We have, however, recorded them all under Defrance's species, as a more convenient method of dealing with the genus as represented in these shore-sands.

Millett's record includes *A. sabulosa* (Montfort), "very common."

Family III. ASTRORHIZIDÆ.

Sub-family 3. **Saccamminae.**

Psammosphæra Schulze.

44. *Psammosphæra fusca* Schulze.

Psammosphæra fusca Schulze, 1874, II. Jahresberichte d. Komm. Unters. d. deutsch. Meere in Kiel., p. 113, pl. ii. fig. 8.
Ditto. (Schulze) Brady, 1879, Quart. Journ. Micr. Sci., vol. xix. N.S. p. 27, pl. iv. figs. 1–2.
Ditto. (Schulze) Brady, 1884, Foram. 'Challenger,' p. 249, pl. xviii. figs. 1–8.
Ditto. (Schulze) Brady, 1887, Synopsis British Recent Foraminifera.

Recent. One small but regular and quite typical specimen. The occurrence of this species in our shore-sand is somewhat remarkable, as it is, normally, a deep-sea type. Schulze's original specimens were from a depth of 120 fathoms off the coast of Norway, and it has been recorded from Loch Scavaig, Skye, from a depth of 45 to 60 fathoms. It is of frequent occurrence in the North Sea, in similar depths, and in cold areas, but its known range extends down to 2,800 fathoms. It has not apparently been hitherto recorded from a shore-sand.

Saccammina M. Sars.

45. *Saccammina sphærica* M. Sars. Plate XV. figs. 12, 13.

Saccamina sphærica M. Sars, 1868, Vidensk.-Selsk. Forhandl. for 1868, p. 248.
Ditto. (M. Sars) G. O. Sars, 1871, Vidensk.-Selsk. Forhandl. for 1871, p. 250.
Ditto. (M. Sars) Carpenter, 1875, The Microscope, 5th ed. p. 532, fig. 272 *a*, *b*, *c*.
Ditto. (M. Sars) Brady, Foram. 'Challenger,' p. 253, pl. xviii. figs. 11–17.

The specimens figured are with considerable doubt assigned to this species. They are apparently fossils.

Family IV. LITUOLIDÆ.

Sub-family I. Lituolinae.

Reophax Montfort.

46. *Reophax moniliforme* Siddall.

Lituola findens Parker, 1870 (in Dawson's paper), Canad. Nat., vol. v. N.S. p. 177; p. 180, fig 1.
Ditto. (Parker) Siddall, 1878, Proc. Chester Soc. Nat. Sci., pt. ii. p. 47.
Reophax (?) sp. Balkwill and Wright, 1885, Trans. R. Irish Acad., xxviii. (Science) p. 328, pl. xiii. figs. 9 and 22, 23.
Reophax moniliforme Siddall, 1886, Proc. Lit. Phil. Soc. Liverpool, vol. xl. Appendix, p. 54, pl. i. fig. 2.
Reophax findens (Parker) Brady, 1887, Synopsis British Recent Foraminifera.
Reophax sp. (?) (Balkwill and Wright) Halkyard, 1889, Recent Foraminifera of Jersey in Trans. of Manchester Micr. Soc., pl. i. figs. 8, 9.

Recent. Several specimens, all imperfect, as is almost invariably the case. Various writers, including Brady, have attributed these to *R. findens* (Dawson), but in our opinion incorrectly. We have typical specimens of *R. findens*, in which the texture of the shell differs entirely from the characteristic ochraceous brown of *R. moniliforme*. Joseph Wright and others have considered the absence of primordial chambers to be evidence that the organism was of a sessile nature, but from specimens recently dredged by Earland in the Moray Firth, this appears not to be the case; the perfect test being cylindrical in form with a somewhat swollen primordial chamber.

Haplophragmium Reuss.

47. *Haplophragmium agglutinans* d'Orbigny sp.

Spirolina agglutinans d'Orbigny, 1846, Foram. Foss. Vienne, p. 137, pl. vii. figs. 10–12.
Haplophragmium agglutinans (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 301, pl. xxxii. figs. 19–26.
Ditto. (d'Orbigny) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. (Science) p. 330, pl. xiii. figs. 18–20.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Millett, 1899, Journ. R. Micr. Soc., p. 357, pl. v. fig. 1.

Fossil (?) and recent. Two distinct varieties are observable. One built up of the ordinary constituent of sand grains, the other utilising garnet and magnetite grains.

Millett's record, "rare."

48. *Haplophragmium canariense* d'Orbigny sp.

Nonionina canariensis d'Orbigny, 1839, Foram. Canaries, p. 128, pl. ii. figs. 33, 34.
Nonionina jeffreysii Williamson, 1858, Recent Foram. Gt. Britain, p. 34, pl. iii. figs. 72, 73.
Haplophragmium canariense (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 310, pl. xxxv. figs. 1–5.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 20, pl. v. figs. 92–101.

Recent. All the specimens are of the compressed evolute type, neatly built of very minute sand grains with a maximum of cement. In most of the specimens the cement is ferruginous, but in some, it is nearly pure white.

49. *Haplophragmium neocomianum* Chapman.

Haplophragmium neocomianum Chapman, 1894, Quart. Journ. Geol. Soc., vol. l. p. 695. pl. xxiv. figs. 2 *a*, *b*.
Ditto. (Chapman) Chapman, 1895, Ann. Mag. Nat. Hist., ser. 6, vol. xvi. p. 315, pl. xi. fig. 7.
Ditto. (Chapman) Chapman, 1900, Journ. Linn. Soc. (Zool.) vol. xxviii. p. 29, pl. v. fig. 2.
Ditto. (Chapman) Chapman, 1904, Proc. Roy. Soc. Victoria, N.S. vol. xvi. part 2, p. 186, pl. xxii. fig. 1.

Fossil. The septation of this species is very obscure, but becomes apparent upon wetting the shell. This species is unknown save in the fossil state, but according to Chapman, it is a frequent constituent of mesozoic microzoa and has been found in the Rhœtic beds of Somerset and the Neocomian beds of Dorset. He has also recorded it from the Cretaceous of South Africa, and from the Jurassic (Lower Oolite) of Geraldton (W. Australia).

Sub-family 2. **Trochammininae.**

Thurammina Brady.

50. *Thurammina papillata* Brady.

"*Orbuline Lituola*" Carpenter, 1875, The Microscope, 5th ed., p. 533, fig. 273, *g*, *h*.
Thurammina papillata Brady, 1879, Quart. Journ. Micr. Sci., xix., N.S. p. 45, pl. v. figs. 4–8.
Ditto. Brady, 1884, Foram. 'Challenger,' p. 321, pl. xxxvi. figs. 7–18.
Ditto. Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Brady) Earland, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 201, pl. xi. figs. 6, 7; xiv. figs. 1, 3.

The curious form figured and described by Earland (*supra*) under the name *Thurammina papillata* Brady, is extremely rare

at Selsey, one specimen only being recorded. Nothing further has, therefore, been ascertained as to the true relationship of the form since the Bognor specimens were described. It is not improbable that, when further opportunities have been afforded for the examination of this test, it may be referred to another genus, possibly to a genus hitherto undescribed, as the examination of specimens from a series of typical tests of *Thurammina papillata* from the North Sea has thrown no light upon the affinities of the Bognor specimens, recorded under this name, with which ours is identical.

Ammodiscus Reuss.

51. *Ammodiscus gordialis* Jones and Parker sp.

Trochammina squamata gordialis Jones and Parker, 1860, Quart. Journ. Geol. Soc., vol. xvi. p. 304.
Trochammina squamata var. *gordialis* Parker and Jones, 1865, Phil. Trans., vol. clv. p. 408, pl. xv. fig. 32.
Ammodiscus gordialis (Jones and Parker) Brady, 1884, Foram. 'Challenger,' p. 333, pl. xxxviii. figs. 7–9.
Ditto. (Jones and Parker) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Jones and Parker) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 202.

Recent. The specimens are quite characteristic and exactly similar to those recorded from Bognor. Many of them show signs of having been attached in life to other organisms.

52. *Ammodiscus incertus* d'Orbigny sp.

Operculina incerta d'Orbigny, 1839, De la Sagra's Hist. Physiq. etc., Cuba, "Foraminifères," p. 49, pl. vi. figs. 16, 17.
Spirillina arenacea Williamson, 1858, Rec. For. Gt. Britain, p. 93, pl. vii. fig. 203.
Trochammina incerta (d'Orbigny) Goës, 1882, Kong. Svenska. Vet. Akad. Handling, Band 19, No. 4, p. 136, pl. xi. figs. 404, 405.
Ammodiscus incertus (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 330, pl. xxxviii. figs. 1–3.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Millett, 1899, Journ. R. Micr. Soc. p. 362.

Fossil only. Apparently from a number of different deposits ranging from the Chalk, upwards, some of them being of comparatively large size.

Trochammina Parker and Jones.

53. *Trochammina inflata* Montagu sp.

Nautilus inflatus Montagu, 1808, Test. Brit., Suppl., p. 81, pl. xviii. fig. 3.
Rotalina inflata (Montagu) Williamson, 1858, Rec. Foram. Gt. Britain, p. 50, pl. iv. figs. 93, 94.
Trochammina inflata (Montagu) Brady, 1884, Foram. 'Challenger,' p. 338, pl. xli. fig. 4 *a–c*.
Ditto. (Montagu) Balkwill and Wright, 1885, Trans. R. Irish Acad. (Science), vol. xxviii. p. 331, pl. xiii. figs. 11, 12.

Trochammina inflata (Montagu) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Montagu) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 29, pl. vi. figs. 222–4.
Ditto. (Montagu) Earland, 1905, Journ. Quekett Micr. Soc., ser. 2, vol. ix. No. 57, p. 203.

Recent. If, as Brady supposes, this is essentially an estuarine species, the extensive mud-flats of Bosham and Chichester Harbour are the probable source of origin of the specimens, which occur in such unusual abundance in the shore-sands of both Bognor and Selsey. It would, however, seem improbable, that, regard being had to the friable nature of the test, specimens of this species should travel such a distance upon a shore so exposed to a recurrence of strong gales. Pending further researches we must consider that Brady's theory as to its essentially estuarine character, remains unproved.

54. *Trochammina squamata* Jones and Parker.

Trochammina squamata Jones and Parker, 1860, Quart. Journ. Geol. Soc., vol. xvi. p. 304.
Ditto. (Jones and Parker) Brady, 1884, Foram. 'Challenger,' p. 337, pl. xli. fig. 3.
Ditto. (Jones and Parker) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Jones and Parker) Egger, 1893, Abhandl. k. bayer Akad. Wiss., Cl. II. vol. xviii. p. 264, pl. v. figs. 4–6.

Recent. One typical specimen. The form is of very rare occurrence in a shore-sand.

Webbina d'Orbigny.

55. *Webbina hemisphærica* Jones, Parker, and Brady. Plate XV. fig. 14.

Webbina hemisphærica Jones, Parker, and Brady, 1866, Monogr. Foram. Crag (Palæontolog. Soc.), p. 27, pl. iv. fig. 5.
Ditto. (Jones, Parker, and Brady) Robertson, 1875, Report Brit. Assoc., Bristol Meeting, p. 189.
Ditto. (Jones, Parker, and Brady) Brady, 1884, Foram. 'Challenger,' p. 350, pl. xli. fig. 11.
Ditto. (Jones, Parker, and Brady) Brady, 1887, Synopsis British Recent Foraminifera.

The specimens figured are with considerable hesitation referred to this species. There is nothing to indicate the age of the specimens, but they are probably recent, as it is hardly conceivable that such a fragile organism could be preserved intact unless in a sheltered angle of its host. The species was originally described from the Crag of Sutton, Suffolk, and has been recorded at rare intervals around our coast. Earland, who has dredged it at several localities off Scotland, has observed a considerable difference in the (1) size, (2) colour, (3) rotundity of the specimens. The Selsey specimens agree with the type in the absence of a "floor" to the chamber. They are attached to quartz grains. The specimen figured has two chambers side by side, but without any means of communication between them.

Family V. TEXTULARIDÆ.

Sub-family 1. Textularinae.

Textularia Defrance.

56. *Textularia agglutinans* d'Orbigny.

Textularia agglutinans d'Orbigny, 1839, Foram. Cuba, p. 136, pl. i. figs. 17, 18, 32, 34.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 363, pl. xliii. figs. 1–3, vars. figs. 4–12.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 35, pl. vii. figs. 281–4, 294–303.

One fairly large fossil specimen, infiltrated with pyrites, from the sands above the Bracklesham Beds, opposite (old) Thorney Coastguard station.

57. *Textularia gramen* d'Orbigny.

Textularia gramen d'Orbigny, 1846, For. Foss. Vienne, p. 248, pl. xv. figs. 4–6.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 365, pl. xliii. figs. 9, 10.
Ditto. (d'Orbigny) Balkwill and Wright, 1885, Trans. R. Irish Acad. vol. xxviii. (Science) p. 332, pl. xiii. figs. 13, 14.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. Typical.

58. *Textularia globulosa* Ehrenberg.

Textularia globulosa Ehrenberg, 1838, Abhandl. k. Akad. Wiss. Berlin, p. 135, No. 60, pl. iv. fig. *β*.
Ditto. (Ehrenberg) Reuss. 1845–1846, Verstein. böhm. Kreide, vol. i. p. 39, pl. xii. fig. 23.
Ditto. (Ehrenberg) Eley, 1859, Geology in the Garden, p. 202, pl. ix. fig. 9*c*.
Ditto. (Ehrenberg) Brady, 1870, Ann. Mag. Nat. Hist. ser. 4. vol. vi. p. 300, pl. xii. fig. 4 *a b*.
Ditto. (Ehrenberg) Balkwill and Wright, 1885, Trans. R. Irish Acad. vol. xxviii. (Science) p. 332.
Ditto. (Ehrenberg) Brady, 1887, Synopsis Brit. Rec. Foram.

Fossil. These specimens are evidently derived from the Chalk. It has been recorded in the recent condition by Balkwill and Wright (*suprâ*), "off Dublin—very rare."

59. *Verneuilina elongata* Terquem.

Verneuilina elongata Terquem, 1882, Mém. Soc. Géol. France, ser. 3, vol. ii. Mém. III. p. 106, pl. xi. figs. 13 *a*, *b*, *c*.

Fossil. One specimen, agreeing in all essentials with Terquem's description and figures. He remarks that the arrangement of the chambers is identical with that of *Tritaxia tricarinata* (Reuss), with which it may perhaps be considered as isomorphous.

60. *Verneuilina polystropha* Reuss sp.

Bulimina polystropha Reuss, 1845, Verstein. böhm. Kreid., pt. ii. p. 109, pl. xxiv. fig. 53.
Bulimina scabra Williamson, 1858, Recent Foram. Gt. Britain, p. 65, pl. v. figs. 136, 137.
Bulimina arenacea. Ibid., p. 98.
Verneuilina polystropha (Reuss) Brady, 1884, Foram. 'Challenger,' p. 386, pl. xlvii. figs. 15–17.
Ditto. (Reuss) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Reuss) Goës, 1894, Arctic and Scandinavian Foram., p. 32, pl. vii. figs. 247–55.

Fossil (?) and recent. All the specimens are of the large, smoothly built, regular type, but they fall naturally into two distinct and well marked groups, one of a rich ferruginous brown, due to the character of the cement with which the sand-grains are built together; the other, pale grey. The latter group is further characterised by the inclusion of numerous grains of garnet, magnetite, and other minerals, giving them a very handsome appearance. It is permissible to conjecture that these marked differences in appearance are due to differences in the source of origin, and we hope eventually to be able to trace the source from which the pale specimens derive their material, and to ascertain whether they are recent or fossil.

Millett records, " rare."

61. *Verneuilina pygmæa* Egger sp.

Bulimina pygmæa Egger, 1857, Neues Jahrb. für Min., etc., p. 284, pl. xii. figs. 10, 11.
Verneuilina pygmæa (Egger) Parker and Jones, 1863, Ann. and Mag. Nat. Hist., ser. 3, vol. xi. pp. 92, 98.
Textilaria triseriata Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii.; Mém. III. p. 145, pl. xv. fig. 10.
Verneuilina pygmæa (Egger) Brady, 1884, Foram. 'Challenger,' p. 385, pl. xlvii. figs. 4–7.

Fossil. A single and typical specimen, possibly derived from the Chalk.

62. *Verneuilina spinulosa* Reuss.

Verneuilina spinulosa Reuss, 1849, Denkschr. d. k. Akad. Wiss. Wien, vol. i. p. 374, pl. xlvii. fig. 12.
Ditto. (Reuss) Brady, 1870, Ann. and Mag. Nat. Hist., ser. 4, vol. vi. p. 301, pl. xii. fig. 6.
Ditto. (Reuss) Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii.; Mém. III. p. 107, pl. xi. fig. 16, *a. b.*
Ditto. (Reuss) Brady, 1884, Foram. 'Challenger,' p. 384, pl. xlvii. figs. 1–3.
Ditto. (Reuss) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Reuss) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 205.

Fossil. Several specimens, apparently derived from different sources. The species has, however, been recorded as recent from

the estuary of the Dee (Siddall), the Dublin coast (Balkwill and Wright), Westport, Ireland (Brady), and Bognor (Earland). In view of the proximity of Bognor to Selsey, we now consider that Earland's recorded specimen should be doubtfully regarded as recent.

63. *Verneuilina triquetra* Münster sp.

Textularia triquetra Münster, 1838, Romer, Neues Jahrb. für Min., p. 384, pl. iii. fig. 19.
Verneuilina triquetra (Münster) Parker and Jones, 1863, Ann. and Mag. Nat. Hist., ser. 3, vol. xi. p. 92.
Ditto. (Münster) Brady, 1884, Foram. 'Challenger,' p. 383, pl. xlvii. figs. 18–20.
Ditto. (Münster) Chapman, 1892, Journ. R. Micr. Soc., p. 329, pl. vi. fig. 24.

Fossil. One specimen, apparently derived from the Chalk.

Tritaxia Reuss.

64. *Tritaxia lepida* Brady.

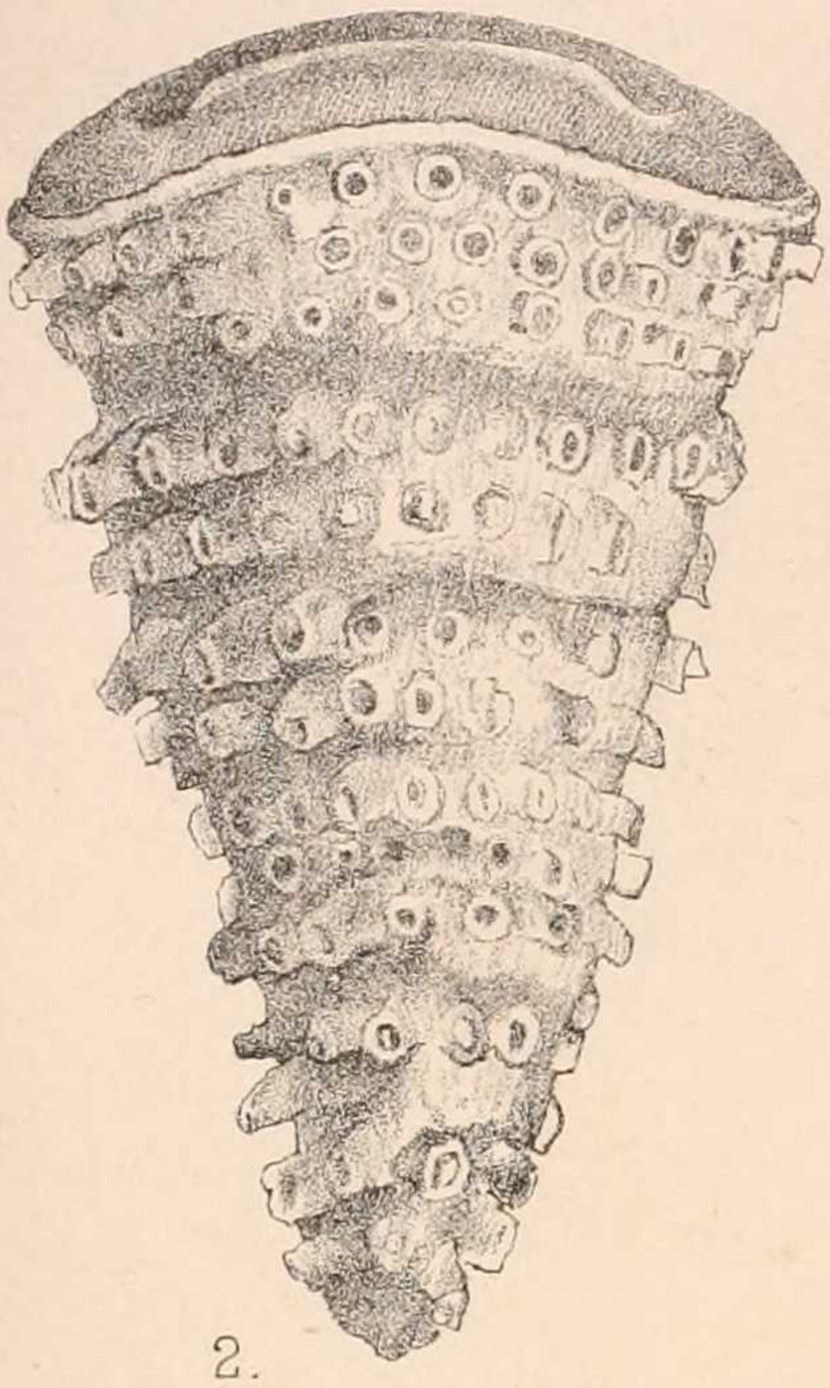
Tritaxia lepida Brady, 1881, Quart. Journ. Micr. Sci., vol. xxi. N.S. p. 55.
Tritaxia ovata Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. Mém. III. p. 105, pl. xi. fig. 11.
Tritaxia lepida (Brady) Brady, 1884, Foram. 'Challenger,' p. 389, pl. xlix. fig. 12 *a*, *b*.
Ditto. (Brady) Millett, 1899, Journ. R. Micr. Soc., p. 12, pl. i. fig. 15.

Fossil. A single specimen from under the rocks at the Mixon Beacon, doubtless derived from the detritus of the *Alveolina* limestone, of which they are mainly composed. The specimen agrees in all essentials with Millett's figure (*suprâ*). The species has not previously been recorded as fossil, except by Terquem (*suprâ*), from the Eocene of the Paris Basin. The habitat of recent specimens is the shallow waters of tropical shores, hence agreeing very well with the source of origin of our specimen.

65. *Tritaxia tricarinata* Reuss.

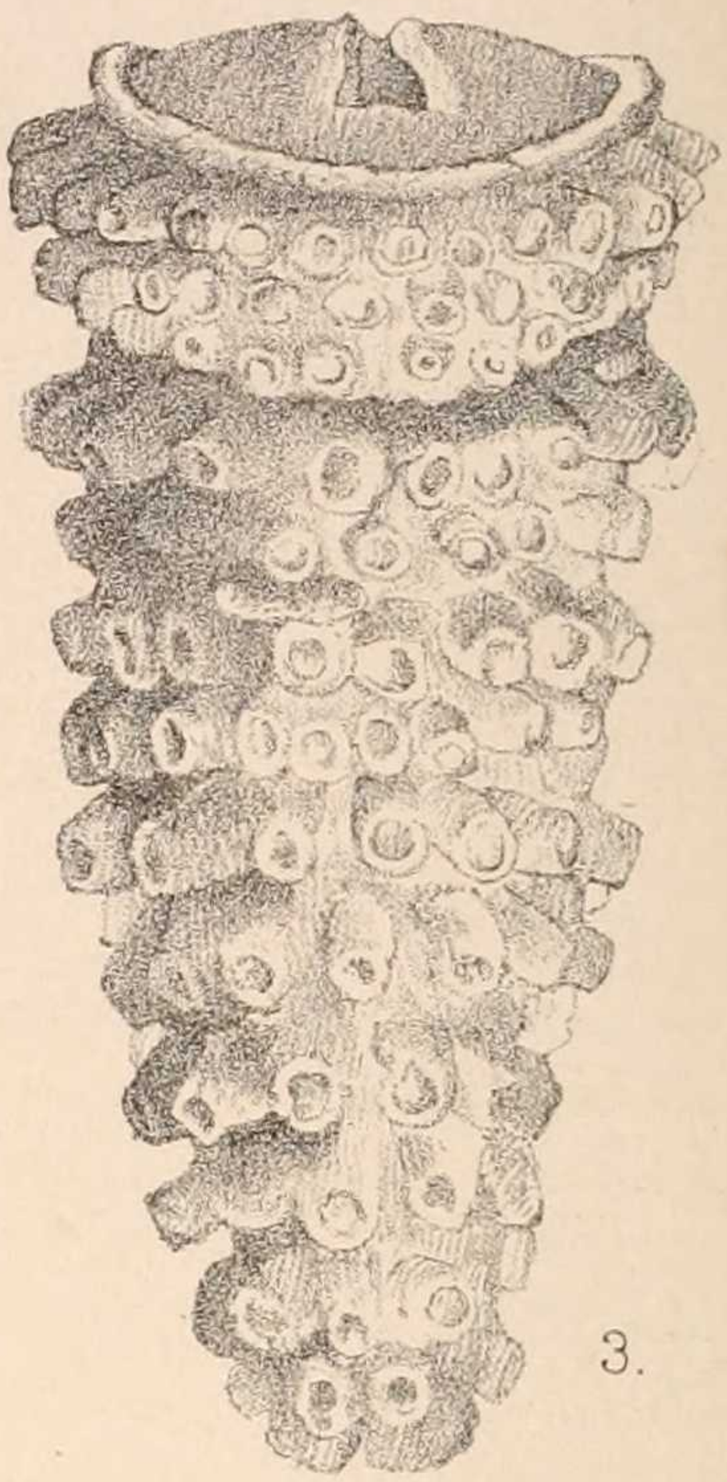
Textularia tricarinata Reuss, 1845, Verstein. Böhm. Kreid., pt. i. p. 39, pl. viii. fig. 60.
Verneuilina dubia Reuss, 1850, Haidinger's Naturw. Abhandl., vol. iv. p. 40, pl. iv. fig. 3.
Tritaxia tricarinata Reuss, 1860, Sitzungsb. d. k. Akad. Wiss. Wien, vol. xl. p. 228, pl. xii. figs. 1, 2.
Ditto. (Reuss) Brady, 1884, Foram. 'Challenger,' p. 389, pl. xlix. figs. 8, 9.

Two fossil specimens.



2.

1.



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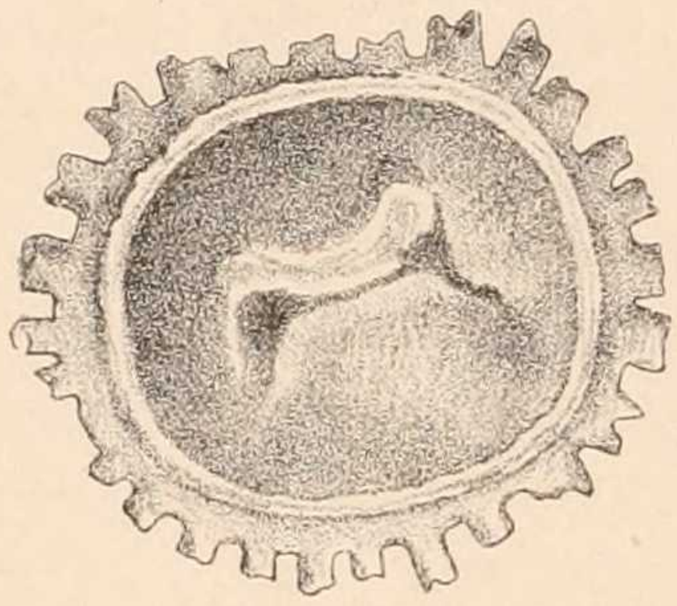

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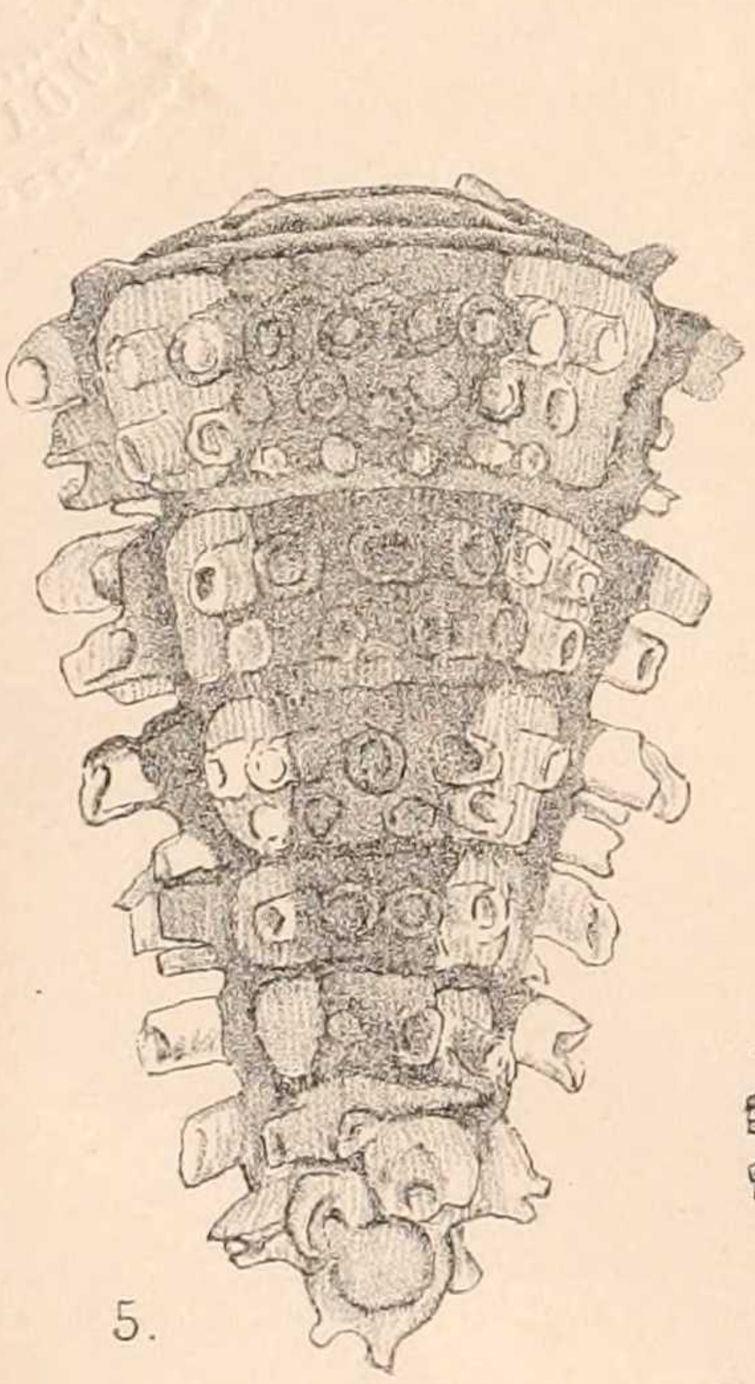

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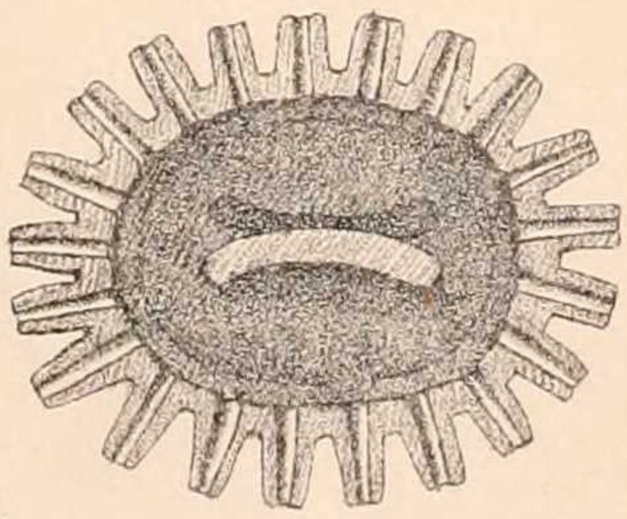

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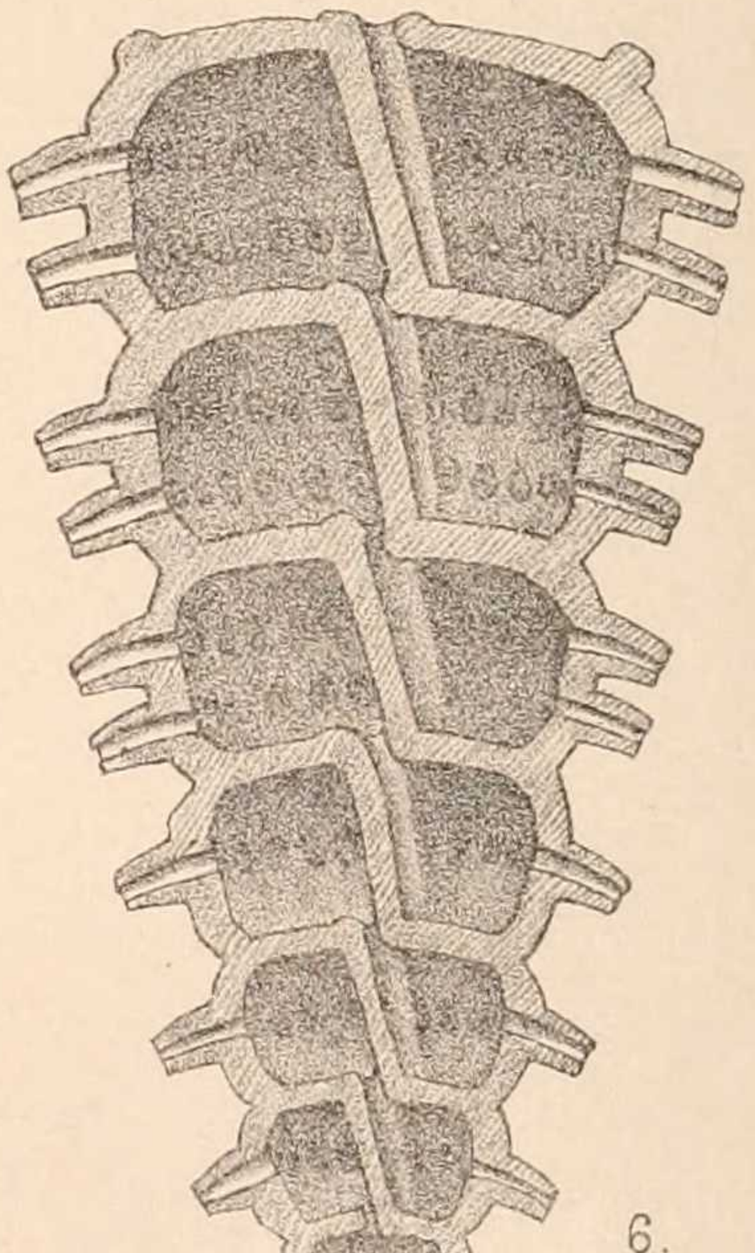

6.

West, Newman lith.

Bigenerina d'Orbigny.

66. *Bigenerina conica* sp. n. Plate XVI.

Clavulina eocæna (Gümbel), Terquem, 1882, Mém. Soc. Géol. France, ser. 3, vol. ii. Mém. III. p. 121, pl. xii. fig. 35 *a*, *b*.

Among the specimens from the shore-sands were found three which presented considerable difficulty in identification. Following Terquem's figures (*supra*) we were at first inclined to allot them to the species *Clavulina eocæna* (Gümbel), but a reference to Gümbel's original figure and description convinced us that Terquem's identification of his specimen was incorrect, and, as we have been unable to identify the form elsewhere, we now describe it under the above name. The aperture and other characteristics of the shell are such as to show it to be a true *Bigenerina*. Terquem's description is as follows :—" Shell short, nail-shaped (*forme de clou*), conical, very rough, oval in transverse section, truncate in front, obtuse behind, formed of chambers first of all spherical, very small and heaped together. The later ones (6–8) very pronounced and arranged in superimposed rings. Sutures large and deep ; aperture oval. Loc., Vaudancourt. Frequent."

This description agrees in nearly all respects with our specimens, except that the sutural lines, though readily distinguishable, can hardly be described as "pronounced," and the surface rugosities referred to in the description are really blunted or broken spines.

The assignation of this form to *Bigenerina* might not have been so certainly decided upon—in view of the few specimens found in

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EXPLANATION OF PLATE XVI.

Bigenerina conica sp. n.

Fig. 1.—A specimen (fossil) from Selsey.
,, 2.—Front view, showing aperture and tubular spines.
,, 3.—Side view.
,, 4.—Oral view.
,, 5.—A front view of balsam-mounted specimen. The dark central portion shows the so-called " siphon," extending from floor to roof in central part of each chamber.
,, 6.—Diagrammatic. Longitudinal median section, showing the nature of the tubular spines and of the so-called " siphon."
,, 7.—Diagrammatic. Horizontal median section through a chamber. The partition, or " siphon," is shown in section in the middle of the cavity, the oral opening leading to the next chamber being darkly outlined above it.

Figures 2, 3, 4, 5 are drawn from Moorabool River specimens.
All figures magnified 110 diameters.

the Selsey shore-sands—but for the fact that the same species occurs with tolerable frequency, and very much better developed, both as regards size and condition, in a fossil deposit which we have from Victoria, Australia (Filter Quarry, Moorabool River), stated to be Miocene. This Filter Quarry deposit is a clean Bryozoan shell-sand rich in Foraminifera. We have prepared sections which show that in addition to the ordinary aperture, the species has a number of supplementary apertures in the form of the conical spines, which form rings round the shell and are tubular throughout. Our sections and balsam-mounted specimens also disclose the fact that the species belongs to the group of *Bigenerinæ* for which the late M. Schlumberger proposed the sub-generic name of *Siphogenerina*. The siphon so-called, however, is not a tube, but merely an internal partition or septum, traversing the central portion of each chamber from floor to roof, and curved in section, corresponding with the external aperture, which, in perfect specimens, is a curved slit, and not an oval, as stated by Terquem.

Length of Selsey specimens, 0·3 mm. Breadth, 0·15 mm.

Filter Quarry specimens: length, 0·5–0·9 mm.; breadth, 0·25–0·4 mm. Average number of chambers in uniserial portion, six.

67. *Bigenerina selseyensis* sp. n. Plate XV. figs. 15–17.

Description.—Test dimorphous, consisting of six to eight chambers arranged on the Textularian plan, followed by two to five chambers in a continuous line. The later chambers oval in section, constricted at the sutures; aperture oval, with slightly bordered and raised rim. Surface very rough, semi-arenaceous; traces of spines observable in some specimens.

Not uncommon in the shore-sands, especially opposite Thorney coastguard station. The specimens, which are all similar in appearance, are apparently derived from a clay source, probably the Selsey Beds of Clement Reid. The species bears a considerable external resemblance to *Bigenerina Schlumbergerii*, Millett, but differs from that form in the character of its test, which is rough and semi-arenaceous, instead of hyaline, and in the absence of definite spines. We have been unable to satisfy ourselves as to the presence of an internal siphon. F. Chapman's figure of *Sagrina calcarata* Berthelin sp.* is not unlike our form in general contour, but possesses a fringe of spines round each of the moniliform chambers, which is absent in *B. selseyensis*.

Length, 0·4–0·55 mm.; breadth, 0·150–0·175 mm.; thickness, 0·125 mm.

* See this Journal, 1898, p. 15, pl. ii. fig. 14, *a*, *b*.

Spiroplecta Ehrenberg.

68. *Spiroplecta sagittula* Defrance sp.

Textularia sagittula Defrance 1824, Dict. Sci. Nat., vol. xxxii. p. 177; vol. liii. p. 344, Atlas Conchol., pl. xiii. fig. 5.
Textularia cuneiformis Williamson, 1858, Rec. Foram. Gt. Britain, p. 75, pl. vi. figs. 158, 159.
Textularia sagittula (Defrance) Brady, 1884, Foram. 'Challenger,' p. 361, pl. xlii. figs. 17, 18.
Ditto. (Defrance) Brady, 1887, Synopsis British Recent Foraminifera.
Spiroplecta sagittula (Defrance) J. Wright, 1891, Proc. R. Irish Acad., ser. 3, vol. i. No. 4, p. 471.
Ditto. (Defrance) J. Wright, 1902, Irish Naturalist, vol. xi. p. 211, pl. iii. figs. A, B, C, D, E.
Spiroplecta wrighti Silvestri, 1903, Atti Accad. Nuovi Lincei, Ann. 56, Sessione 3, p. 59.
Spiroplecta sagittula (Defrance) Chapman, 1907, Journ. Linn. Soc. (Zool.) vol. xxx. p. 27, pl. iii. figs. 58, 59.

Fossil and recent. The specimens vary very greatly in size and in maximum width of shell.

69. *Spiroplecta fusca* Earland.

Spiroplecta fusca Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 204, pl. xii. figs. 1, 2, 3.

Recent. One typical specimen from the sand opposite Medmerry Farm.

Valvulina d'Orbigny.

70. *Valvulina austriaca* d'Orbigny.

Valvulina austriaca d'Orbigny, 1846, Foram. Foss. Vienne, p. 181, pl. xi. figs. 7–8.

Fossil. One specimen, rather waterworn, but apparently referable to this species, which has also been recorded by Mr. Millett from this locality.

71. *Valvulina triangularis* d'Orbigny.

Valvulina triangularis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 270, No. 1; Modèle No. 25.
Ditto. (d'Orbigny) Terquem, 1882, Mém. Soc. Géol. France, Sér. iii. vol. ii. p. 101, pl. xi. fig. 4.

We have a single specimen from the shore-sands which is probably referable to this species, and may possibly be the same form as that referred to in Millett's list under the name *Valvulina triangularis* d'Orbigny, Bulimine form. The aperture, however, in our specimen is unfortunately broken.

Clavulina d'Orbigny.

72. *Clavulina communis* d'Orbigny.

Clavulina communis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 268, No. 4.
Ditto. d'Orbigny, 1846, For. Foss. Vienne. p. 196, pl. xii. figs. 1, 2.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 394, pl. xlviii. figs. 1–13.

Fossil. One fine specimen, and numerous fragments, apparently derived from the London Clay.

73. *Clavulina parisiensis* d'Orbigny.

Clavulina parisiensis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 268, No. 3; Modèle No. 66.
Valvulina parisiensis (d'Orbigny) Parker, Jones, and Brady, 1865, Ann. and Mag. Nat. Hist., ser. 3, vol. xvi. pp. 29, 35, pl. i. fig. 26.
Clavulina parisiensis (d'Orbigny) Terquem, 1882, Mem. Soc. Géol. France, ser. 3, vol. ii. Mém. III. p. 121, pl. xii. fig. 34 *a*, *b*.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 395, pl. xlviii. figs. 14–18.

Fossil. Many specimens, whose appearance denotes probably at least three different sources of origin; probably the London Clay, and two different sandy deposits.

Bulimina d'Orbigny.

74. *Bulimina aculeata* d'Orbigny.

Bulimina aculeata d'Orbigny, 1826, Ann. Sci. Nat., vol. vii., p. 269, No. 7.
Bulimina pupoides var. *spinulosa* Williamson, 1858, Rec. Foram. Gt. Britain, p. 62, pl. v. fig. 128.
Bulimina aculeata (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 406, pl. li. figs. 7–9.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. The recent specimen, which is the more noticeable as the species is usually confined to deep water, shows well marked spines.

75. *Bulimina affinis* d'Orbigny.

Bulimina affinis (d'Orbigny) 1839, Foram. Cuba, p. 109, pl. ii. figs. 25, 26.
Bulimina ovulum (Reuss), 1850, Haidinger's Natur. Wiss. Abhandl., vol. iv. p. 38, pl. iv. fig. 9.
Bulimina affinis (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 400, pl. l. fig. 14 *a*, *b*.

Many specimens, all fossil, some, certainly, from the Chalk.

76. *Bulimina brevis* d'Orbigny.

Bulimina brevis d'Orbigny, 1826, Ann. Sci. Nat. vol. vii. p. 270, No. 13.
Ditto. d'Orbigny, 1840, Mém. Soc. Géol. France, sér. i. vol. iv., p. 41, pl. iv. figs. 13–14; facsimile in Science Gossip, London, 1870, p. 156, fig. 147.
Ditto. (d'Orbigny) Chapman, 1892, Journ. R. Micr. Soc. p. 8, pl. xii. fig. 8.

One specimen, fossil, from a clay.

77. *Bulimina elegans* d'Orbigny.

Bulimina elegans d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 270, No. 10, Modèle No. 9.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 398, pl. l. figs. 1–4.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent, the former predominating. Among the specimens are several monstrous forms, due to the fusion of two or more individuals. Such specimens are not uncommon in recent dredgings in which this species abounds.

78. *Bulimina elongata* d'Orbigny.

Bulimina elongata d'Orbigny, 1826, Ann. Sci. Nat. vol. vii. p. 269, No. 9.
Ditto. d'Orbigny, 1846, Foram. Foss. Vienne, p. 187, pl. xi. figs. 19, 20.
Ditto. (d'Orbigny) Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. Mém. III. p. 109, pl. xi. figs. 22 *a*, *b*, 22.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 401, pl. li. figs. 1, 2.

Fossil, and one or two specimens which are apparently recent. The recorded localities for recent specimens are from moderately deep water.

79. *Bulimina obtusa* d'Orbigny.

Bulimina obtusa d'Orbigny, 1840, Mém. Soc. Géol. France, sér. 1, vol. iv. p. 39, pl. iv. fig. 5, 6; facsimile in Science Gossip, London, 1870, p. 156, fig. 143.
Ditto. (d'Orbigny) Chapman, 1892, Journ. R. Micr. Soc. p. 7, pl. xii. fig. 7 *a*, *b*.

Fossil. One specimen.

80. *Bulimina pupoides* d'Orbigny.

Bulimina pupoides d'Orbigny, 1846, Foram. Foss. Vienne, p. 185, pl. xi. figs. 11, 12.
Ditto. (d'Orbigny) Williamson, 1858, Rec. Foram. Gt. Britain, p. 62, pl. v. figs. 124, 125.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 400, pl. l. fig. 15 *a*, *b*.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Recent specimens frequent; a few fossils.

81. *Bulimina squamigera* d'Orbigny.

Bulimina squamigera d'Orbigny, 1839, Foram. Canaries, p. 137, pl. i. figs. 22–24.
Ditto. (d'Orbigny) Siddall, 1878, Proc. Chester Soc. Nat. Sci., pl. ii. p. 49.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 207.

Fossil only, with one or two doubtful exceptions. The species is of rare occurrence in recent gatherings round the British coast.

Virgulina d'Orbigny.

82. *Virgulina subsquamosa* Egger.

Virgulina subsquamosa Egger, 1857, Neues Jahrb. für Min., etc.; p. 295, pl. xii. figs. 19–21.
Virgulina tenuis Seguenza, 1862, Atti dell' Accad. Gioenia, vol. xviii. ser. 2, p. 110, pl. ii. figs. 2, 2*a*.
Virgulina subsquamosa (Egger) Brady, 1884, Foram. 'Challenger,' p. 415, pl. lii. figs. 7–11.

One specimen, apparently fossil.

Bolivina d'Orbigny.

83. *Bolivina aenariensis* Costa sp.

Brizalina aenariensis Costa, 1856, Atti dell' Accad. Pont., vol. vii. p. 297. pl. xv. fig. 1, *a*, *b*.
Bolivina costata (d'Orbigny) Siddall, 1878, Proc. Chester Soc. Nat. Science, pt. ii. p. 55.
Bolivina aenariensis (Costa) Brady, 1882, Proc. Roy. Soc. Edinburgh, vol. xi. p. 711—Table.
Ditto. (Costa) Brady, 1884, Foram. 'Challenger,' p. 423, pl. liii. figs. 10–11.
Ditto. (Costa) Siddall, 1886, Proc. Lit. Phil. Soc. Liverpool, vol. xl. Appendix, p. 56.
Ditto. (Costa) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil only; apparently from at least two different sources.

84. *Bolivina beyrichi* Reuss.

Bolivina beyrichi Reuss, 1851, Zeitschr. d. deutsch. geol. Gesell., vol. iii. p. 83, pl. vi. fig. 51.
Ditto. (Reuss) Hantken, 1875, Mittheil. Jahrb. d. k. Ung. geol. Anstalt., vol. iv. p. 64, pl. vii. fig. 11.
Ditto. (Reuss) Terrigi, 1880, Atti dell' Accad. Pont., ann. xxxiii. p. 198, pl. ii. fig. 44.
Ditto. (Reuss) Brady, 1884, Foram. 'Challenger,' p. 422, pl. liii. fig. 1.

Fossil, common. The specimens, which are apparently derived from two or three different sources, show a considerable variation in breadth. None of them exhibit any tendency to the formation of the "wing," which is usually more or less prominent in recent examples.

85. *Bolivina dilatata* Reuss.

Bolivina dilatata Reuss. 1849, Denkschr. d. k. Akad. Wiss. Wien, vol. i. p. 381, pl. xlviii. fig. 15.
Textularia variabilis var. *spathulata* Williamson, 1858, Rec. Foram. Gt. Brit., p. 76, pl. vi. figs. 164, 165.
Bolivina dilatata (Reuss) Brady, 1884, Foram. 'Challenger,' p. 418, pl. lii. figs. 20, 21.
Ditto. (Reuss) Brady, 1887, Synopsis British Recent Foraminifera.

Recent. One large and very fine specimen.

86. *Bolivina lævigata* Williamson sp.

Textularia variabilis var. *lævigata* Williamson, 1858, Recent Foram. Gt. Britain, p. 77, pl. iv. fig. 168.
Bolivina textilarioides Reuss, 1862, Sitzungsb. d. k. Akad. Wiss. Wien., vol. xlvi. p. 81, pl. x. fig. 1.
Ditto. (Reuss) Brady, 1884, Foram. 'Challenger,' p. 419, pl. lii. figs. 23–25.
Ditto. (Reuss) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. (Science) p. 334.
Bolivina lævigata (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil. Our specimens conform to Reuss's figure *B. textilarioides* (*suprâ*). Following Balkwill and Wright, and also Brady in his "Synopsis," we have assigned them to *B. lævigata* Williamson, but we are not at all convinced as to the correctness of their identification of these two forms. Williamson's type, which has well-marked peculiarities in its initial chambers, and in the texture of its surface, is of continual recurrence in North Sea and other British dredgings. It presents, in our opinion, features sufficiently marked and distinct from *B. textilarioides* to entitle the latter form to separate specific rank.

87. *Bolivina nobilis* Hantken.

Bolivina nobilis Hantken, 1875 (1876) A magy. kir. földt. int. évkönyve, iv. 56, pl. xv. fig. 4, and Mitth. a. d. Jahrb. k. ungar. geol. Anstalt iv. 1875 (1881) 65, same pl. and fig.
Ditto. (Hantken) Brady, 1884, Foram. 'Challenger,' p. 424, pl. liii. figs. 14, 15.
Ditto. (Hantken) Millett, 1900, Journ. R. Micr. Soc., p. 541, pl. iv. fig. 4.
Ditto. (Hantken) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 209.

Fossil. One large and typical example.

88. *Bolivina plicata* d'Orbigny.

Bolivina plicata d'Orbigny, 1839, Foram. Amér. Mérid., p. 62, pl. viii. figs. 4–7.
Ditto. (d'Orbigny) Brady, 1870, Ann. and Mag. Nat. Hist., ser. 4, vol. vi. p. 302, pl. xii. fig. 7.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Halkyard, 1889, Trans. and Ann. Rep. Manchester Micr Soc., p. 35, pl. i. fig. 13.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foram., p. 51, pl. ix. figs. 487, 488.

Recent and perhaps also fossil. The specimens are, in every particular, characteristic.

89. *Bolivina punctata* d'Orbigny.

Bolivina punctata d'Orbigny, 1839, Foram. Amér. Mérid., p. 63, pl. viii. fig. 10–12.
Ditto. (d'Orbigny) Brady, 1864, Trans. Linn. Soc. Lond., vol. xxiv. p. 468, pl. xlviii. fig. 9.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 417, pl. lii. figs. 18, 19.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 49, pl. ix. figs. 475-478, 480.

Fossil, frequent. Large and characteristic. Recorded by Millett, "very rare."

90. *Bolivina decorata* Jones.

Bolivina decorata (Jones MS.) Wright, J. in Cretaceous Foraminifera of Keady Hill, Co. Derry, Proc. Belfast Naturalists' Field Club, Appendix 1885–6, p. 330, pl. xxvii. figs. 7, 8.

Fossil. A few specimens only, evidently cretaceous. This rather striking species is apparently nearly allied to *Bolivina reticulata* Hantken. The description, as given by Wright, is as follows: "Test elongate, compressed, broad at the oral end and tapering to a rounded point at the aboral extremity; surface ornamented with prominent oblong tubercles, which are arranged in oblique rows."

The species is common in the Chalk obtained by Wright from hollow flints at Keady Hill, Co. Derry, and probably elsewhere in similar material.

91. *Bolivina variabilis* Williamson sp.

Textularia variabilis (*typica*) Williamson, 1858, Rec. Foram. Gt. Britain, p. 76, pl. vi figs. 162, 163 (incorrectly numbered 162, 161 on plate).
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.
Bolivina variabilis (Williamson) Chaster, 1892, First Report Southport Soc. Nat. Sci., 1890–1891, pp. 59, 69.

Fossil and recent.

Journal of the
Royal Microscopical Society

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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FOR THE YEAR

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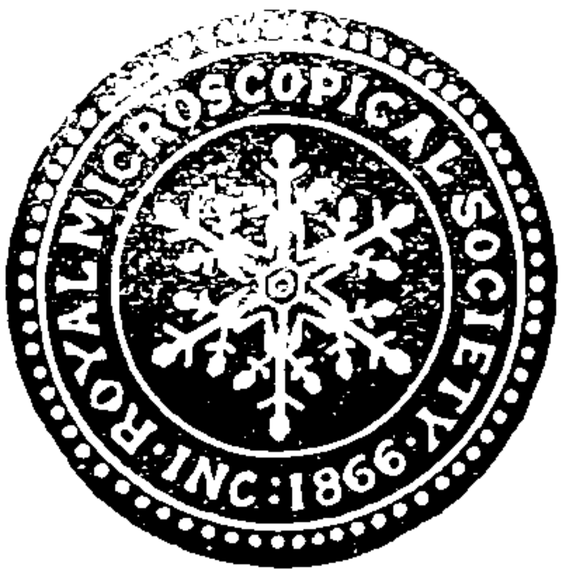

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