XIII.—*On the Recent and Fossil Foraminifera of the Shore-sands of Selsey Bill, Sussex.*—III.

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

(*Read May* 19, 1909.)

Plates XVII., XVIII.

Family VII. LAGENIDÆ.

Sub-family 1. Lageninae.

Lagena Walker and Boys.

92. *Lagena globosa* Montagu sp.

Vermiculum globosum Montagu, 1803, Test. Brit., p. 523.
Entosolenia globosa (Montagu) Williamson, 1858, Recent Foram. Gt. Britain, p. 8, pl. i. figs. 15, 16.
Lagena globosa (Montagu) Brady, 1884, Foram. 'Challenger,' p. 452, pl. lvi. figs. 1–3.
Ditto. (Montagu) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Walker and Jacob) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 77, pl. xiii. fig. 741.

Recent and fossil. The fossil specimens are principally derived from a clay, and exhibit great diversity in size. Some may possibly be primordial chambers of other Lagenidæ.

93. *Lagena lævis* Montagu sp.

Vermiculum læve Montagu, 1803, Test. Brit., p. 524.
Lagena vulgaris Williamson, 1858, Recent Foram. Gt. Britain, p. 4, pl. i. figs. 5, 5*a*.
Lagena lævis (Montagu) Brady, 1884, Foram. 'Challenger,' p. 455, pl. lvi. figs. 7–14, 30.
Ditto. (Montagu) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Montagu) Millett, 1901, Journ. R. Micr. Soc., p. 9.

Fossil (common) and recent (rare). The specimens, which are evidently from several sources, present great differences of appearance, some being practically globular, with a produced neck, others pyriform, ranging to attenuate. A few of the fossil specimens show spiral corrugations round the neck. The fossil specimens are all larger than the recent. Millett gives exhaustive references for this widely-distributed form in his Malay paper (*suprâ*).

94. *Lagena clavata* d'Orbigny sp.

Oolina clavata d'Orbigny, 1846, For. Foss. Vienne, p. 24, pl. i. figs. 2, 3.
Lagena lævis var. *amphora* Williamson, 1848, Ann. and Mag. Nat. Hist., ser. 2, vol. i. p. 12, pl. i. figs. 3, 4.
Lagena vulgaris var. *clavata* Williamson, 1858, Recent Foram. Gt. Britain, p. 5, pl. i. fig. 6.
Lagena clavata (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 75, pl. xiii. figs. 725–27.

Recent. Typical.

95. *Lagena striata* d'Orbigny sp.

Oolina striata d'Orbigny, 1839, Foram. Amér. Mérid., p. 21, pl. v. fig. 12.
Lagena substriata Williamson, 1848, Ann. and Mag. Nat. Hist., ser. 2, vol. i. p. 15, pl. ii. fig. 12.
Lagena vulgaris var. *substriata* Williamson, 1858, Recent Foram. Gt. Britain, p. 7, pl. i. fig. 14.
Lagena striata (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 460, pl. lvii. figs. 22, 24, 28, 29, etc.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 75, pl. xiii. figs. 732–6.

Recent and fossil. Rare.

96. *Lagena sulcata* Walker and Jacob sp.

Serpula (*Lagena*) *sulcata* Walker and Jacob, 1798, Adam's Essay, Kammacher's ed., p. 634, pl. xiv. fig. 5.
Lagena vulgaris var. *perlucida* (pars) Williamson, 1858, Recent Foram. Gt. Britain, p. 5, pl. i. fig. 8.
Lagena vulgaris var. *striata* Williamson, 1858, Recent Foram. Gt. Britain, p. 6, pl. i. fig. 10.
Lagena sulcata (Walker and Jacob) Brady, 1884, Foram. 'Challenger,' p. 462, p. lvii. figs. 23, 25, 26, 27, 33, 34; pl. lviii. figs. 4, 5, 6, 17, 18.
Ditto. (Walker and Jacob) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Walker and Boys) Goës, 1894, Arctic and Scandinavian Foram., p. 78, pl. xiii. fig. 744.

Fossil and recent. The fossil specimens are apparently from several sources. Recent specimens occur which may be referred to Williamson's var. *interrupta*, which is of doubtful varietal value.

97. *Lagena acuticosta* Reuss.

Lagena acuticosta Reuss, 1861, Sitz. k. Akad. Wiss. Wien, vol. xliv. p. 305, pl. i. fig. 4.
Ditto. (Reuss) Brady, 1884, Foram. 'Challenger,' p. 464, pl. lvii. figs. 31, 32; pl. lviii. figs. 20 (?), 21.

One small specimen, of a very elongate type, and with only five costæ—apparently a Cretaceous fossil.

98. *Lagena williamsoni* Alcock sp.

Entosolenia williamsoni Alcock, 1865, Proc. Lit. and Phil. Soc. Manchester, vol. iv. p. 195.
Lagena williamsoni (Alcock) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. (Sci.) p. 339, pl. xiv. figs. 6–8.
Ditto. (Alcock) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. Fairly frequent, the recent specimens predominating.

99. *Lagena semistriata* Williamson.

Lagena striata var. *β semistriata* Williamson, 1848, Ann. and Mag. Nat. Hist., ser. 2, vol. i. p. 14, pl. i. figs. 9, 10.
Lagena vulgaris var. *semistriata* Williamson, 1858, Recent Foram. Gt. Britain, p. 6, pl. i. fig. 9.
Lagena semistriata (Williamson) Brady, 1884, Foram. 'Challenger,' p. 465, pl. lvii. figs. 14, 16, 17.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. The recent specimens agree in all respects with Williamson's type. The fossil specimens contain examples both of the type, and of Williamson's type *perlucida*.

100. *Lagena squamosa* Montagu sp.

Vermiculum squamosum Montagu, 1803, Test. Brit., p. 526, pl. xiv. fig. 2.
Entosolenia squamosa (Montagu) Williamson, 1858, Recent Foram. Gt. Britain, p. 12, pl. i. fig. 29.
Lagena squamosa (Montagu) Brady, 1884, Foram. 'Challenger,' p. 471, pl. lviii. figs. 28–31.
Ditto. (Montagu) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Montagu) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 79, pl. xiii. fig. 745.

Recent.

101. *Lagena reticulata* Macgillivray sp.

Lagenula reticulata Macgillivray, 1843, Hist. Test. Anim. Aberdeen, etc., p. 38.
Lagena reticulata (Macgillivray) Reuss, 1862, Sitz. k. Akad. Wiss. Wien, vol. xliv. p. 335, p. v. figs. 67, 68.
Ditto. (Macgillivray) Jones, 1895, Palæont. Soc., p. 195, pl. iv. fig. 7.

Fossil and recent. The fossil specimens are apparently derived from a clay.

102. *Lagena hexagona* Williamson sp.

Entosolenía squamosa var. *hexagona* Williamson, 1848, Ann. and Mag. Nat. Hist., ser. 2, vol. i. p. 20, pl. ii. fig. 23.
Ditto. Williamson, 1858, Recent Foram. Gt. Britain, p. 13, pl. i. fig. 31.
Entosolenia squamosa var. *scalariformis* Williamson, 1858, Recent Foram. Gt. Britain, p. 13, pl. i. fig. 30.
Lagena hexagona (Williamson) Brady, 1884, Foram. 'Challenger,' p. 472, pl. lviii. figs. 32, 33.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil. Rare.

103. *Lagena lævigata* Reuss sp.

Fissurina lævigata Reuss, 1849, Denkschr. d. k. Akad. Wiss. Wien, vol. i. p. 366, pl. xlvi. fig. 1.
Lagena lævigata (Reuss) Balkwill and Millett, 1884, Journ. Micr., vol. iii. p. 80, pl. ii. fig. 6; trigonal form, p. 81, pl. iii. fig. 6.
Ditto. (Reuss) Brady, 1884, Foram. 'Challenger,' p. 473, pl. cxiv. fig. 8 *a*, *b*.
Ditto. (Reuss) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent.

104. *Lagena lucida* Williamson sp.

Entosolenia marginata var. *lucida* Williamson, 1858, Recent Foram. Gt. Britain, p. 10, pl. i. figs. 22, 23.
Lagena oblonga (Seguenza) J. Wright, 1876-7, Proc. Belfast Field Club (Appendix), p 104, pl. iv. fig. 9 *a*, *b*.
Lagena lucida (Williamson) Balkwill and Millett, 1884, Journ. Micr., vol. iii. p. 80, pl. ii. fig. 7, and pl. iii. figs. 4, 5.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

Recent only.

105. *Lagena marginata* Walker and Boys.

Serpula (*Lagena*) *marginata* Walker and Boys, 1784, Test. Min., p. 2, pl. i. fig. 7.
Entosolenia marginata (pars) Williamson, 1858, Recent Foram. Gt. Britain, p. 10, pl. i. fig. 21.
Lagena marginata (Walker and Boys) Brady, 1884, Foram. 'Challenger,' p. 476, pl. lix. figs. 21-3.
Ditto. (Walker and Boys) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent, the former predominating in numbers. The marginal keel is only slightly developed in the Selsey specimens, and the fossils come from two or three different sources.

106. *Lagena orbignyana* Seguenza sp.

Entosolenia marginata (pars) Williamson, 1858, Recent Foram. Gt. Britain, p. 10, pl. i. figs. 19, 20.
Fissurina orbignyana Seguenza, 1862, Foram. Monotal. Misc. Messina, p. 6, pl. ii. figs. 65, 66.
Lagena orbignyana (Seguenza) Brady, 1884, Foram. 'Challenger,' p. 484, pl. lix. figs. 1, 18, 24–6.
Ditto. (Seguenza) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil (frequent) and recent (rare). The recent specimens present no features different from those usually found in shore specimens, but the fossils, the majority of which are apparently derived from clays, vary greatly in size, convexity, and width of "wing." Some of the fossil specimens are covered with an adherent matrix; these may possibly be derived from the limestone of the Mixon Rocks.

107. *Lagena orbignyana* var. *selseyensis* var. n.

(Plate XVII. figs. 1, 2.)

Among the specimens referable to Seguenza's species *L. Orbignyana* are a number which possess sufficiently striking individuality to render them worthy of separate and particular notice, and for them we propose the varietal name "*selseyensis*." The specimens, which are all fossils, and apparently derived from the same source of origin—which, judging from their appearance, was probably a shell-sand of sub-tropical origin, such as characterises the fauna of many early Tertiary formations—are of a somewhat elongate form; the two faces of the shell are nearly parallel and surrounded by a raised edge, which is also extended into a "wing." The intermediate, or middle wing, which is of about the same diameter all round the shell, is strongly marked. The shell is

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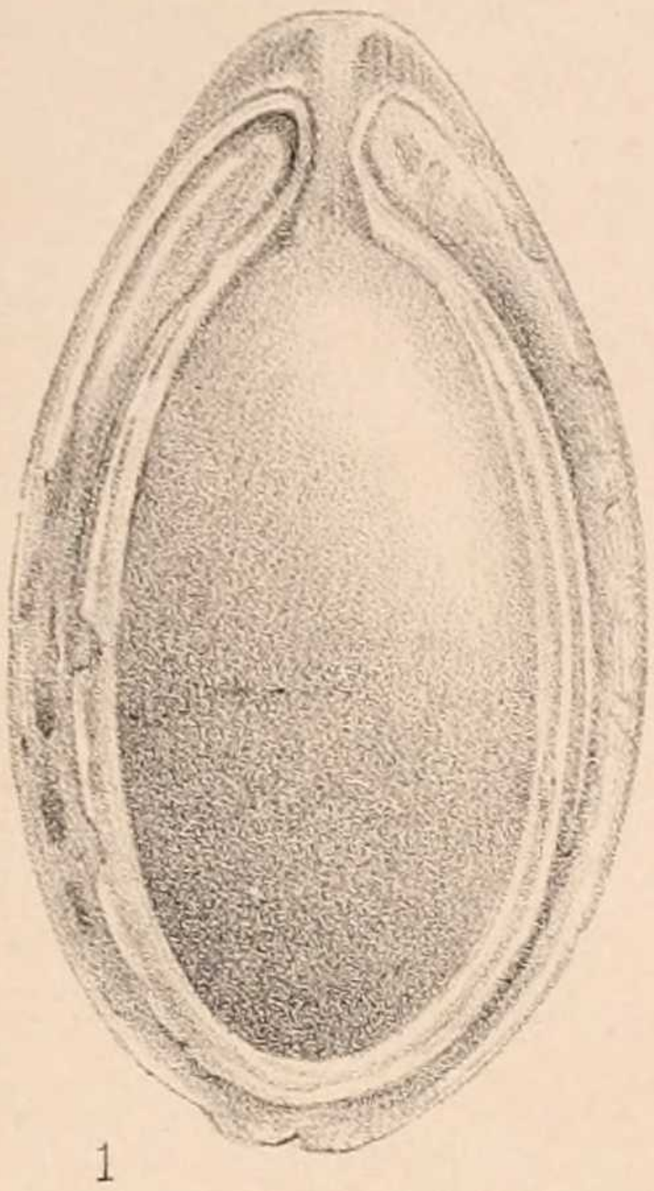
EXPLANATION OF PLATE XVII.

Fig. 1.—*Lagena orbignyana* Seguenza sp. var. *selseyensis*.
„ 2.—Ditto. Edge views.
„ 3.—*Polymorphina complanata* d'Orbigny.
„ 4.—Ditto.
„ 5.—Ditto. Oral aspect.
„ 6.—*P. concava* Will. Detached specimen.
„ 7.—*P. hirsuta* B. P. and J.
„ 8.—*P. ornata* Karrer.
„ 9.—*P. spinosa* d'Orb. sp.

Figs. 3, 4, 5 × 50 diam.; the others × 100 diam.



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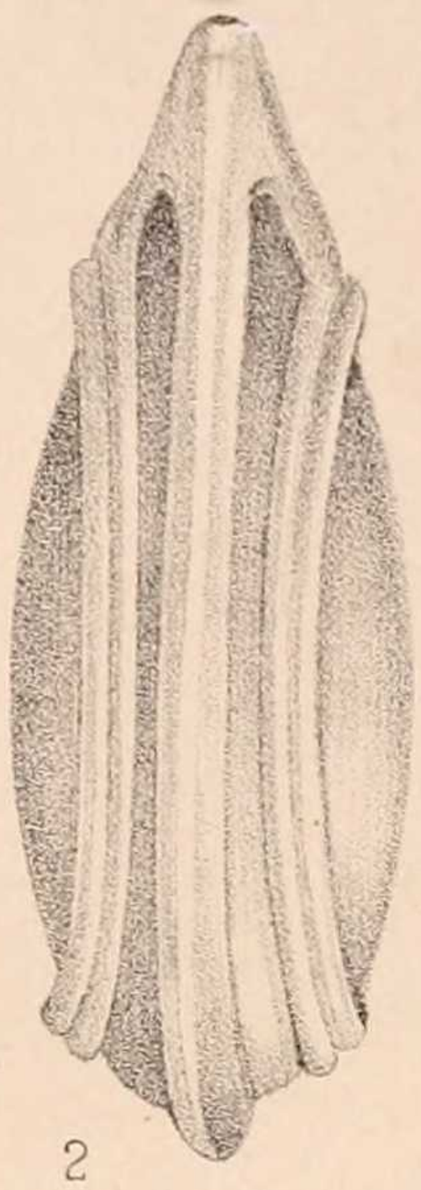

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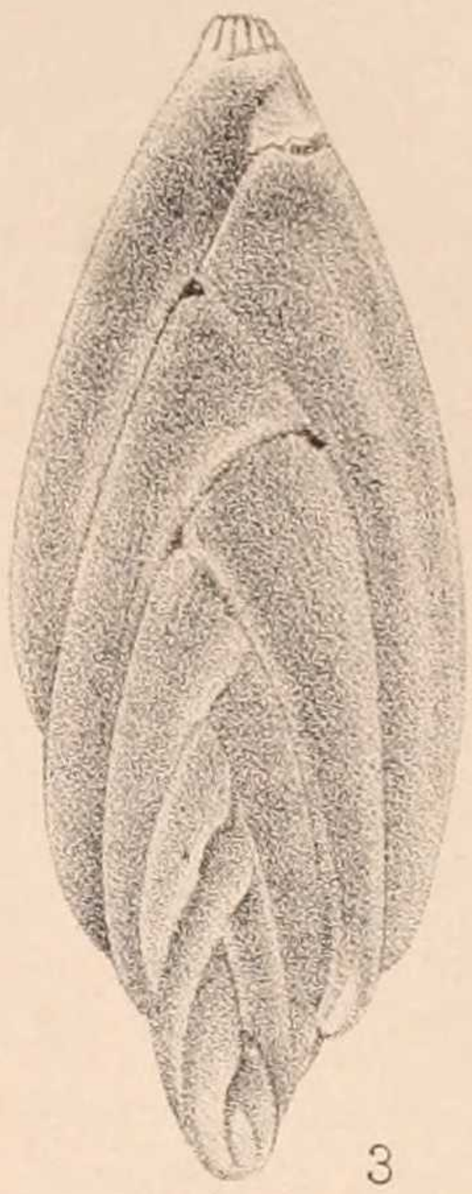

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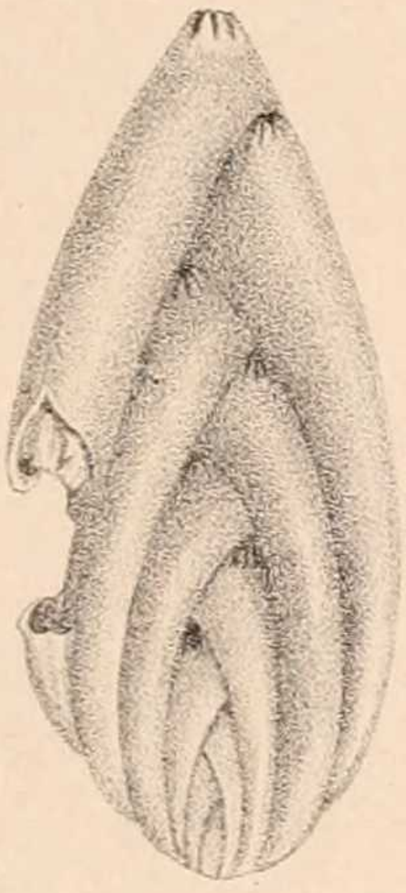

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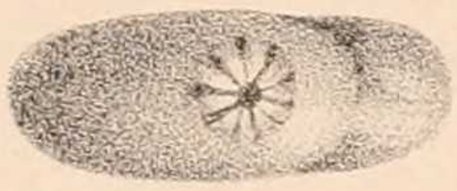

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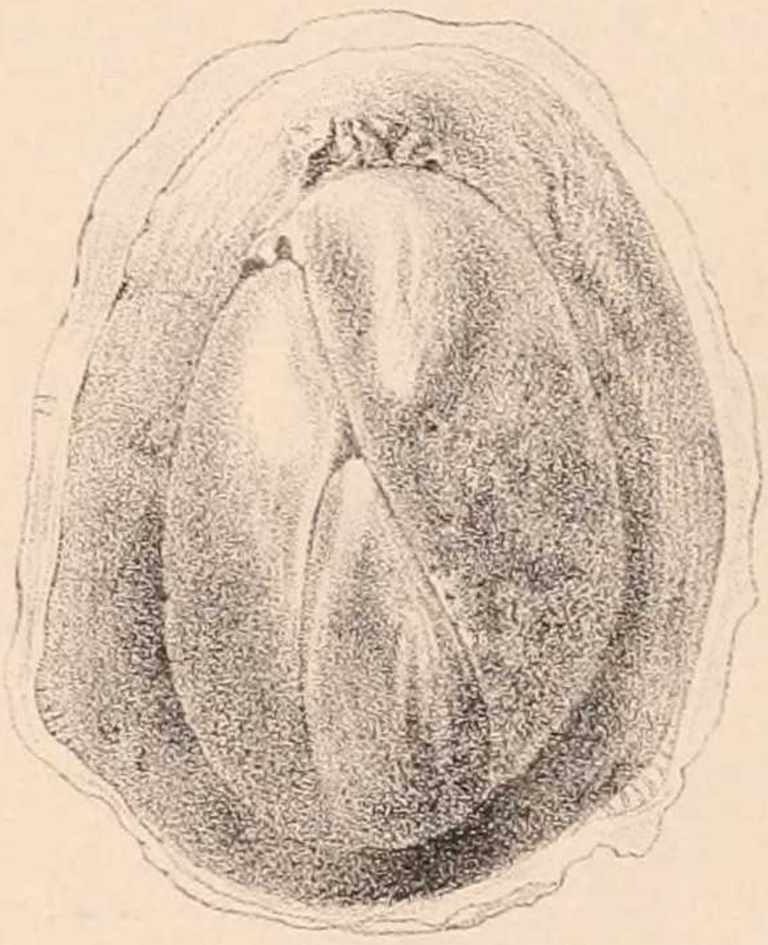

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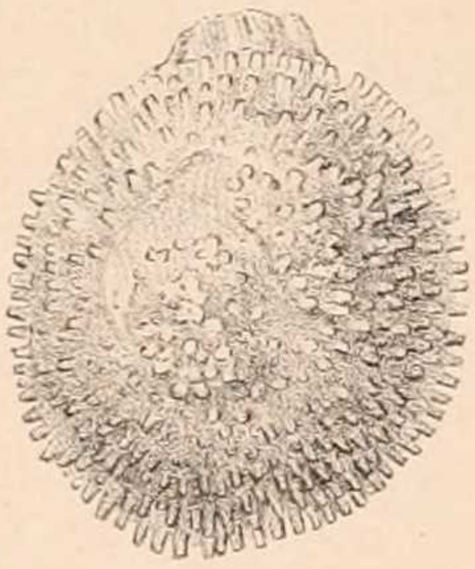

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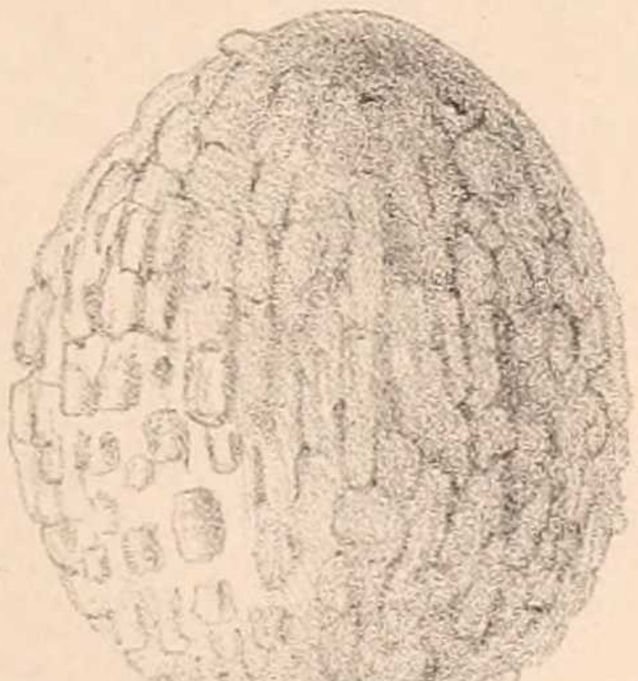

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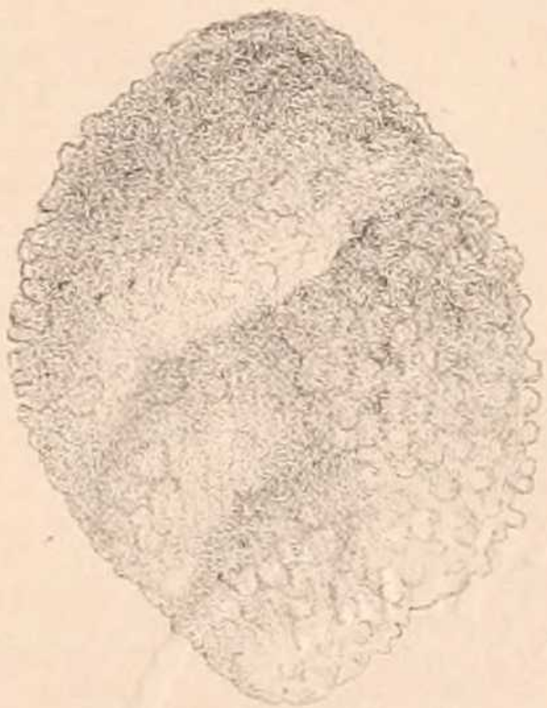

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West, Newman lith.

stout and massively built; the oral end is somewhat produced, the middle carina being continued to the very extremity. The surface is typically smooth in all instances.

Sub-family 2. **Nodosarinae.**

Nodosaria Lamarck.

108. *Nodosaria lævigata* d'Orbigny.

Nodosaria (*Glandulina*) *lævigata* d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 252, No. 1, pl. x. figs. 1–3.
Nodosaria lævigata (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 490, pl. lxi. figs. 20–2.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 71, pl. xiii. figs. 702, 703, 706, 707, 709.

Fossil only. Most of the specimens are of an elongate type, principally derived from clays.

109. *Nodosaria filiformis* d'Orbigny.

Nodosaria filiformis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 253, No. 14.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 500, pl. lxiii. figs. 3–5.

Fossil, apparently derived from both chalk and clay.

110. *Nodosaria soluta* Reuss.

Dentalina soluta Reuss, 1851, Zeitschr. deutsch. geol. Gesell., vol. iii. p. 63, pl. iii. fig. 4.
Nodosaria soluta (Reuss) Brady, 1884, Foram. 'Challenger,' p. 503, pl. lxii. figs. 13–16; var. pl. lxiv. fig. 28.
Ditto. (Reuss) Goës, 1894, Arctic and Scandinavian Foram., p. 70, pl. xii. fig. 690.

One fossil fragment, apparently referable to this species.

Frondicularia Defrance.

111. *Frondicularia inæqualis* Costa.

Frondicularia inæqualis Costa 1855, Mem. Accad. Sci. Napoli, vol. ii. p. 372, pl. iii. fig. 3.
Ditto. (Costa) Brady, 1884, Foram. 'Challenger,' p. 521, pl. lxvi. figs. 8–12.

Fossil. One imperfect specimen, from a clay. This species has been recorded from many fossil deposits of later Tertiary age.

Rhabdogonium Reuss.

112. *Rhabdogonium tricarinatum* d'Orbigny sp.

Vaginulina tricarinata d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 258, No. 4; Modèle No. 4.
Rhabdogonium pyramidale Karrer, 1861, Sitz. k. Akad. Wiss. Wien, vol. xvi. p. 19, pl. i. fig. 34.
Rhabdogonium tricarinatum (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 525, pl. lxvii. figs. 1–3.
Ditto. (d'Orbigny) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. (Science) p. 344, pl. xii. figs. 17, 18.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

One specimen only, fossil and pyritised, from the Blue Band opposite West Street (Thorney Coastguard Station). It has been recorded from the Miocene of Baden (near Vienna) by Karrer, and from other later Tertiary deposits.

Cristellaria Lamarck.

113. *Cristellaria lata* Cornuel sp.

Marginulina lata Cornuel, 1848, Mém. Soc. Géol. France, sér. 2, vol. iii. p. 252, pl. i. figs. 34–7.
Planularia pauperata Jones and Parker, 1860, Quart. Journ. Geol. Soc., vol. xvi. p. 454, pl. xx. fig. 39.
Cristellaria lata (Cornuel) Brady, 1884, Foram. 'Challenger,' p. 539, pl. lxvii. fig. 18 *a*, *b*.

One fossil specimen; cretaceous.

114. *Cristellaria crepidula* Fichtel and Moll sp.

Nautilus crepidula Fichtel and Moll, 1803, Test. Micr., p. 107, pl. xix. figs. *g–i*.
Cristellaria crepidula (Fichtel and Moll) d'Orbigny, 1839, Foram. Cuba, p. 64, pl. viii. figs. 17, 18.
Cristellaria cymboides d'Orbigny, 1846, For. Foss. Vienne, p. 85, pl. iii. figs. 30, 31.
Cristellaria subarcuatula Williamson, 1858, Recent Foram. Gt. Britain, p. 29, pl. ii. 56, 57.
Cristellaria crepidula (Fichtel and Moll) Brady, 1884, Foram. 'Challenger,' p. 542, pl. lxvii. figs. 17, 19, 20; pl. lxviii. figs. 1, 2.
Ditto. (Fichtel and Moll) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Fichtel and Moll) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 62, pl. xi. figs. 599, 600.

Fossil. The specimens are of the megalospheric type.

115. *Cristellaria italica* Defrance sp.

Saracenaria italica Defrance, 1824, Dict. Sci. Nat., vol. xxxii. p. 177; ibid. 1827, vol. xlvii. p. 344; Atlas Conchol., pl. xiii. fig. 6.
Cristellaria (*Saracenaria*) *italica* (Defrance) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 293, No. 26; Modèles 19 and 85.

Cristellaria subarcuatula var. *scapha* Williamson, 1858, Recent Foram. Gt. Britain, p. 30, pl. ii. figs. 60, 61.
Cristellaria italica (Defrance) Brady, 1884, Foram. 'Challenger,' p. 544, pl. lxviii. figs. 17, 18, 20–3.
Ditto. (Defrance) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil only. One good and typical specimen, of medium size.

116. *Cristellaria rotulata* Lamarck sp.

Lenticulites rotulata Lamarck, 1804, Ann. Mus., vol. v. p. 188, No. 3; and 1806, vol viii. pl. lxii. fig. 11.
Cristellaria rotulata (Lamarck) d'Orbigny, 1840, Mém. Soc. Géol. France, sér. 1, vol. iv. p. 26, pl. ii. figs. 16–18.
Cristellaria calcar (Linné) *typica* Williamson, 1858, Recent Foram. Gt. Britain, p. 27, pl. ii. figs. 52, 53.
Cristellaria rotulata (Lamarck) Brady, 1884, Foram 'Challenger,' p. 547, pl. lxix. fig. 13 *a*, *b*.
Ditto. (Lamarck) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Lamarck) Goës, 1894, Arctic and Scandinavian Foraminifera, p. 60, pl. x. figs. 559–78.

Fossil and recent. All the specimens are small; the largest recent specimen is somewhat abnormal, and is characterised by a very large primordial chamber. The fossil specimens have the appearance of being derived from the London Clay.

117. *Cristellaria crassa* d'Orbigny.

Cristellaria crassa d'Orbigny, 1846, Foram. Foss. Vienne, p. 90, pl. iv. figs. 1–3.
Robulina deformis Reuss, 1851, Zeitschr. d. deutsch. geol. Gesell., vol. iii. p. 70, pl. iv. fig. 30.
Cristellaria crassa (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 549, pl. lxx. fig. 1 *a*, *b*.

One fossil specimen, apparently derived from the Chalk. The species, according to Brady, is very rare in the recent condition. It occurs more frequently in many later Tertiary deposits.

118. *Cristellaria nitida* d'Orbigny.

Cristellaria nitida d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 291, No. 5.
Cristellaria cassis (pars) (Fichtel and Moll) Parker, Jones, and Brady, 1871, Ann. and Mag. Nat. Hist., ser. iv. vol. viii. p. 244, pl. x. fig. 88.
Cristellaria nitida (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 549, pl. lxx. fig. 2 *a*, *b*.

Fossil. One specimen, from a clay. The carina is slightly serrate.

119. *Cristellaria cultrata* Montfort.

Robulus cultratus Montfort, 1808, Conchol. Systém., vol. i. p. 214, 54e genre.
Robulina cultrata (Montfort) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 287, No. 1; Modèle No. 82.
Cristellaria cultrata (Montfort) Brady, 1884, Foram. 'Challenger,' p. 550, pl. lxx. figs. 4–8.

Fossil. The specimens are rare, and present both the megalospheric and microspheric forms. They are small, but well developed and typical.

Sub-family 3. **Polymorphininae.**

Polymorphina d'Orbigny.

120. *Polymorphina lactea* Walker and Jacob sp.

Serpula lactea Walker and Jacob, 1798, Adam's Essays (Kammacher's ed.) p. 634, pl. xiv. fig. 4.
Polymorphina lactea (typica) (pars) Williamson, 1858, Recent Foram. Gt. Britain, p. 70, pl. vi. fig. 147.
Polymorphina lactea var. *communis* Williamson, ibid. p. 72, pl. vi. figs. 153–5.
Polymorphina lactea (Walker and Jacob) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 213, pl. xxxix. figs. 1 *a–c*.
Ditto. (Walker and Jacob) Brady, 1884, Foram. 'Challenger,' p. 559, pl. lxxi. figs. 11, 14.
Ditto. (Walker and Jacob) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. Recent specimens frequent, fossil specimens abundant, characterised by the same diversity in (1) source of origin, (2) size, (3) shape or rotundity, as in the closely allied species *P. gibba*; indeed, with many of the specimens it is difficult to say to which form they should be referred. In such a collection of varying specimens it is possible to build up a series linking the two forms.

121. *Polymorphina oblonga* Williamson.

Polymorphina lactea var. *oblonga* Williamson, 1858, Recent Foram. Gt. Britain, p. 71, pl. vi. fig. 149.
Polymorphina oblonga (Williamson) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 222, pl. xxxix. fig. 7 *a*, *b*.
Polymorphina lactea var. *oblonga* (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.
Polymorphina lactea var. *oblonga* (Williamson) Millett, 1903, Journ. R. Micr. Soc., p. 262, pl. v. fig. 5.

Recent and characteristic, but rare. The specific name, *P oblonga*, has been previously used by d'Orbigny for an elongate variety which has really no definite specific value, but presents characteristics allied to d'Orbigny's *P. problema* and *P. communis*. In view of the well-marked and constant features presented by

the form which Williamson described as a variety of *P. lactea*, we are justified in suppressing d'Orbigny's species, and raising Williamson's variety to specific rank as *P. oblonga*, a definite type.

122. *Polymorphina concava* Williamson.

(Plate XVII. fig. 6.)

Polymorphina lactea var. *concava*, Williamson, 1858, Rec. Foram. Gt. Britain, p. 72, pl. vi. figs. 151, 152.
Polymorphina concava (Williamson) Brady, Parker and Jones, 1870, Trans. Linn. Soc. Lond, vol. xxvii. p. 236, pl. xl. figs. 22 *a*, b.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.
Polymorphina lactea var. *concava* (Williamson) Sidebottom, 1907, Mem. Lit. and Phil. Soc. Manchester, vol. li. pt. 3, p. 14, pl. iii. figs. 8, 9.

One perfect, recent specimen, unattached. This pretty little Foraminifer is of very infrequent occurrence under any circumstances, and especially so in shore gatherings. Sidebottom (*suprâ*) has written at some length upon the peculiar features of this species.

123. *Polymorphina gibba* d'Orbigny.

Polymorphina (*Globulina*) *gibba* d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 266, No. 20; Modèle No. 63.
Polymorphina gibba (d'Orbigny) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 216, pl. xxxix. fig. 2 *a–d*.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 561, pl. lxxi. fig. 12 *a*, *b*.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. Very common, the fossil specimens especially abundant, and presenting the greatest possible variety of form, from the perfectly globular to compressed specimens hardly separable from *P. lactea*. The fossils are evidently derived from a number of different sources; many of them show signs of considerable wear and weathering. It will be observed later that this is one of the commonest Foraminifera in the Bracklesham clays of the artesian well boring, to be considered at a future date.

124. *Polymorphina sororia* Reuss.

Polymorphina (*Guttulina*) *sororia* Reuss, 1862, Bull. Acad. Roy. Belg., sér 2, vol. xv. p. 121, pl. ii. figs. 25–29.
Ditto. Reuss, 1870, Sitz. k. Akad. Wiss. Wien, vol. lxii. p. 487, No. 9; von Schlicht, 1870, Foram. Pietzpuhl, pl. xxvi. figs. 4–12, 16, 18.
Polymorphina sororia (Reuss) Brady, 1884, Foram. 'Challenger,' p. 562, pl. lxxi. figs. 15, 16.
Ditto. (Reuss) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil. This type is with difficulty separable from *P. lactea*, from which it is differentiated merely by its elongated sub-fusiform shape.

125. *Polymorphina angusta* Egger.

Polymorphina (*Globulina*) *angusta* Egger, 1857, Neues Jahrb. für Min., etc., p. 290, pl. xiii. figs. 13–15.
Polymorphina fusiformis (pars) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 219.
Polymorphina angusta (Egger) Brady, 1884, Foram. 'Challenger,' p. 563, pl. lxii. figs. 1–3.

One specimen, which is to all appearances a recent one. It may, however, be noted that this species is usually found in deep water only, and its occurrence in a shore-sand would therefore be a matter of some note. As a fossil it has been recorded from the Miocene.

126. *Polymorphina lanceolata* Reuss.

Polymorphina lanceolata Reuss, 1851, Zeitschr. d. deutsch. geol. Gesell., vol. iii. p. 83, pl. vi. fig. 50.
Polymorphina fusiformis (pars) (Roemer) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. London, vol. xxvii. p. 219, pl. xxxix. fig. 5 *b*, *c*.
Polymorphina lanceolata (Reuss) Brady, 1884, Foram. 'Challenger,' p. 564, pl. lxxii. figs. 5, 6.
Ditto. (Reuss) Brady, 1887, Synopsis British Recent Foraminifera.

Frequent, and, with one possible exception, all fossil. The fossil specimens are evidently from several different sources, one, at least, being cretaceous. Of the others, some are apparently derived from clays, and others from sandy deposits.

127. *Polymorphina compressa* d'Orbigny.

Polymorphina compressa d'Orbigny, 1846, For. Foss. Vienne, p. 233, pl. xii. figs. 32–4.
Polymorphina lactea (Walker and Jacob) *typica* (pars) Williamson, 1858, Recent Foram. Gt. Britain, p. 70, pl. vi. figs. 145, 146.
Polymorphina compressa (d'Orbigny) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 227, pl. xl. figs. 12 *a–f*.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 565, pl. lxxii. figs. 9–11.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Frequent and well developed. Fossil only, and apparently from several sources. A few specimens are evidently derived from the Mixon Rocks, as they are still imbedded in matrix.

128. *Polymorphina complanata* d'Orbigny.

(Plate XVII. figs. 3–5.)

Polymorphina complanata d'Orbigny, 1846, For. Foss. Vienne, p. 234, pl. xiii. figs. 25–30.
Ditto. (d'Orbigny) Jones, Parker, and Brady, 1866, Mon. Crag. Foram. (Palæont. Soc.), pl. i. figs. 52, 53, 60.

Polymorphina complanata (d'Orbigny) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond. vol. xxvii. p. 230, pl. xl. figs. 14 *a*, *b*, woodcuts *f*–*j*.
Ditto. (d'Orbigny) Balkwill and Millett, 1884, Journ. Micr. and Nat. Sci. vol. iii. p. 84, pl. iv. fig. 9.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

One large and perfect specimen, and several more or less imperfect. They are of an extremely compressed and elongate type, differing considerably in breadth from most of the figured specimens of *P. complanata*. Indeed, their general outline is strongly suggestive of *Frondicularia gaultina* (Reuss), but the true polymorphine nature of the shell is clearly marked by the fact that the earlier chambers are set in a somewhat different plane to the later ones. The specimens are undoubtedly fossil, and are probably derived from a clay, but it has been recorded among recent British Foraminifera by Balkwill and Millet (*suprâ*) from the shore-sands of Galway. Their specimen, however, is of a broader and thicker build.

The large perfect specimen measures 1·15 mm. in length and 0·425 mm. in breadth; the smaller one, which is less attenuate, is 0·83 mm. in length and 0·375 in breadth.

129. *Polymorphina elegantissima* Parker and Jones.

Polymorphina elegantissima Parker and Jones, 1865, Phil. Trans., vol. clv. table x. p. 438.
Ditto. (Parker and Jones) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 231, pl. xl. figs. 15 *a*–*c*.
Ditto. (Parker and Jones) Brady, 1884, Foram. 'Challenger,' p. 566, pl. lxxii. figs. 12–15.

Fossil. The specimen, which is not very characteristic, is apparently derived from a clay. Brady's records are all from moderate depths in tropical and sub-tropical seas, but he mentions that the *P. problema* var. *deltoidea* of Reuss and *P. anceps* of Philippi are apparently inseparable from this species. These are both recorded as Tertiary fossils.

130. *Polymorphina communis* d'Orbigny.

Polymorphina (*Guttulina*) *communis* d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 266, pl. xii. figs. 1–4; Modèle No. 62.
Polymorphina communis (d'Orbigny) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 224, pl. xxxix. fig. 10 *a*, *b*.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 568, pl. lxii. fig. 19.
Polymorphina problema (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Frequent. The specimens are apparently all fossil.

131. *Polymorphina rotundata* Bornemann sp.

Guttulina rotundata Bornemann, 1855, Zeitschr. d. deutsch. geol. Gesell., vol. vii. p. 346, pl. xi., pl. xvii. fig. 3.
Polymorphina rotundata (Bornemann) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 234, pl. xl. figs. 19 *a–e* and woodcuts.
Ditto. (Bornemann) Brady, 1884, Foram. 'Challenger," p. 570, pl. lxxiii. figs. 5–8.
Ditto. (Bornemann) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil. Many and large, and one small recent specimen. The fossils are evidently derived from several different sources.

132. *Polymorphina myristiformis* Williamson.

Polymorphina myristiformis Williamson, 1858, Recent Foram. Gt. Britain, p. 73, pl. vi. figs. 156, 157.
Ditto. (Williamson) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 240, pl. xli. fig. 30 *a–c*.
Ditto. (Williamson) Brady, 1884, Foram. 'Challenger,' p. 571, pl. lxxiii. figs. 9, 10.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

One good and typical specimen. Recent.

133. *Polymorphina ornata* Karrer.

(Plate XVII. fig. 8.)

Polymorphina ornata Karrer, 1868, Sitz. k. Akad. Wiss., vol. lvii. p. 175, pl. iv. fig. 10.
Ditto. (Karrer) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 242, pl. xli. figs. 34 *a*, *b*.

One fossil specimen, which agrees very well with the figure in Brady, Parker, and Jones's monograph (*suprâ*), although the ornamentation is even more strongly pronounced. It is to all appearances derived from the Chalk. The locality of Karrer's specimens is not furnished, but they were presumably Miocene. As pointed out by Brady, Parker, and Jones (*suprâ*) this form can hardly be separated from strongly-marked specimens of *P. myristiformis* (Williamson).

134. *Polymorphina tuberculata* d'Orbigny sp.

Globulina tuberculata d'Orbigny, 1846, For. Foss. Vienne, p. 230, pl. xiii. figs. 21, 22.
Polymorphina tuberculata (d'Orbigny) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 242, pl. xli. fig. 35 *a–d*.

Fossil. One specimen only. This form is with difficulty separable from the last named species; probably any considerable number of specimens would present a complete series of transitional types.

135. *Polymorphina regina* Brady, Parker, and Jones.

Polymorphina regina Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 241, pl. xli. fig. 32 *a*, *b*.
Polymorphina semicostata Marsson, 1878, Mitth. Nat. Ver. Neu-Vorpommern u. Rugen, Jahrg., x. p. 150, pl. ii. fig. 19.
Polymorphina regina (Brady, Parker, and Jones) Brady, 1884, Foram. 'Challenger,' p. 571, pl. lxxiii. figs. 11–13.
Ditto. (Brady, Parker, and Jones) var. Wright, 1886, Proc. Belfast Nat. Field Club, 1884–5, App. ix. p. 331, pl. xxvii. figs. 13, 14.
Ditto. (Brady, Parker, and Jones) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 217.

Many specimens, all well defined; some fossil, others, to all appearances, recent. The distribution, with the exception of Earland's record from the Bognor shore-sands, is confined to tropical and sub-tropical shallow water. Fossil records are apparently confined to the Chalk, but our specimens are certainly not Cretaceous, being probably derived from Tertiary sands and clays.

136. *Polymorphina spinosa* d'Orbigny sp.

(Plate XVII. fig. 9.)

Globulina spinosa d'Orbigny, 1846, For. Foss. Vienne, p. 230, pl. xiii. figs. 23, 24.
Polymorphina spinosa (d'Orbigny) Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 243, pl. xlii. figs. 36 *a*, *b*.
Ditto. (d'Orbigny) Siddall, 1878, Proc. Chester Soc. Nat. Sci., pt. ii. p. 48.
Ditto. (d'Orbigny) Balkwill and Wright, 1885, Trans. R. Irish Acad. (Science), vol. xxviii. p. 347, pl. xii. fig. 27.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Many fossils, and one very fine specimen which is almost certainly recent. The fossils vary considerably in the abundance and size of the spines, and have the appearance of being derived from a Tertiary shell-sand. The species has been recorded in the recent state by Siddall from the estuary of the Dee, and by Balkwill and Wright from the Irish Sea (*supra*). It has also been recently found by Earland in the Moray Firth.

137. *Polymorphina hirsuta* Brady, Parker, and Jones.

(Plate XVII. fig. 7.)

Polymorphina hirsuta Brady, Parker, and Jones, 1870, Trans. Linn. Soc. Lond., vol. xxvii. p. 243, pl. xlii. fig. 37.

One specimen, probably fossil, well marked and typical. The separation of this form from *P. spinosa* (d'Orbigny) is somewhat

arbitrary, the only essential difference being in the character of the spines, which are fine and regular instead of being coarse or tubercular. *P. hirsuta* has been recorded as a fossil from the Crag, and also in the recent condition by Brady, Parker, and Jones from the West Indies.

Note.—Fistulose specimens referable to *P. lactea*, *P. gibba*, and *P. rotundata*, have also been observed in the Selsey shore-sands. Rupert Jones and Chapman have devoted much labour to the examination of the recorded specimens of fistulose *Polymorphinæ*, and the separation of these outgrowths into varieties (see Journ. Linn. Soc. (Zool.) vol. xxvi. 1897). But the question of giving varietal names to these abnormal outgrowths is very debatable. The different forms assumed by these abnormal growths, both free and attached, is, in our opinion (which is based upon a very extended series of recent specimens dredged in the North Sea) due entirely to the position assumed by the specimen at the time when it entered upon the proliferous stage of shell-growth, and the character and shape of the objects immediately surrounding it at that time, or to which it was adherent.

Uvigerina d'Orbigny.

138. *Uvigerina asperula* Czjzek var. *ampullacea* Brady.

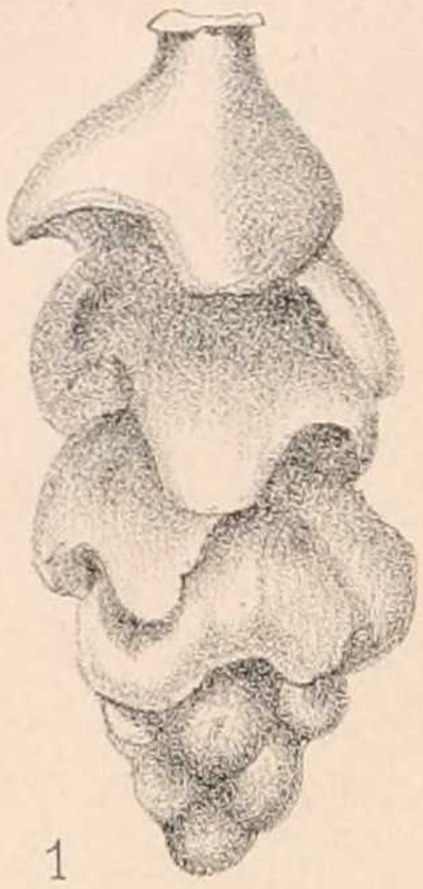
Uvigerina asperula var. *ampullacea* Brady, 1884, Foram. 'Challenger,' p. 579, pl. lxxv. figs. 10, 11.

One fossil specimen, pyritised, and probably from the London Clay. This variety has apparently not been previously recorded in the fossil state.

139. *Uvigerina angulosa* Williamson.

Uvigerina angulosa Williamson, 1858, Recent Foram. Gt. Britain, p. 67, pl. v., fig. 140.
Uvigerina pygmea var. *angulosa* (Williamson) Parker and Jones, 1865, Phil. Trans., vol. clv., p. 364, pl. xiii., fig. 68; pl. xvii., fig. 66.
Uvigerina angulosa (Williamson) Brady, 1884, Foram. 'Challenger,' p. 576, pl. lxxiv., fig. 15–18.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

Rare, both in the recent and fossil states. As a recent shell it is widely distributed, but usually occurs in fairly deep water; as a fossil it has been recorded from the later Tertiary deposits.



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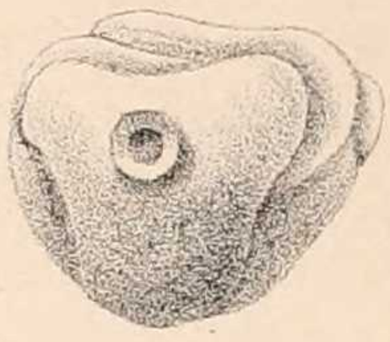

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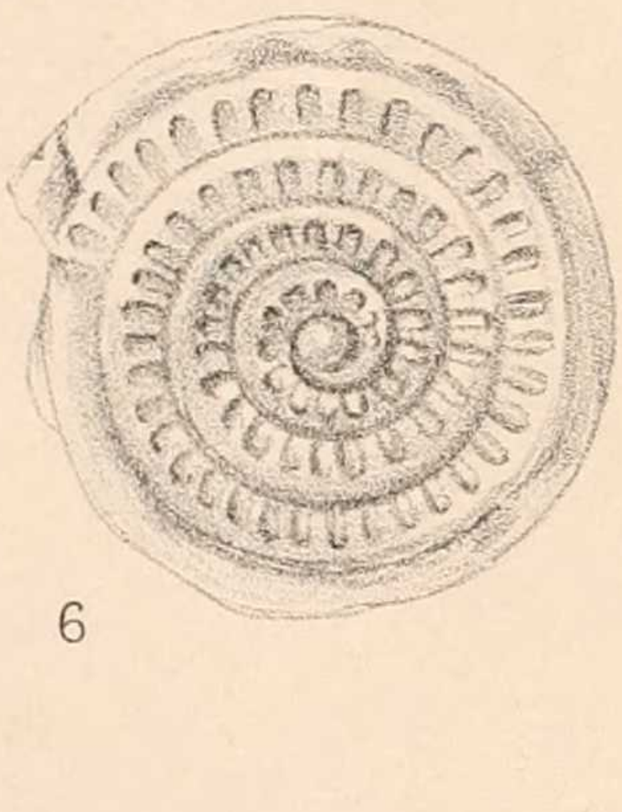

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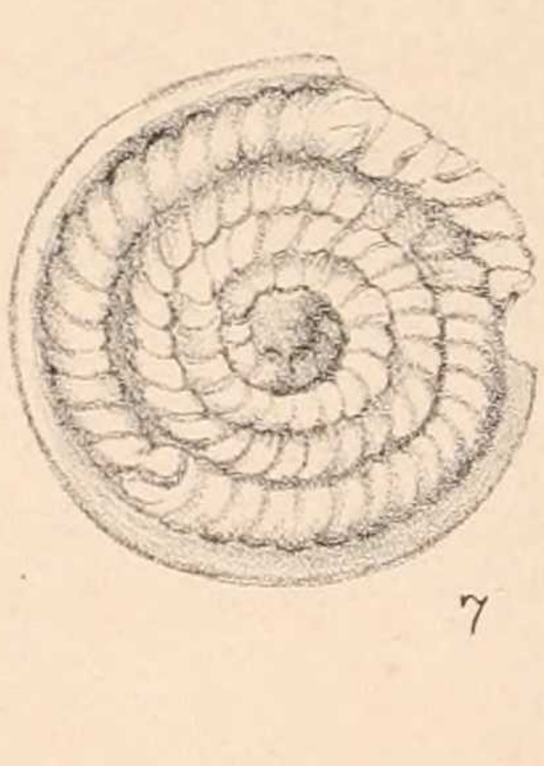

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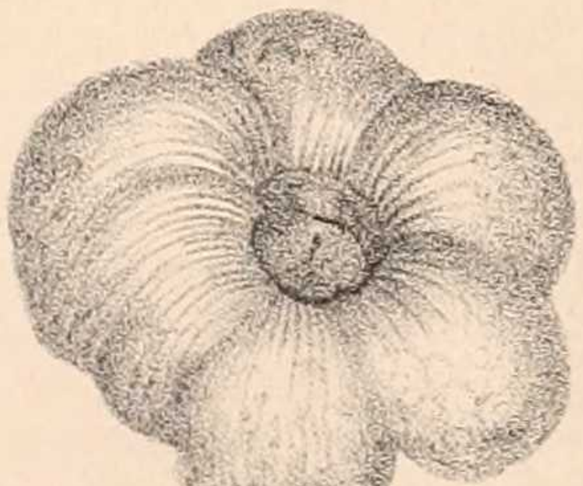

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West, Newman lith.

140. *Uvigerina muralis* Terquem.

Uvigerina muralis Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. 2, Mém. III. p. 119, pl. xii. figs. 26–9.

Fossil. We have found a good many specimens of this rather striking type, all of which are in agreement with the figures 27, 28, and 29 in Terquem's monograph. Terquem describes and figures two distinct forms under this name, one having a rough surface and with the earlier chambers arranged biserially, the other having a smooth surface and a consistently uvigerine arrangement. It appears probable, however, from the figure and description, that the rough surfaced specimens are a distinct form.

The specific name *muralis* very well describes the appearance of the form, the chambers of which look like rounded pebbles imbedded in a wall. Terquem's description also refers to this appearance of the shell, "formée des loges irregulières . . . agglutinées comme des petites pierres."

Terquem's specimens were from the Eocene of the Paris basin. He does not state whether they occur with frequency or otherwise.

141. *Uvigerina selseyensis* sp. n.

(Plate XVIII. figs. 1–3.)

Several fossil specimens. This handsome form presents appearances intermediate between *U. angulosa* (Williamson) and *U. porrecta* (Brady). It differs from *U. angulosa* in that the later chambers, which are triangular in shape, are set spirally around the central tube, as in *U. porrecta*, from which, however, it differs in the absence of the strongly marked costæ which characterise that species. The basal edge of each of the later chambers is strongly concave, whereas in *U. porrecta* the basal edge is convex. Length 0·4 mm., greatest breadth, 0·2 mm.

EXPLANATION OF PLATE XVIII.

Fig. 1.—*Uvigerina selseyensis* sp. n.
,, 2.—Ditto.
,, 3.—Ditto. Oral aspect.
,, 4.—*Globigerina pachyderma* Ehrenberg sp.
,, 5.—Ditto.
,, 6.—*Spirillina selseyensis* sp. n. Superior surface.
,, 7.—Ditto. Inferior surface.
,, 8.—*Discorbina cristata* sp. n. Superior surface.
,, 9.—Ditto. Inferior surface.
,, 10.—Ditto. Side views.

All figures × 100 diam.

Family VIII. GLOBIGERINIDÆ.

Globigerina d'Orbigny.

142. *Globigerina bulloides* d'Orbigny.

Globigerina bulloides d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 277, No. 1; Modèles Nos. 17 and 76.
Ditto. (d'Orbigny) Williamson, 1858, Recent Foram. Gt. Britain, p. 56, pl. v. figs. 116–118.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 593, pl. lxxvii., pl. lxxix. figs. 3–7.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Very rare. The specimens are all fossil, and apparently derived from a clay, as well as from the Chalk.

143. *Globigerina cretacea* d'Orbigny.

Globigerina cretacea d'Orbigny, 1840, Mém. Soc. Géol. France, vol. iv. p. 34, pl. iii. figs. 12–14.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 596, pl. lxxxii. figs. 10, 11.

Frequent. All Chalk fossils.

144. *Globigerina linnæana* d'Orbigny sp.

Rosalina linnæana d'Orbigny, 1839, Foram. Cuba, p. 106, pl. v. figs. 10–12.
Rosalina canaliculata Reuss, 1854, Denkschr. d. k. Akad. Wiss. Wien, vol. vii. p. 70, pl. xxvi. fig. 4 *a*, *b*.
Globigerina linnæana (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 598, pl. lxxxii. fig. 12; pl. cxiv. fig. 21.

Frequent. From the Chalk.

145. *Globigerina dutertrei* d'Orbigny.

Globigerina dutertrei d'Orbigny, 1839, Foram. Cuba, p. 95, pl. iv. figs. 19–21.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 601, pl. lxxxi. figs. 1 *a–c*.

Fossil, pyritised, from the "Blue Band." A single specimen only.

146. *Globigerina pachyderma* Ehrenberg sp.

(Plate XVIII. figs. 4, 5.)

Aristerospira pachyderma Ehrenberg, 1873, Abhandl. d. k. Akad. Wiss. Berlin, (1872), p. 386, pl. i. fig. 4.
Aristerospira crassa, ibid., p. 388, pl. iii. fig. 9.
Globigerina omphalotetras, ibid., p. 388, pl. iii. fig. 11.

Globigerina bulloides (d'Orbigny), "arctic variety," Brady, 1878, Ann. and Mag. Nat. Hist., ser 5, vol. i. p. 435, pl. xxi. fig. 10.
Globigerina bulloides var. *borealis*, Brady, 1882, Proc. Roy. Soc. Edin., vol. xi. p. 716.
Globigerina pachyderma (Ehrenberg) Brady, 1884, Foram. 'Challenger,' p. 600, pl. cxiv. figs. 19, 20.

Rare, but quite typical fossils. As this is a distinctly Boreal species, it may be assumed that the specimens have been washed from the Glacial drift which underlies the Brick-earth and Alluvium of the peninsula. At the present time its distribution is confined to the Arctic seas and the cold areas of the Atlantic Ocean and North Sea, immediately to the southward of the Arctic Circle, such as the cold area of the Faroë Channel.

Family IX. ROTALIDÆ.

Sub-family 1. Spirillininae.

Spirillina Ehrenberg.

147. *Spirillina vivipara* Ehrenberg.

Spirillina vivipara Ehrenberg, 1841, Abhandl. k. Akad. Wiss. Berlin, p. 442, pl. iii., fig. 41.
Spirillina perforata Williamson, 1858, Recent Foram. Gt. Britain, p. 92, pl. vii. fig. 202.
Spirillina vivipara (Ehrenberg) Brady, 1884, Foram. 'Challenger,' p. 630, pl. lxxxv. figs. 1–5.
Ditto. (Ehrenberg) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Ehrenberg) Sidebottom, 1908, Mem. and Proc. Manchester Lit. and Phil. Soc., vol. lii. No. 13, p. 6, pl. i. figs. 12–14; pl. ii. figs. 1–3.

Recent, very rare; but frequent in the fossil state, and from various strata. One specimen at least is silicified and apparently from the Chalk.

148. *Spirillina inæqualis* Brady.

Spirillina inæqualis Brady, 1879, Quart. Journ. Micr. Sci., vol. xix. n.s., p. 278, pl. viii., fig. 25 *a*, *b*.
Ditto. (Brady) Brady, 1884, Foram. 'Challenger,' p. 631, pl. lxxxv., figs. 8–11.
Ditto. (Brady) Egger, 1893, Abhandl. k. Bayer. Akad. Wiss., Cl. II., vol. xviii., p. 394, pl. xviii., figs. 40–42.

One fossil specimen; typical and in good preservation. This species does not appear to have been hitherto recorded in the fossil state. Brady's specimens are from shallow water from various tropical localities. Under such conditions, the species has a fairly wide distribution. Our specimen is probably from one of the Tertiary strata which were laid down under similar climatic conditions.

149. *Spirillina limbata* Brady.

Spirillina limbata Brady, 1879, Quart. Journ. Micr. Sci., vol. xix. n.s., p. 278, pl. viii., fig. 26.
Ditto. (Brady) Brady, 1884, Foram. 'Challenger,' p. 632, pl. lxxxv. figs. 18–21.
Ditto. (Brady) Siddall, 1886, Proc. Lit. Phil. Soc., Liverpool, vol. xl., Appendix, p. 59.
Ditto. (Brady) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil. Several specimens, which are with some hesitation referred to this species, the matrix which is still adherent to them rendering their precise identification somewhat doubtful. One of the specimens is clearly derived from the limestone of the Mixon Rocks. It has apparently never been recorded previously in the fossil state.

150. *Spirillina margaritifera* Williamson.

Spirillina margaritifera Williamson, 1858, Recent Foram. Gt. Britain, p. 93, pl. vii. fig. 204.
Ditto. (Williamson) J. Wright, 1886, Proc. Belfast Nat. Field Club, App. 1885–86, p. 321, pl. xxvi. fig. 12.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

Two fossil specimens from opposite Medmerry Farm (north-west corner). The locality of Williamson's specimen is not stated, and it is not clear whether it was a recent specimen or a derived fossil. The species is rare, but widely distributed in the recent state. It occurs in some abundance in coral sands from Macassar. Closely allied forms have been described by Terquem from the Eocene of Paris under the name of *S. nodifera*, and it is possible that our specimens are derived from a Tertiary deposit of similar age.

151. *Spirillina selseyensis* sp. n.

(Plate XVIII. figs. 6, 7.)

Several specimens of fossil origin have been found which are evidently closely allied to *S. margaritifera* Williamson, but which present well-marked points of distinction. The shell is somewhat concave on the superior side. The sutural lines are strongly limbate as in *S. margaritifera*, but the sutures are connected by shallower intermediate ridges. On the inferior side it is almost flat, though slightly excavated towards the umbilical region. Each whorl bears a series of raised tubercles which, increasing in size with the width of the spiral tube, are set at an angle to the periphery of the shell, so as to resemble the spiral twisting of the strands of a rope. Diameter, 0·25–0·3 mm.

Sub-family 2. **Rotalinae.**

Patellina Williamson.

152. *Patellina corrugata* Williamson.

Patellina corrugata Williamson, 1858, Recent Foram. Gt. Britain, p. 46, pl. iii. figs. 86–9.
Ditto. (Williamson) Brady, 1884, Foram. 'Challenger,' p. 634, pl. lxxxvi. figs. 1–7.
Ditto. (Williamson) Brady, 1887, Synopsis British Recent Foraminifera.

Fossil and recent. The fossil specimen is of a very thin and scale-like type. The only hitherto recorded specimens are from Post-Tertiary beds of the north-west of Ireland and Scotland.

Discorbina Parker and Jones.

153. *Discorbina turbo* d'Orbigny sp.

Rotalia (*Trochulina*) *turbo* d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 274, No. 29: Modèle No. 73.
Discorbina turbo (d'Orbigny) Parker, Jones, and Brady, 1865, Ann. and Mag. Nat. Hist., ser. 3, vol. xvi. p. 30, pl. ii. fig. 68.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 642, pl. lxxxvii. fig. 8.

Common in the fossil state, and a few specimens apparently recent. The fossils vary greatly in size, probably indicating different sources of origin.

154. *Discorbina globularis* d'Orbigny sp.

Rosalina globularis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 271, pl. xiii. figs. 1–4; Modèle No. 69.
Rotalina concamerata (Young) Williamson, 1858, Recent. Foram. Gt. Britain, p. 53, pl. iv. figs. 104, 105.
Discorbina globularis (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 643, pl. lxxxvi. figs. 8, 13.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (d'Orbigny) Sidebottom, 1908, Mem. Manchester Lit. and Phil. Soc., vol. lii. No. 13, p. 11, pl. iii. figs. 3–8, and pl. iv. figs. 1, 2.

Rare in both recent and fossil conditions.

155. *Discorbina valvulata* d'Orbigny sp.

Rosalina valvulata d'Orbigny, 1826, Ann. Sci. Nat. vol. vii. p. 271, No. 4.
Ditto. d'Orbigny, 1839, Foram. Cuba, p. 103, pl. iii. figs. 21–3.
Ditto. d'Orbigny, 1839, Foram. Canaries, p. 136, No. 28, pl. ii. figs. 19–21.
Discorbina valvulata (d'Orbigny) Jones and Parker, 1872, Quart. Jour. Geol. Soc., vol. xxviii. p. 114.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 644, pl. lxxxvii. figs. 5–7.

Fossil, apparently derived from a clay.

156. *Discorbina obtusa* d'Orbigny sp.

Rosalina obtusa d'Orbigny, 1846, Foram. Foss. Vienne, p. 179, pl. xi. figs. 4–6.
Discorbina turbo (d'Orbigny) var. *vesicularis*, subvar. *obtusa* Parker and Jones, 1865, Phil. Trans., vol. clv. p. 386, pl. xiv. figs. 18, 19.
Discorbina obtusa (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 644, pl. xci., fig. 9.
Ditto. (d'Orbigny) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 220, pl. xii. fig. 8, and pl. xiv. fig. 4.

Recent. The specimens resemble those figured by Earland from Bognor, and are of frequent occurrence.

157. *Discorbina rosacea* d'Orbigny sp.

Rotalia rosacea d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 273, No. 15; Modèle No. 39.
Rotalina mamilla Williamson, 1858, Recent Foram. Gt. Britain, p. 54, pl. iv. figs. 109–11.
Discorbina rosacea (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 644, pl. lxxxvii. figs. 1–4.
Ditto. (d'Orbigny) Brady, 1887, Synopsis British Recent Foraminifera.

Frequent, fossil and recent. The recent specimens are large and well developed.

158. *Discorbina vilardeboana* d'Orbigny sp.

Rosalina vilardeboana d'Orbigny, 1839, Foram. Amér. Mérid., p. 44, pl. vi. figs. 13-15.
Discorbina vilardeboana (d'Orbigny) Parker and Jones, 1872, Quart. Journ. Geol. Soc., vol. xxviii. p. 115.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 645, pl. lxxvi. figs. 9–12; pl. lxxxviii. fig. 2.

Recent. One very fine specimen of this handsome variety.

159. *Discorbina isabelleana* d'Orbigny sp.

Rosalina isabelleana d'Orbigny, 1839, Foram. Amér. Merid., p. 43, pl. vi. figs. 10–12.
Discorbina isabelleana (d'Orbigny) Parker and Jones, 1872, Quart. Journ. Geol. Soc., vol. xxviii. p. 115.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 646, pl. lxxviii. fig. 1.

We have a number of fossil specimens, probably Eocene, which are apparently referable to this type.

160. *Discorbina orbicularis* Terquem sp.

Rosalina orbicularis Terquem, 1876, Anim. sur la Plage de Dunkerque, p. 75, pl. ix. fig. 4 *a*, *b*.
Discorbina orbicularis (Terquem) Brady, 1884, Foram. 'Challenger,' p. 647, pl. lxxxviii. figs. 4–8.

Discorbina orbicularis. (Terquem) Balkwill and Wright, Trans. R. Irish Acad., vol. xxviii. (Science), p. 349, pl. xiii. figs. 31–3.
Ditto. (Terquem) Brady, 1887, Synopsis British Recent Foraminifera.

Common as fossils, and a few perhaps recent. The fossils vary greatly in size, and are evidently derived from various strata. It has been recorded from several Tertiary deposits.

161. *Discorbina parisiensis* d'Orbigny sp.

Rosalina parisiensis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii., p. 271, No. 1; Modèle No. 38.
Discorbina parisiensis (d'Orbigny) Parker, Jones, and Brady, 1865, Ann. and Mag. Nat. Hist., ser. 3, vol. xvi., pl. ii. fig. 70.
Ditto. (pars) (d'Orbigny) Wright, 1877, Proc. Belfast Nat. Field Club, 1876–7, Appendix, p. 105, pl. iv., fig. 1.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 648, pl. xc., figs. 5, 6, 9–12.
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. 221, woodcut, pl. xii. figs. 4–7, and pl. xiv. fig. 5.

Recent. Specimens identical with those from Earland's collection at Bognor are fairly frequent. Plastogamic specimens have been observed, but less frequently than at Bognor.

162. *Discorbina. wrightii* Brady.

Discorbina wrightii Brady, 1881, Denkschr. d. k. Akad. Wiss. Wien, vol. xliii. p. 104, pl. ii. fig. 6; Ann. and Mag. Nat. Hist., ser. 5, vol. viii. p. 413, pl. xxi. fig. 6.
Ditto. (Brady) Brady, 1887, Synopsis British Recent Foraminifera.
Ditto. (Brady) Earland, 1905, Journ. Quekett Micr. Club, ser. 2, vol. ix. No. 57, p. 223.

Recent. Less frequent than at Bognor.

163. *Discorbina opercularis* d'Orbigny sp.

Rosalina opercularis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 271, No. 7.
Ditto. d'Orbigny, 1839, Foram. Cuba, p. 101, pl. iii. figs. 24, 25, pl. iv. fig. 1.
Discorbina opercularis (d'Orbigny) Parker and Jones, 1872, Quart. Journ. Geol. Soc., vol. xxviii. p. 114.
Ditto. (d'Orbigny) Brady, 1884, Foram. 'Challenger,' p. 650, pl. lxxxix. figs. 8, 9.

Two specimens; fossil. It is a shallow-water tropical and sub-tropical form in the recent state.

164. *Discorbina rarescens* Brady.

Discorbina rarescens Brady, 1884, Foram. 'Challenger,' p. 651, pl. xc. figs. 2, 3, (4?).

Rare, but typical fossil specimens.

165. *Discorbina vesicularis* Lamarck sp.

Discorbites vesicularis Lamarck, 1804, Ann. du Muséum, vol. v. p. 183; vol. viii. pl. lxii. fig. 7.
Rotalia turbo var. *vesicularis* (Lamarck) Parker and Jones, 1860, Ann. and Mag. Nat. Hist., ser. 3, vol. v. p. 293, No. 6.
Discorbina vesicularis (Lamarck) Brady, 1884, Foram. 'Challenger,' p. 651, pl. lxxxvii. fig. 2.
Ditto. (Lamarck) Earland, 1905, Journ. Quekett Micr. Cub., ser. 2, vol. ix., No. 57, p. 224, pl. xii. figs. 9, 10, and pl. xiv. fig. 6.

Fossil, frequent. All the specimens are of a large and well developed type such as are found in the recent state in Australian shore-sands. None of the thin-walled delicate specimens recorded by Halkyard from Jersey, and Earland from Bognor, have been found at present in the Selsey shore-sands.

166. *Discorbina dimidiata* Jones and Parker.

Discorbina dimidiata Jones and Parker, 1862, Carpenter, Parker, and Jones, Introduc. Foram., p. 201, fig. 32 *b*.
Ditto. (J. and P.) Parker and Jones, 1865, Phil. Trans., vol. clv., pp. 385, 422, pl. xix. figs. 9 *a–c*.
Ditto. (Jones and Parker) Chapman, 1907, Journ. Quekett Micr. Club, ser. 2, vol. x. No. 61, p. 136, pl. x. fig. 8.

Fossil only; frequent. This species, which differs from the type *D. vesicularis* (Lamarck), in the possession of a relatively flat inferior face, is abundant in the Australian shore-sands, in common with *D. vesicularis*, and its fossil records are probably identical. Lamarck's specimens of *D. vesicularis* were from the Eocene of the Paris basin. Our specimens are probably referable to the same period.

167. *Discorbina biconcava* Parker and Jones.

Discorbina biconcava Parker and Jones, 1865, Phil. Trans., vol. clv. p. 422, pl. xix. fig. 10 *a*, *b*, *c*.
Ditto. (Parker and Jones) Siddall, 1878, Proc. Chester Soc. Nat. Sci., pt. 2 p. 50.
Ditto. (Parker and Jones) Brady, 1884, Foram. 'Challenger,' p. 653, pl. xci. fig. 2 (*not* fig. 3).
Ditto. (Parker and Jones) Brady, 1887, Synopsis British Recent Foraminifera.

One specimen, fossil; in which condition the species does not appear to have been previously recorded.

168. *Discorbina saulcii* d'Orbigny sp.

Rosalina saulcii d'Orbigny, 1839, Foram. Amér. Mérid., p. 42, pl. ii. figs. 9–11.
Ditto. Parker and Jones, 1872, Quart. Journ. Geol. Sci., vol. xxviii. p. 156.

Fossil only. Its distribution in the recent state is confined to the shallow waters of sub-tropical seas.

169. *Discorbina trochidiformis* Lamark sp.

Rotalites trochidiformis Lamarck, 1804, Ann. Mus., vol. v. p. 184; and 1806, vol. viii. No. 1, pl. lxii. fig. 8 *a*, *b*.
Discorbina trichidiformis (Lamarck) Jones, 1878, Dixon's Geology of Sussex, 2nd ed., p. 172, pl. ix. (10) fig. 6.
Rotalina trochidiformis (Lamarck) Terquem, 1882, Mém. Soc. Géol. France, sér. 3, vol. ii. Mém. III. p. 68, pl. vi. fig. 2.

Fossil. Large specimens, apparently derived from the Mixon Rocks, are of frequent occurrence in the coarser gatherings.

Millett describes it as "common."

170. *Discorbina allomorphinoides* Reuss sp.

Valvulina allomorphinoides Reuss, 1860, Sitz. k. Akad. Wiss. Wien, vol. xl. p. 223, pl. xi. fig. 6.
Discorbina allomorphinoides (Reuss) Brady, 1884, Foram. 'Challenger,' p. 654, pl. xci. figs. 5, 8.
Ditto. (Reuss) Millett, 1903, Journ. R. Micr. Soc. p. 703.

Frequent; fossil. Reuss's specimens were from the Chalk, but these are apparently of a more recent, and probably Tertiary, origin.

171. *Discorbina cristata* sp. n.

(Plate XVIII. figs. 8–10.)

We have found three specimens of fossil origin which we have been unable to identify with any published description within our knowledge, and we propose for them the specific name *D. cristata*.

Description.—Shell a rotaline spiral of about nine chambers arranged in two convolutions, the chambers rapidly increasing in size. The superior face but slightly convex and very rough in appearance, due to a thickening of the shell wall, which rises like a crest on each inflated chamber. The inferior face presenting only the five chambers of the last convolution, and opening in the centre into an umbilical cavity, which apparently extends to all the chambers of the test. The inferior side, which is covered with fine striæ radiating from the central umbilicus, is comparatively smooth, the depressions between the several chambers being very slight.

We cannot state whether the curious umbilical cavity is a normal feature of the shell, or merely due to a dissolution of the internal septa, such as has been described by Earland* as occurring in the reproductive stages of some recent *Discorbinæ* from the adjacent shore-sands of Bognor. A similar dissolution can be observed in many specimens of the genus *Polymorphina*, and has

* Earland, The Foraminifera of the Shore-sands of Bognor, 1905. Journ. Quekett Micr. Club, ser. 2, ix. No. 57, pp. 221–3.

been fully described by Sidebottom.* The inferior side of *D. cristata* is very similar to *D. pulvinata* Brady in the curious radiating striæ, but it differs from that form in the arrangement of the chambers and the appearance of the superior face. Sidebottom (*op. cit.*) refers to a variety of *D. pulvinata* which apparently approaches our species more closely than does the type.

Dimensions.—Greatest breadth, 0·225–0·3 mm.; least breadth, 0·2–0·225 mm. Height, 0·15 mm.

* Sidebottom, Foraminifera from the Island of Delos, 1907. Mem. and Proc. Manchester Lit. and Phil. Soc. li. No. 9, pp. 17–18.

Journal of the
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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.

EDITED BY

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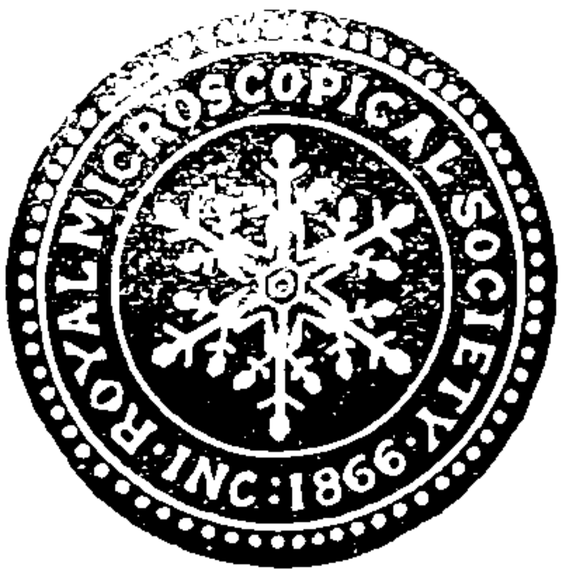

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