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Foraminifera of Malay Archipelago.



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IV.—*Report on the Recent Foraminifera of the Malay Archipelago  
collected by Mr. A. Durrand, F.R.M.S.—Part XIV.*

By FORTESCUE WILLIAM MILLETT, F.R.M.S.

(Read April 17th, 1903.)

PLATE V.

*Cristellaria* Lamarek.

*Cristellaria Schloenbachi* Reuss.

*Cristellaria Schloenbachi* Reuss, 1862, Sitzungsber. k. Akad. Wiss. Wien, vol. xlvi. p. 65, pl. vi. figs. 14, 15. *C. Schloenbachi* (Reuss) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 315, pl. lxiii. fig. 4. *C. Schloenbachi* (Reuss) Egger, 1899, Abhandl. k. Bayer. Akad. Wiss., Cl. II. vol. xxi. p. 110, pl. xii. figs. 38–40; pl. xxiv. figs. 30, 31.

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EXPLANATION OF PLATE V.

- Fig. 1.—*Cristellaria variabilis* Reuss. × 100.  
„ 2.—*Amphicoryne glabra* sp. n. × 70.  
„ 3. „ *Bradyi* A. Silvestri sp. × 90.  
„ 4. „ *falx* Parker and Jones sp. × 70.  
„ 5.—*Polymorphina lactea* var. *oblonga* Williamson. × 60.  
„ 6.—*Dimorphina lingulinoides* sp. n. × 90.  
„ 7.—*Uvigerina canariensis* d'Orbigny var. × 90.  
„ 8, 9. „ *Auberiana* d'Orbigny, var. *glabra* var. n. × 90.  
„ 10.—*Sagrina columellaris* Brady. × 75. Microspheric form.  
„ 11. „ „ × 75. Megalospheric form.  
„ 12–15. „ *nodosa* Parker and Jones. × 90.  
„ 16. „ *tessellata* Brady. × 75.  
„ 17. „ *limbata* Brady. × 70. From a drawing by C. Elcock.  
„ 18, 19. „ „ × 75. Specimens from Raine Island.

June 17th, 1903

In the Pacific Ocean the genus *Cristellaria* is very sparingly distributed, and there are few records of its occurrence in the equatorial region or in the North Pacific.

In Mr. Durrand's collection, although the genus is represented by several species, the individuals are few and ill-developed.

*C. Schloenbachi* possessing characters common to both *Vaginulina* and *Cristellaria* comes naturally as a connecting link between the two genera.

It occurs sparingly at Stations in both Areas, and is not uncommon at Station 30.

'Challenger' Stations are off Bermuda, 435 fathoms; off Culebra Island, 390 fathoms; and off Raine Island, 155 fathoms. Flint records it from two Stations in the Gulf of Mexico, at depths of 169 and 210 fathoms.

*Cristellaria crepidula* Fichtel and Moll sp.

*Nautilus crepidula* Fichtel and Moll, 1803, Test. Micr., p. 107, pl. xix. figs. *g-i*. *Cristellaria crepidula* d'Orbigny, 1839, Foram. Cuba, p. 64, pl. viii. figs. 17, 18. *C. crepidula* (F. and M.) Jones, 1884, Quart. Journ. Geol. Soc., vol. xl. p. 770, pl. xxxiv. fig. 8. *C. crepidula* (F. and M.) Balkwill and Millett, 1884, Journ. Micr., vol. iii. p. 84, pl. iv. fig. 8. *C. crepidula* (F. and M.) Sherborn and Chapman, 1886, Journ. R. Micr. Soc., ser. ii. vol. vi. p. 753, pl. xv. fig. 21. *C. crepidula* (F. and M.) Halkyard, 1889, Trans. and Ann. Rept. Manchester Micr. Soc., p. 67, pl. ii. fig. 5. *C. dilatata* Wisniowsky, 1890, Pamietnik Wydz. iii. Akad. Umiej-Krakowie, vol. xvii. p. 31, pl. ix. fig. 10; and *C. dorsoarcuata* p. 31, pl. ix. fig. 11. *C. crepidula* (F. and M.) Haeusler, 1890, Abhandl. schweiz. pal. Gesell., vol. xvii. p. 111, pl. xiv. fig. 59; pl. xv. figs. 1, 18. *C. crepidula* (F. and M.) Fornasini, 1890, Mem. R. Accad. Sci. Ist. Bologna, ser. 4, vol. x. p. 471, pl. figs. 31-33, 56-60. *C. crepidula* (F. and M.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 350, pl. xi. figs. 51, 52; pl. xii. figs. 34, 35. *C. crepidula* (F. and M.) Fornasini, 1894, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. iv. p. 220, pl. iii. fig. 10. *C. crepidula* (F. and M.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 62, pl. xi. figs. 599, 600. *C. crepidula* var. *intermedia* Burrows and Holland, 1897, Proc. Geol. Assoc., vol. xv. p. 40, pl. i. fig. 11; var. *cymboides*, pl. i. figs. 1-3; var. *subarcuatula*, pl. i. fig. 17; var. *harpa*, pl. i. figs. 12, 18-21. *C. crepidula* (F. and M.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 316, pl. lxxiii. fig. 2. *C. crepidula* (F. and M.) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 110, pl. xxiii. figs. 21, 22; pl. xxv. figs. 27, 28.

Very few specimens of this form have been observed, and these are of the *subarcuatula* type.

It occurs in both Areas.

*Cristellaria acutauricularis* Fichtel and Moll sp.

*Nautilus acutauricularis* Fichtel and Moll, 1803, Test. Micr., p. 102, pl. xviii. figs. *g-i*. *Cristellaria acutauricularis* (F. and M.) Parker and Jones, 1860, Ann. and Mag. Nat. Hist., ser. 3, vol. v. p. 114, No. 20. *C. acutauricularis* (F. and M.) Sherborn and Chapman, 1886, Journ. R. Micr. Soc., ser. 2, vol. vi. p. 753, pl. xv. fig. 22. *C. acutauricularis* (F. and M.) Haeusler, 1890, Abhandl. schweiz. pal. Gesell., vol. xvii. p. 113, pl. xv. fig. 17. *C. acutauricularis* (F. and M.) Crick and Sherborn, 1891, Journ. Northamptonshire Nat. Hist. Soc., vol. vi. p. 212, pl. fig. 25; and 1892, vol. vii. pl. ii. figs. 17, 18. *C. acutauricularis* (F. and M.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 353, pl. xii. figs. 19, 20. *C. acutauricularis* (F. and M.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 316, pl. lxiii. fig. 5. *C. acutauricularis* (F. and M.) Chapman, 1900, Quart. Journ. Geol. Soc., vol. lvi. p. 259, pl. xv. fig. 9.

The examples of this species are small and pass imperceptibly into *C. gibba*.

It occurs at several Stations in both Areas, but always in small numbers.

In the recent condition this is by no means a common form, although it has a very wide range. Besides the localities mentioned by Brady it has been recorded by Egger from Mauritius, and by Flint from two Stations off the Atlantic coast of the United States.

*Cristellaria gibba* d'Orbigny.

*Cristellaria gibba* d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 292, No. 17. *C. gibba* d'Orbigny, 1839, Foram. Cuba, p. 40, pl. vii. figs. 20, 21. *C. gibba* (d'Orb.) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 259, pl. x. figs. 19, 21. *C. gibba* (d'Orb.) Crick and Sherborn, 1891, Journ. Northamptonshire Nat. Hist. Soc., vol. vi. p. 212, pl. fig. 29. *C. gibba* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 352, pl. xii. figs. 21, 27. *C. gibba* (d'Orb.) Silvestri, 1893, Mem. Pontif. Accad. Nuovi Lincei, vol. ix. p. 207, pl. vi. fig. 4. *C. gibba* (d'Orb.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 61, pl. x. figs. 287, 288. *C. gibba* (d'Orb.) Fornasini, 1894, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. iv. p. 221, pl. iii. fig. 20. *C. gibba* (d'Orb.) Jones, 1895, Palæont. Soc., p. 247, pl. vii. fig. 19. *C. gibba* (d'Orb.) Chapman, 1896, Journ. R. Micr. Soc., p. 4, pl. i. fig. 7. *C. gibba* (d'Orb.) Burrows and Holland, 1897, Proc. Geol. Assoc., vol. xv. pp. 44, 45, pl. ii. figs. 5, 6. *C. gibba* (d'Orb.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 317, pl. lxiv. fig. 1. *C. gibba* (d'Orb.) Chapman, 1900, Journ. Linn. Soc. (Zool.) vol. xxviii. p. 31,

pl. v. fig. 13 ; and Proc. California Acad. of Sci., ser. 3, Geol., vol. i. p. 251, pl. xxx. fig. 3.

This species is rather more plentiful than *C. acutauricularis*, and its distribution is much the same.

Brady records notes of its occurrence in the North Atlantic and the South Pacific. Silvestri has found it in the Mediterranean, and Egger at Mauritius, West Australia, and New Guinea ; whilst Flint adds the Gulf of Mexico to the list of localities.

*Cristellaria italica* DeFrance sp.

*Saracenaria italica* DeFrance, 1824, Dict. Sci. Nat., vol. xxxii. p. 177 ; 1827, vol. xlvii. p. 344 ; Atlas Conch., pl. xiii. fig. 6. *Cristellaria (Saracenaria) italica* (DeFr.) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 293, No. 26 ; and Modèles, Nos. 19 and 85. *C. italica* (DeFr.) Sherborn and Chapman, 1886, Journ. R. Micr. Soc., ser. 2, vol. vi. p. 754, pl. xv. fig. 23 ; pl. xvi. fig. 4. *C. italica* (DeFr.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 350, pl. xii. figs. 22, 23, 26, 40-42. *C. italica* (DeFr.) Chapman, 1894, Journ. R. Micr. Soc., p. 653, pl. x. fig. 10. *C. italica* (DeFr.) Fornasini, 1894, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. iv. p. 219, pl. iii. fig. 8 ; and 1895, vol. v. p. 12, pl. iv. fig. 28. Idem, 1895, Palæont. Italica, vol. i. p. 145, pl. vii. fig. 10. *C. italica* (DeFr.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 316, pl. lxiii. fig. 6.

In the Malay Archipelago this is a very rare form and has been observed only at Station 12 in Area 1.

To the numerous list of localities mentioned by Brady, Egger adds West Australia ; and Flint records it from the coast of Georgia and the Gulf of Mexico.

*Cristellaria variabilis* Reuss, plate V. fig. 1.

*Cristellaria variabilis* Reuss, 1849, Denkschr. k. Akad. Wiss. Wien, vol. i. p. 369, pl. xlvi. figs. 15, 16. *C. variabilis* (Reuss) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 224, pl. xlv. fig. 12. *C. variabilis* (Reuss) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 560, pl. x. fig. 22. *C. Bradyana* Procházka, 1893, Vestnik král. české spol. náuk. Třída Math., p. 44, pl. xi. fig. 5. *C. variabilis* (Reuss) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 353, pl. xii. figs. 16-18. *C. variabilis* (Reuss) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 62, pl. x. figs. 593-595. *C. variabilis* (Reuss) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 316, pl. lxiii. fig. 1.

There are several examples of this form from Station 25 in Area 2, and it also occurs at Station 13 in Area 1. The specimens

are small and ill-developed, none of them attaining the carinate stage.

Brady states that it is by no means uncommon from 100 to 600 fathoms; Egger records it from four Stations at depths of from 37 to 650 fathoms; Goës from 126 fathoms; and Flint from six Stations, 68 to 196 fathoms.

*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* d'Orbigny, 1840, Mém. Soc. Géol. Fr., sér. i. vol. iv. p. 26, pl. ii. figs. 16-18. *C. rotulata* (Lam.) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 224, pl. lxiv. fig. 15. *C. rotulata* (Lam.) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 559, pl. x. fig. 17. *C. rotulata* (Lam.) Haeusler, 1890, Abhandl. schweiz. pal. Gesell., vol. xvii. p. 114, pl. xv. figs. 7, 8, 10, 12, 13. *C. rotulata* (Lam.) Terrigi, 1891, Mem. R. Com. Geol. Italia, vol. iv. p. 95, pl. iii. fig. 8. *C. rotulata* (Lam.) Beissel (Holzapfel), 1891, Abhandl. k. Preuss. geol. Landesanst., N.F., Heft 3, p. 55, pl. i. figs. 2, 3; pl. x. figs. 20-43. *C. rotulata* (Lam.) Perner, 1892, Česká Akad. Císaře Františka Josefa (Palæont. Bohemica No. 1) p. 62, pl. iv. figs. 1-11. *C. rotulata* (Lam.) Crick and Sherborn, 1892, Journ. Northamp. Nat. Hist. Soc., vol. vii. p. 70, pl. ii. fig. 14. *C. rotulata* (Lam.) A. Silvestri, 1893, Atti e Rendic. Accad. Sci. Lett. e Arti dei Zelanti e P.P. dello Studio di Acireale, vol. v. p. 14. pl. iii. figs. 22, 23. *C. rotulata* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 351, pl. xii. figs. 1, 2, 32, 33. *C. rotulata* (Lam.) Fornasini, 1893, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. iii. p. 435, pl. ii. fig. 11; and 1894, vol. iv. pp. 221, 222, pl. iii. figs. 24, 25. *C. rotulata* (Lam.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 60, pl. x. figs. 559-578. *C. (Lenticulites) rotulata* (Lam.) Egger, 1895, Naturhist. Ver. Passau, Jahresber., xvi. p. 26, pl. iii. figs. 4-7. *C. rotulata* (Lam.) Fornasini, 1895, Palæont. Italica, vol. i. p. 146, pl. vii. fig. 12. *C. rotulata* (Lam.) Chapman, 1896, Journ. R. Micr. Soc., p. 5, pl. i. fig. 8. *C. rotulata* (Lam.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 314, pl. lxiv. fig. 4. *C. rotulata* (Lam.) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 122, pl. xi. figs. 3, 4. *C. rotulata* (Lam.) Chapman, 1900, Journ. Linn. Soc. (Zool.), vol. xxviii. p. 32, pl. v. fig. 14; and Proc. California Acad. of Sci., ser. 3, Geol. vol. i. p. 251, pl. xxx. fig. 4.

Brady speaks of this as one of the most widely diffused of all the foraminifera. In the Malay Archipelago it is one of the rarest and has been observed only at Station 25 in Area 1.



*Cristellaria calcar* Linné sp.

*Nautilus calcar* Linné, 1767, Syst. Nat., 12th ed., p. 1162, No. 272. *N. calcar* (Linné) Fichtel and Moll, 1803, Test. Micr., p. 69, pl. xi. figs. *a, b, c*; pl. xii. figs. *i, k*; pl. xiii. figs. *c, d, h, i*. *Cristellaria calcar* (Linné) Parker and Jones, 1857, Ann. and Mag. Nat. Hist., ser. 2, vol. xix. p. 289, pl. x. figs. 10–12. *C. calcar* (Linné) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 224, pl. xliv. fig. 14. *C. calcar* (Linné) Terrigi, 1891, Mem. R. Com. Geol. Italia, vol. iv. p. 96, pl. iii. fig. 16. *C. calcar* (Linné) Egger, 1895, Naturhist. Ver. Passau, Jahresber., xvi. p. 27, pl. iii. figs. 1, 2. *C. calcar* (Linné) Dervieux, 1896, Mem. Pontif. Accad. Nuovi Lincei, vol. xi. pl. xiv. fig. 5. *C. calcar* (Linné) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 318, pl. lxvi. fig. 1. *C. calcar* (Linné) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 123, pl. xi. figs. 17, 18. *C. calcar* (Linné) Fornasini, 1902, Mem. R. Accad. Sci. Ist. Bologna, ser. 5<sup>a</sup>, vol. x. p. 46, fig. 45.

Found only at Station 2 in Area 1. The examples, although few and small, are characteristic; the varieties *a* and *k* of Fichtel and Moll both being represented.

*Cristellaria costata* Fichtel and Moll sp.

*Nautilus costatus* Fichtel and Moll, 1803, Test. Micr., p. 47, pl. iv. figs. *g, h, i*. *Cristellaria costata* (F. and M.) Parker and Jones, 1860, Ann. and Mag. Nat. Hist., ser. 3, vol. v. p. 113, No. 19. *C. costata* (d'Orb.) Crick and Sherborn, 1891, Journ. Northamp. Nat. Hist. Soc., vol. vi. p. 213, pl. fig. 20. *C. ariminensis* (d'Orb.) Fornasini, 1894, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. iv. p. 223, pl. iii. figs. 36–38. *C. costata* (F. and M.) Fornasini, 1895, Palæont. Italica, vol. i. p. 146, pl. vii. fig. 13. *C. costata* (F. and M.) Silvestri, 1899, Mem. Pontif. Accad. Nuovi Lincei, vol. xv. p. 218, pl. i. fig. 13. *C. costata* var. *spinata* Schubert, 1899, Sitzungsber. Deutsch. naturw.-med. Ver. für Bohmen, "Lotos" No. 6, p. 16, pl. v. fig. 7.

Simply because they are ribbed, two very different forms have been associated under this name. The *Nautilus costatus* of Fichtel and Moll is lenticular and may be described as being a variety of *Cristellaria calcar* bearing concentric costæ. Closely allied, if not identical with this, is the *Robulina ariminensis* of d'Orbigny.

The *Cristellaria costata* of d'Orbigny represented by Modèle No. 84, is a more elongated form, and as interpreted by subsequent authors is nothing more nor less than a costate *Marginulina* or *Vaginulina*. Of this variety good examples from the lias are figured by Brady, 1867, and by Crick and Sherborn, 1891.

In the Malay Archipelago it has been observed only at Station 13 in Area 1, and the few examples are small and of arrested growth.

There are three 'Challenger' Stations for this form given by Brady: off Gomera, Canaries, 620 fathoms; off Kandavu, Fiji, 210 fathoms; and off Raine Island, Torres Strait, 155 fathoms. He also states that it has been reported from the shores of the Adriatic, at Rimini and Lido.

*Amphicoryne* Schlumberger.

Of all the compound forms this is perhaps the most difficult to deal with in a satisfactory manner, for not only is it in many instances hard to determine the genera of the component parts, but there are numerous monstrosities which so nearly resemble the types that it is difficult to distinguish between them.

Although this genus was instituted to include the forms compounded of *Cristellaria* and *Nodosaria*, the Cristellarian portion, so far as has been observed, is always of the *crepidula* type and consequently passes by imperceptible degrees into the genus *Vaginulina*. It is doubtful if any good purpose would be served by the adoption of the genus *Nodosariopsis*, and although Prof. Silvestri is quite in order in giving a generic name to the combination of *Vaginulina* and *Nodosaria*, in practice there would be a great difficulty in keeping the two genera distinct; besides this, there would be the inconvenience of removing the species *falx* from the genus *Amphicoryne*, of which it has hitherto been considered the type. In this state of uncertainty it will perhaps be convenient to assign to *Amphicoryne* all the forms having the initial portion Cristellarian or Vaginuline.

*Amphicoryne glabra* sp. n., plate V. fig. 2.

*Cristellaria subarcuatula* (Walker) Williamson, 1858, Rec. Foram. Gt. Britain, p. 30, pl. ii. fig. 57. *Marginulina obstipa* var. A Terquem, 1868, Bull. Soc. Hist. Nat. Moselle, vol. xi. p. 129, pl. viii. fig. 26. ? "Dimorphous specimen, the earlier chambers arranged as in *Cristellaria*, the later ones as in *Polymorphina*," Brady, 1884, Chall. Rept., pl. lxxi. fig. 10.

Surface of test smooth; earlier portion, a compact variety of *Cristellaria crepidula*; later portion resembling *Dentalina communis*. Length 0.90 mm.

This smooth form is very rare in the Malay Archipelago, and has been found only at Station 30 in Area 2.

It is quite possible that the three figured examples referred to in the above list of synonyms may be monstrosities, rather than members of the genus *Amphicoryne*. Williamson writes of his example, "Fig. 57 represents a curious monstrosity, in which the



development by gemmation has proceeded in the ordinary way through a succession of segments, but in the last two the direction has been reversed, their septal orifices being situated on the opposite margin to that which they occupy in all the preceding ones, the curvature of the shell and direction of the septal lines being likewise reversed." But the figure shows that in addition to the change of direction there is a change of character, the compact initial portion of the test being succeeded by two inflated chambers which may be assigned either to *Dentalina* or *Marginulina*. The *Marginulina obstipa* of Terquem differs from the other figured examples in having the aperture situated in a phialine neck. The form figured by Brady is still more doubtful, but there seems to be no particular reason why the terminal chamber should be assigned to *Polymorphina* rather than to *Dentalina*.

*Amphicoryne Bradyi* A. Silvestri sp., plate V. fig. 3.

"Intermediate specimen with Vaginuline commencement and final Nodosarian chamber," Brady, 1884, Chall. Rept., explanation of plate, pl. lxvi. fig. 20. *Nodosariopsis bradyi* A. Silvestri, 1902, Atti Accad. Pontif. Nuovi Lincei, anno lv. p. 53.

The strong resemblance between the example here figured and the 'Challenger' specimen, renders it highly improbable that both should be monstrosities. Brady's figure just indicates the spines which are so conspicuous a feature in the specimen from the Malay Archipelago.

It is exceedingly rare and has been found only at Station 25 in Area 2.

*Amphicoryne falx* Parker and Jones sp., plate V. fig. 4.

*Marginulina falx* Parker and Jones, 1860, Quart. Journ. Geol. Soc., vol. xvi. p. 302, No. 28. *Amphicoryne falx* (P. and J.) Brady, 1884, Chall. Rept., p. 556, pl. lxv. fig. 7-9; ? pl. cxiii. fig. 13. *Nodosaria scalaris* var. *caudata* A. Silvestri, 1893, Mem. Pontif. Accad. Nuovi Lincei, vol. ix. p. 204, pl. iv. fig. 2. *Amphicoryne falx* (P. and J.) A. Silvestri, 1899, Mem. Pontif. Accad. Nuovi Lincei, vol. xv. p. 221, pl. iii. fig. 4. *Nodosariopsis falx* (J. and P.) A. Silvestri, 1902, Atti Accad. Pontif. Nuovi Lincei, anno lv. p. 49, figs. 1-3, 9.

This form is a little less rare than the others, but it occurs only at Station 30 in Area 2. The Malay Archipelago examples are delicately striated, whilst those from other localities have the Nodosarian portion strongly costate. In some of the Mediterranean examples and in the specimen from the Italian pliocene figured by Silvestri the Cristellarian portion is smooth, whilst the succeeding chambers are costate. Of this character also is the example



figured in the 'Challenger' Report, pl. cxiii. fig. 13, which appears to correspond with the definition of the genus more closely than any of the other figured specimens, yet at p. 556 Brady, for some reason or other, says that it is obviously nothing more than a monstrosity.

According to Brady it is not uncommon in the Mediterranean at depths of less than 400 fathoms; and occurs also off the Cape of Good Hope, 150 fathoms; on the western shores of New Zealand, 275 fathoms; and off Raine Island, Torres Strait, 155 fathoms.

Silvestri records it from off the east coast of Sicily, 164 to 602 fathoms; and fossil from the pliocene of Sienna.

### Sub-family **Polymorphininae**.

#### *Polymorphina* d'Orbigny.

##### *Polymorphina lactea* Walker and Jacob sp.

"*Serpula tenuis ovalis laevis*" Walker and Jacob, 1784, Test. Min., p. 2, pl. i. fig. 5. *Serpula lactea* Walker and Jacob (*vide* Kannacher), 1798, Adams's Essays, 2nd ed. p. 634, pl. xiv. fig. 4. *Polymorphina lactea* (W. and J.) Williamson, 1858, Rec. Foram. Gt. Britain, p. 70, pl. vi. fig. 147. *P. lactea* (W. and J.) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 561, pl. xi. fig. 9. *P. lactea* (W. and J.) Crick and Sherborn, 1892, Journ. Northamp. Nat. Hist. Soc., vol. vii. p. 71, fig. 25. *P. lactea* (Walker and Jones) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 308, pl. ix. figs. 8, 14, 15; and *P. elegantissima* (P. and J.) p. 308, pl. ix. fig. 16. *P. lactea* (W. and J.) Chapman, 1896, Journ. R. Micr. Soc., p. 9, pl. ii. fig. 3. *P. lactea* (W. and J.) Morton, 1897, Proc. Portland Soc. Nat. Hist., vol. ii. p. 119, pl. i. fig. 7.

This cosmopolitan form occurs at several Stations in both Areas, but the examples are always small and wanting in character.

##### *Polymorphina amygdaloides* Reuss sp.

*Globulina amygdaloides* Reuss, 1851, Zeitschr. deutsch geol. Gesell., vol. iii. p. 82, pl. vi. fig. 47. *Polymorphina amygdaloides* Reuss, 1855, Sitzungsber. k. Akad. Wiss. Wien, vol. xviii. p. 250, pl. viii. fig. 84. *P. amygdaloides* (Reuss) Burrows and Holland, 1897, Proc. Geol. Assoc., vol. xv. p. 46, pl. ii. fig. 18. *P. amygdaloides* var. *lepida* Fornasini, 1901, Mem. Accad. Sci. Ist. Bologna, ser. 5, vol. ix. p. 72, fig. 24; and var. *terquemiana*, p. 72, fig. 25.

This compressed variety of *Polymorphina lactea* is much more abundant than the type and occurs at a greater number of Stations.



Usually the sutures are more depressed than in the figures given by Reuss, consequently the chambers are more inflated.

*Polymorphina lactea* var. *oblonga* Williamson, plate V. fig. 5.

*Polymorphina lactea* (W. and J.) var. *oblonga* Williamson, 1858, Rec. Foram. Gt. Britain, p. 71, pl. vi. fig. 149. *P. oblonga* (Will.) Brady, Parker, and Jones, 1870, Trans. Linn. Soc., vol. xxvii. p. 222, pl. xxxix. fig. 7. *P. oblonga* (Will.) Terquem, 1875, Ess. Anim. Plage Dunkerque, part i. p. 37, pl. v. fig. 11. *P. formosa* Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 440, pl. ix. figs. 17-19.

This is an intermediate variety connecting *P. lactea* with *P. compressa*, and must not be confounded with the *P. oblonga* of d'Orbigny, which resembles an elongated *P. problema*. The example figured well represents the normal form, with the exception that it possesses a supplementary chamber of a Nodosarian character. This is evidently a monstrosity, otherwise the specimen would have to be assigned to the genus *Dimorphina*. This chamber appears to have nothing in common with the fistulose extraneous growths so frequently found in the *Polymorphinæ* generally, but rare or unknown in the examples from the Malay Archipelago.

*P. lactea* var. *oblonga* occurs in more or less abundance at several Stations in both Areas.

Of its distribution generally Brady, Parker, and Jones write, "The geographical range of *P. oblonga* seems to be limited; it is most abundant on the Devonshire and Cornwall coast, and may be found sparingly distributed at intervals all round the British Islands. We are not aware of its occurrence in the seas of warmer latitudes or in a fossil condition."

*P. formosa* is recorded by Egger from Cape Verde Islands, 38 fathoms; and from West Australia, 196 fathoms.

As a fossil it is not uncommon in the tertiary beds of St. Erth.

#### *Polymorphina compressa* d'Orbigny.

"*Polymorpha subovalia*" Soldani, 1791, Testaceographia, vol. i. part 2, p. 114, pl. cxiv. fig. F; pl. cxv. fig. N; pl. cxvi. fig. x. *Polymorphina compressa* d'Orbigny, 1846, For. Foss. Vienne, p. 233, pl. xii. figs. 32-34. *P. aff. amygdala* Deecke, 1886, Mém. Soc. ém. Montbéliard, sér. 3, vol. xvi. p. 37, pl. i. fig. 20. *P. polygona* Terquem, 1886, Mém. Soc. Géol. France, sér. 3, vol. iv. p. 63, pl. xiii. fig. 18. *P. lactea* (W. and J.) Dawson, 1886, Handbook Zoology, p. 44, fig. 34. *P. compressa* (d'Orb.) Mariani, 1888, Boll. Soc. Geol. Italia, vol. vii. p. 288, pl. x. fig. 13. *P. compressa* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 309, pl. ix. figs. 11-13. *P. compressa* (d'Orb.) Goës, 1894, K. Svenska



Vet.-Akad. Handl., vol. xxv. p. 58, pl. x. figs. 539-553. *P. compressa* (d'Orb.) Jones, 1895, Palæont. Soc., p. 258, pl. v. figs. 26, 28. *P. compressa* var. *marginalis* Jones and Chapman, 1896, Journ. Linn. Soc. (Zool.), vol. xxv. p. 507, fig. 37. *P. compressa* (d'Orb.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899) p. 319, pl. lxxvii. fig. 3. *P. proteus* (Beissel) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 131, pl. xxv. figs. 16, 17.

Found sparingly at several Stations in both Areas. The examples are with difficulty separable from *P. amygdaloides*.

*Polymorphina elegantissima* Parker and Jones.

*Polymorphina elegantissima* Parker and Jones, 1864, Phil. Trans., vol. clv. table x. p. 438. *P. elegantissima* (P. and J.) Brady, Parker, and Jones, 1870, Trans. Linn. Soc., vol. xxvii. p. 231, pl. xl. fig. 15. *P. elegantissima* (P. and J.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 319, pl. lxxvii. fig. 4.

This form is tolerably abundant at Station 13 in Area 1, and occurs sparingly at Station 22 and a few others in Area 2. The examples are invariably small, and rarely consist of more than three chambers. Their affinity is with *P. problema*.

According to Brady,\* the species appears to be confined to the shores of the Pacific, and is best known from Australian specimens. Flint does not mention the locality of the 'Albatross' examples nor the depth from which they were obtained.

*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. *P. (Guttulina) problema* var. *deltoidea* Andreae, 1884, Abhandl. geol. Special-Karte Elsass-Loth., vol. ii. p. 210, pl. ix. fig. 21. *P. glommerata* (Röm.) Beissel (Holzapfel) 1891, Abhandl. k. Preuss. geol. Landesanst., N.F. Heft 3, p. 62, pl. xii. figs. 17-29. *Bulimina pyrula* (d'Orb.) Silvestri, 1893, Atti e Rendic. Accad. Sci. Lett. e Arti dei Zelanti e P.P. dello Studio di Acireale, vol. v. p. 12, pl. v. figs. 73, 74. *Polymorphina gibba* near *communis* (d'Orb.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 55, pl. ix. figs. 523, 524. *P. communis* (d'Orb.) Jones, 1895, Palæont. Soc., p. 265, pl. v. fig. 24; pl. vi. fig. 16. *P. communis* (d'Orb.) var. *acuplacentata* Jones and Chapman, 1896, Journ. Linn. Soc. (Zool.) vol. xxv. p. 502, fig. 9. *P. communis* (d'Orb.) Burrows and Holland, 1897, Proc. Geol. Assoc., vol. xv. p. 46, pl. ii. fig. 14. *P. communis* (d'Orb.) Bagg, 1898, Bull. U.S. Geol. Survey, No. 88, p. 60, pl. vi. fig. 2.

\* Chall. Rept., 1884, p. 567.



*P. communis* var. *acuplacentata* (J. and C.) Silvestri, 1899, Mem. Pontif. Accad. Nuovi Lincei, vol. xv. p. 233, pl. iv. fig. 2. *P. communis* (d'Orb.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 319, pl. lxxvii. fig. 6. *P. communis* (d'Orb.) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 128, pl. xvii. figs. 36, 37. *P. communis* (d'Orb.) Fornasini, 1900, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. viii. p. 387, fig. 37.

Is not common nor widely distributed, but the examples are more robust than those of the other species of the genus found in the Malay Archipelago.

*Polymorphina problema* d'Orbigny.

*Polymorphina (Guttulina) problema* d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 266, No. 14; Modèle, No. 61. *Bulimina pyrula* (d'Orb.) Silvestri, 1893, Atti e Rendic. Accad. Sci. Lett. e Arti dei Zelanti e P.P. dello Studio di Acireale, vol. v. p. 12, pl. v. figs. 79, 80. *Polymorphina problema* (d'Orb.). Jones, 1895, Palæont. Soc. p. 267, pl. v. fig. 23; pl. vi. fig. 12. *P. problema* (d'Orb.) Burrows and Holland, 1897, Proc. Geol. Assoc., vol. xv. p. 46, pl. ii. fig. 17. *P. problema* (d'Orb.) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 129, pl. xvii. figs. 33-35.

The specimens which can be distinguished from *P. communis* are few and insignificant, and seem to be confined to a few Stations in Area 1.

*Polymorphina oblonga* d'Orbigny.

*Polymorphina oblonga* d'Orbigny, 1846, For. Foss. Vienne, p. 232, pl. xii. figs. 29-31. *P. oblonga* (d'Orb.) Terquem, 1882, Mém. Soc. Géol. Fr., sér. 3, vol. ii. p. 145, pl. xxiii. fig. 9. *P. oblonga* (d'Orb.) Chaster, 1892, First Rept. of the Southport Soc. of Nat. Sci., 1890-1891 (1892), p. 64, pl. i. fig. 13. *P. oblonga* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 309, pl. xi. figs. 9, 10, 24. *P. oblonga* (d'Orb.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899) p. 319, pl. lxxvii. fig. 5.

This form is very rare in the Malay Archipelago and has been observed only at Station 22 in Area 2.

Of its occurrence in the recent condition, Brady states that its distribution is similar to that of the allied forms *P. problema* and *P. compressa*. Chaster records it from the neighbourhood of Southport. Egger's 'Gazelle' Stations are Table Bay, 50 fathoms; Mauritius, 225 fathoms; and West Australia, 196 fathoms. Flint records it from off the coast of Georgia and North Carolina, 276 and 168 fathoms.



*Polymorphina sororia* Reuss.

*Polymorphina (Guttulina) sororia* Reuss, 1863, Bull. Acad. Roy. Belg., sér. ii. vol. xv. p. 151, pl. ii. figs. 25-29. *P. sororia* (Reuss) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 308, pl. ix. fig. 20. *P. sororia* (Reuss) Jones, 1896, Palæont. Soc., p. 257, pl. vi. fig. 13. *P. sororia* (Reuss) Chapman, 1896, Journ. R. Micr. Soc., p. 12, pl. ii. figs. 11, 12. *P. sororia* (Reuss) var. *fistulosa* Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 319, pl. lxxvii. fig. 2. *P. sororia* (Reuss) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 126, pl. xvii. figs. 6, 7.

Although moderately plentiful and widely distributed in the Malay Archipelago, the examples are small and composed of but few chambers.

Brady says of this form that it is less common than the type (*P. lactea*), but it has a similar wide area of distribution. Egger records it from West Africa, 371 fathoms; and Flint has the fistulose variety from the North Atlantic, from off the coast of Brazil, and from the Gulf of Mexico, 671 to 1781 fathoms.

*Polymorphina sororia* var. *cuspidata* Brady.

*Polymorphina sororia* var. *cuspidata* Brady, 1884, Chall. Rept., p. 563, pl. lxxi. figs. 17-19, pl. lxxii. fig. 4. *P. sororia* var. *cuspidata* (Brady) Chapman, 1896, Journ. R. Micr. Soc., p. 13, pl. ii. fig. 13. *P. sororia* var. *cuspidata* (Brady) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 127, pl. xvii. figs. 10, 11.

This variety is better represented than the type, it is rather more abundant, and widely distributed, and the examples are less feeble.

Brady says, "This form has been met with at two points in the North Atlantic, west of Ireland, depth 808 fathoms and 1443 fathoms respectively; and at Station 146, about midway between the Cape of Good Hope and Kerguelen Island, 1375 fathoms."

*Polymorphina regina* Brady, Parker, and Jones.

*Polymorphina regina* Brady, Parker, and Jones, 1870, Trans. Linn. Soc., vol. xxvii. p. 241, pl. xli. fig. 32; and *P. Orbignii* (Zborzewski sp.) p. 244, pl. xlii. fig. 38m. *P. semicostata* Marsson, 1878, Mitth. Nat. Ver. Neu-Vorpommern u. Rugen, Jahrg. x. p. 150, pl. ii. fig. 19. *P. regina* (B., P., and J.) var. Wright, 1886, Proc. Belfast Nat. Field Club, 1884-1885, App. ix. p. 331, pl. xxvii. figs. 13, 14. *P. regina* (P. and J.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 310, pl. ix. figs. 45, 50, 51. *P. regina* var. *damæcornis* (Reuss) Jones and Chapman, 1896, Journ.



Linn. Soc. (Zool.), vol. xxv. p. 501, fig. 3; and var. *marginalis*, p. 507, fig. 36.

This form is represented by a few examples from Station 22 in Area 2. The shell is very thin and there are rarely more than two chambers.

Of its distribution in the recent condition Brady writes,\* “The distribution of *Polymorphina regina* seems limited to comparatively shallow water in the neighbourhood of the islands of the Pacific.”

Egger records it from Kerguelen Island, 57 fathoms.

### *Dimorphina* d’Orbigny.

#### *Dimorphina lingulinoides* sp. n., plate V. fig. 6.

Test elongate, straight, compressed; extremities rounded or obtuse; earlier portion biserial, with triangular chambers; sutures sinuous, not depressed; final portion Linguline; aperture a long slit, with protruding lips. Length 0·33 mm.

This form closely resembles the *D. compacta* of the Coralline Crag of Sutton, but is easily distinguished from it by the slit-like aperture.

In the tertiary beds of St. Erth *Dimorphinæ* are not uncommon, but all the forms are compounded of the genera *Polymorphina* and *Lingulina*, thus differing from all the described species with the exception of *Polymorphina regularis* var. *parallela* † of the St. Erth clay, which evidently belongs to this group. In *Dimorphina Capellini*, ‡ from the lower pliocene of Bonfornello in Sicily, the aperture is a lipped slit, but it is slightly curved, and the chamber to which it pertains is circular in transverse section.

In the Malay Archipelago *D. lingulinoides* is very rare and has been noticed only at Station 25 in Area 2.

### *Uvigerina* d’Orbigny.

#### *Uvigerina canariensis* d’Orbigny, plate V. fig. 7.

*Uvigerina canariensis* d’Orbigny, 1839, Foram. Canaries, p. 138, pl. i. figs. 25–27. *U. canariensis* (d’Orb.) Fornasini, 1891, Foraminiferi Pliocenici del Ponticello di Savena, pl. ii. fig. 26. *U. canariensis* (d’Orb.), Woodward and Thomas, 1893, Geol. and Nat. Hist. Survey of Minnesota, vol. iii. p. 39, pl. D, fig. 9. *U. canariensis* (d’Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 311, pl. ix. fig. 43. *U. canariensis* (d’Orb.) Goës, 1894,

\* Chall. Rept., 1884, p. 571.

† Millett, Trans. R. Geol. Soc. of Cornwall, vol. xi. 1895, p. 658, pl. figs. 5, 6.

‡ De Amicis, Naturalista Siciliano, anno xiv. 1895, p. 45, pl. i. fig. 18.

K. Svenska Vet.-Akad. Handl., vol. xxv. p. 52, pl. xi. figs. 489-492. *U. canariensis* (d'Orb.) forma *distoma* De Amicis, 1894, Atti Soc. Tosc. Sci. Nat., Mem., vol. xiv. p. 29, pl. ii. fig. 5. *U. canariensis* (d'Orb.) var. *farinosa* (Hantken) Jones, 1896, Palæont. Soc., p. 278, pl. vii. fig. 27.

This form is very abundant and occurs at nearly all the Stations in both Areas. The surface of the test, normally smooth, is often more or less rough, and without a break passes into that of *U. aculeata*.

The typical form is common, but the specimen chosen for illustration represents an interesting variety which occurs only at Station 22 in Area 2.

#### *Uvigerina asperula* Czjzek.

*Uvigerina asperula* Czjzek, 1848, Haidinger's Naturwiss. Abhandl., vol. ii. p. 146, pl. xiii. figs. 14, 15. *U. asperula* (Czjzek) Sherborn and Chapman, 1886, Journ. R. Micr. Soc., ser. 2, vol. vi. p. 755, pl. xvi. fig. 7. *U. asperula* (Czjzek) Toutkowsky, 1887, Zap. Kievsk. Obsch. Estest., vol. ix. p. 41, pl. ii. fig. 3. *U. asperula* (Czjzek). Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 225, pl. xlv. figs. 4, 5. *U. asperula* (Czjzek) Terrigi, 1891, Mem. R. Com. Geol. Italia, vol. iv. p. 100, pl. iii. fig. 25. *U. asperula* (Czjzek) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 312, pl. ix. fig. 41. *U. asperula* (Czjzek) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 320, pl. lxviii. fig. 4.

This is just as plentiful as the smooth form, *U. canariensis*, and the distribution is identical. It may be noted that at the individual Stations the relative abundance of the two forms is invariably the same.

The disposition to become uniserial is shown in many examples, and in this respect they resemble the var. *ampullacea* of Brady, which is described as a dimorphous *U. asperula*, connecting the *Uvigerinæ* with the *Sagrinæ*.

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

*Uvigerina asperula* (Czjzek) var. *ampullacea* Brady, 1884, Chall. Rept., p. 579, pl. lxxv. figs. 10, 11. *U. ampullacea* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 313, pl. ix. fig. 37. *U. asperula* var. *ampullacea* (Brady) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 320, pl. lxviii. fig. 5.

In the Malay Archipelago this variety of *U. asperula* is very rare, and is confined to Area 1.

Brady names nine localities where it has been found, the depths ranging from 350 fathoms to 725 fathoms; Egger records it from



Mauritius, 225 fathoms, and from West Australia, 560 fathoms; whilst the only 'Albatross' Station is off the Brazil coast, 1019 fathoms.

*Uvigerina interrupta* Brady.

*Uvigerina interrupta*, Brady, 1879, Quart. Journ. Micr. Sci., n.s. vol. xix. p. 274, pl. viii. figs. 17, 18. *U. interrupta* Brady, 1884, Chall. Rept., p. 580, pl. lxxv. figs. 12-14. *U. interrupta* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 313, pl. ix. fig. 58.

This appears to be nothing more than an attenuated form of *U. ampullacea*, and the gradation from one to the other is well shown by the Malay specimens.

It is plentiful at Station 25 in Area 2, and occurs, but very sparingly, at a few Stations in Area 1.

Brady says it has only been observed in the South Pacific, and names six localities, the depths varying from 37 to 1375 fathoms.

Egger gives two 'Gazelle' Stations, both off the coast of West Australia, at depths of 196 and 650 fathoms.

*Uvigerina auberiana* d'Orbigny var. *glabra* var. n.,  
pl. V. figs. 8, 9.

*Uvigerina auberiana* d'Orbigny, 1839, Foram. Cuba, p. 106, pl. ii. figs. 23, 24. *U. auberiana* (d'Orb.) Goës, 1882, K. Svenska Vet.-Akad. Handl., vol. xix. p. 60, pl. iv. figs. 71-75.

The Malay examples of this form are more compressed and neater than those from the West Indies described by d'Orbigny; they also differ in having the surface of the test quite smooth, but they agree in the more important character of being biserial. The elongated form (fig. 9) differs from *Bolivina* only in the form of the aperture. It closely resembles the figures of *U. Parkeri* given by Karrer,\* but he does not state that his species is biserial. Brady in his 'Challenger' Report makes *U. auberiana* a variety of *U. asperula*; if this diagnosis were accepted the Malay form would have to be treated as a compressed biserial variety of *U. canariensis*, but taking surface ornamentation as being of less value than the mode of aggregation of the chambers, it seems more natural to group together the biserial varieties.

Goës, writing of *U. auberiana* from the Caribbean Sea, says, "Our form is often more smooth and more slender than d'Orbigny's—also from the West Indies." These, it will be observed, are pre-

\* Abhandl. k. k. geol. Reichs., vol. ix. 1877, p. 385.

cisely the differences between d'Orbigny's and the Malay examples.

The smooth form is very abundant in the Malay Archipelago and occurs at most of the Stations in both Areas.

*Uvigerina pygmæa* d'Orbigny.

*Uvigerina pygmæa* d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 269, pl. xii. figs. 8, 9; and Modèle, No. 67. *U. pygmæa* (d'Orb.), Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 224, pl. xlv. figs. 1, 2. *U. pygmæa* (d'Orb.) Terrigi, 1891, Mem. R. Com. Geol. Italia, vol. iv. p. 100, pl. iii. fig. 24. *U. pygmæa* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 314, pl. ix. fig. 42. *Polymorphina regina* (B., P., and J.) Silvestri, 1893, Atti e Rendic. Accad. Sci. Lett. e Arti dei Zelanti e P.P. dello Studio di Acireale, vol. v. p. 14, pl. v. figs. 70-72. *U. pygmæa* (d'Orb.) Silvestri, 1893, Mem. Pontif. Accad. Nuovi Lincei, vol. ix. p. 207, pl. v. fig. 5. *U. pygmæa* (d'Orb.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 51, pl. ix. figs. 496-501. *U. pygmæa* (d'Orb.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 320, pl. lxxviii. fig. 2. *U. pygmæa* (d'Orb.) Silvestri, 1899, Mem. Pontif. Accad. Nuovi Lincei, vol. xv. p. 239, pl. iv. fig. 5; and *U. pygmæa* var. *asperula* Idem, 1900, Ibid. vol. xvii. p. 277, pl. vi. fig. 95.

This form is represented by a few feeble examples from Station 2, in Area 1.

*Uvigerina porrecta* Brady.

*Uvigerina porrecta* Brady, 1879, Quart. Journ. Mier. Sci., n.s. vol. xix. p. 274, pl. viii. figs. 15, 16; Idem, 1884, Chall. Rept., p. 577, pl. lxxiv. figs. 21-23. *U. porrecta* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 315, pl. ix. figs. 51, 63.

This form also is very rare in the Malay Archipelago, although it occurs at Stations in both Areas.

With regard to its distribution generally, Brady writes, "This is a coral-reef species, and with one exception all the localities lie within the tropics." He names several Stations where it has occurred at depths ranging from 12 fathoms to 1850 fathoms. The solitary 'Gazelle' Station is West Australia, 196 fathoms.

*Uvigerina angulosa* Williamson.

*Uvigerina angulosa* Williamson, 1858, Rec. Foram. Gt. Britain p. 67, pl. v. fig. 140. *U. angulosa* (Will.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 314, pl. ix. figs. 40, 46, 47.

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*U. angulosa* (Will.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 51, pl. ix. figs. 502-509. *U. angulosa* (Will.) Jones, 1895, Palæont. Soc., p. 277, pl. vii. fig. 26. *U. angulosa* (Will.) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 320, pl. lxxviii. fig. 3. *U. angulosa* (Will.) Liebus, 1901, Neues Jahrb. für Min., vol. i. p. 120, pl. v. fig. 3.

This species is likewise rare in the Malay Archipelago, but it is found in both Areas, and the examples are well developed.

*Sagrina* d'Orbigny, emended by Parker and Jones.

*Sagrina columellaris* Brady, plate V. figs. 10, 11.

*Sagrina columellaris* Brady, 1881, Quart. Journ. Micr. Sci., n.s. vol. xxi. p. 64. *Siphogenerina glabra* Schlumberger, 1883, Feuille Jeunes Nat., p. 118, pl. iii. fig. 1. *Siphogenerina (Sagrina) columellaris* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 316, pl. ix. figs. 28, 31, 33. *Siphogenerina columellaris* (Brady) Idem, 1899, Ibid., vol. xxi. p. 134, pl. xvi. figs. 20, 21. *Sagrina columellaris* (Brady) Fornasini, 1900, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. viii. p. 391, fig. 41. *Siphogenerina columellaris* (Brady) Silvestri, 1902, Atti Pontif. Accad. Romana dei Nuovi Lincei, anno lv. p. 1, figs. 1, 2.

In treating of *Bigenerina (Siphogenerina) Schlumbergerii* mention was made of the difficulty of assigning to the various forms of *Siphogenerina* their correct position in the classification of the foraminifera; whether *columellaris* would be more at home amongst the *Sagrinae* or the *Bigenerinae*, is still a matter of opinion.

The recent discovery by Prof. Silvestri\* of characteristic specimens of *Pleurostomella brevis* having the contorted internal tube, is of great interest in its bearing on this question.

In the Malay Archipelago the number of examples is small and the species seems to be confined to Area 1. There are, however, specimens of both the microspheric and megalospheric forms, which are well differentiated in this species, as shown by the figures given by Schlumberger in 1883, and by Silvestri in 1902.

With regard to its general distribution in the living condition, Brady in his 'Challenger' Report gives thirteen localities, at depths varying from the shore to 1125 fathoms; Egger quotes three 'Gazelle' Stations, at depths from 75 fathoms to 225 fathoms; whilst Fornasini and Silvestri record it from the Adriatic and Mare Jonio.

*Sagrina bifrons* Brady.

*Sagrina bifrons* Brady, 1881, Quart. Journ. Micr. Sci., n.s. vol. xxi. p. 64; and 1884, Chall. Rept., p. 582, pl. lxxv. figs. 18-20.

\* Atti R. Accad. Sci. Torino, vol. xxxviii. 1903, p. 5, fig. 1a-c.

*Siphogenerina (Sagrina) bifrons* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 317, pl. ix. figs. 25, 26, 29. *Sagrina bifrons* (Brady) Idem, 1899, Ibid., vol. xxi. p. 134, pl. xv. figs. 25, 26.

Of this rare form a few poor examples occur at several Stations in both Areas; they differ from *columellaris* in little more than the compression of the test.

Brady states that it has only been observed in one locality, the *Hyalonema*-ground, south of Japan, depth 345 fathoms. Egger's very doubtful 'Gazelle' examples are from West Australia, 560 fathoms.

*Sagrina virgula* Brady.

*Sagrina virgula* Brady, 1879, Quart. Journ. Micr. Sci., n.s. vol. xix. p. 275, pl. viii. figs. 19-21; and 1884, Chall. Rept., p. 583, pl. lxxvi. figs. 4-10. *Siphogenerina (Sagrina) virgula* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 318, pl. ix. fig. 27.

In the Malay Archipelago this is the predominant species of the genus, being found in abundance at most of the Stations all over the Region. The examples are large, well developed, and possess all the characters of the species.

With regard to its distribution elsewhere, Brady writes, "*Sagrina virgula* has been obtained in the South Atlantic off Pernambuco, 675 fathoms; with that exception the distribution, which extends altogether to ten localities, is confined to the South Pacific, the bathymetrical range being from 12 fathoms to 2075 fathoms." Egger reports it from the western coast of South Africa, 1914 fathoms; and two Stations off West Australia, 196 fathoms and 560 fathoms.

*Sagrina nodosa* Parker and Jones, plate V. figs. 12-15.

*Uvigerina (Sagrina) nodosa* Parker and Jones, 1865, Phil. Trans., vol. clv. p. 363, pl. xviii. fig. 15. *Sagrina nodosa* (P. and J.) Brady, 1884, Chall. Rept., p. 583, pl. cxiv. fig. 18. *S. cylindrica* (d'Orb. sp.) Fornasini, 1897, Rivista Ital. di Paleont., fasc. v. vi. p. 13, fig.

As indicated by the figures, the Malay Archipelago representatives of this species vary considerably from the type. The uniserial chambers are often irregularly lobed at their base; whilst in some examples the Uvigerine portion is obscure, and the test appears to be uniserial throughout. In the surface ornamentation the usual costæ are replaced by regular rows of closely placed dots; a few of the examples, however, have the surface quite smooth. In my cabinet are examples dredged from 50 fathoms off the coast of



Portugal which resemble the Malay forms in every respect. It may be noted that in some of Terquem's figures of *Uvigerina muralis* from the Paris eocene,\* there is an evident tendency to the lobulation of the base of the chambers.

*S. nodosa* is not uncommon in the Malay Archipelago and occurs at several Stations in both Areas.

Brady in his 'Challenger' report writes "*Sagrina nodosa* is by no means a common form: so far as the 'Challenger' collections are concerned, it only appears at one locality,—off the Cape of Good Hope, depth 150 fathoms. Otherwise it has been reported from the Mediterranean and from the Italian tertiaries."

*Sagrina striata* Schwager sp.

*Dimorphina striata* Schwager, 1866, Novara-Exped., Geol. Theil, vol. ii. p. 251, pl. vii. fig. 99, and fig. 2 in text. *Sagrina striata* Schwager, 1877, Boll. R. Com. Geol. Italia, p. 25, pl. fig. 35. *S. striata* (Schwager) Brady, 1884, Chall. Rept., p. 524, pl. lxxv. figs. 25, 26. *Siphogenerina (Sagrina) striata* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 316, pl. ix. figs. 32, 34, 35, 64, 65.

Usually this is not a common form, but in the Malay Archipelago it is well represented, being found in considerable numbers at several Stations in both Areas. The examples are fine and exhibit greater affinity with *S. raphanus* than with *S. nodosa*.

Brady specifies the following localities:—"Off the coast of South America, south of Pernambuco, 350 fathoms; shore-sand, east coast of Madagascar; off Kandavu, Fiji Islands, 210 fathoms; off New Hebrides, 125 fathoms; Torres Strait, 3 to 11 fathoms; off Ki Islands, 129 fathoms; and off the Philippines, 95 fathoms." The 'Gazelle' Stations are Mauritius, 225 fathoms, and West Australia, 196 fathoms.

*Sagrina raphanus* Parker and Jones.

*Uvigerina (Sagrina) raphanus* Parker and Jones, 1865, Phil. Trans., vol. clv. p. 363, pl. xviii. figs. 16, 17. *Siphogenerina costata* Schlumberger, 1883, Feuille Jeunes Nat., p. 118, fig. B. *Sagrina raphanus* (P. and J.) Brady, 1884, Chall. Rept., p. 585, pl. lxxv. figs. 21–25. *Siphogenerina (Sagrina) raphanus* (P. and J.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 317, pl. ix. fig. 36.

Although not quite so abundant in the Malay Archipelago as *S. striata*, nor so widely distributed, the examples are fine and characteristic, and both the microspheric and megalospheric forms are represented.

\* Mém. Soc. Géol. Fr., sér. 3, vol. ii. 1882, p. 119, pl. xx. figs. 26–29.

Brady writes, "*Sagrina raphanus* is essentially a coral-reef Foraminifer," and then specifies a number of Stations, the depths ranging from 2 to 260 fathoms. The solitary 'Gazelle' example is from Mauritius, 225 fathoms.

*Sagrina tessellata* Brady, plate V. fig. 16.

*Sagrina* (?) *tessellata* Brady, 1884, Chall. Rept., p. 585, pl. lxxvi. figs. 17-19.

Of this very rare and doubtful form several examples have been found in the material from Station 2, in Area 1. Externally they agree in all respects with the figures of the 'Challenger' specimens; but internally the chambers are subdivided into chamberlets by transverse septa, usually from eight to ten in each chamber.

According to Brady his knowledge of the species was derived from two or three specimens from Nares Harbour, Admiralty Islands, 17 fathoms, and Raine Island, Torres Strait, 155 fathoms.

*Sagrina limbata* Brady, plate V. figs. 17-19.

*Sagrina limbata* Brady, 1884, Chall. Rept., p. 586, pl. cxiii. fig. 14. *S. limbata* (Brady) Howchin, 1889, Trans. R. Soc. S. Australia, vol. xii. p. 11, pl. i. fig. 7.

Of this very rare and little understood form a solitary example has been found in the material from Station 2, in Area 1. Unfortunately the specimen has been mislaid, but the finder, Charles Elcock of Belfast, had previously made a drawing of it, and a copy of this appears on the plate (fig. 17).

Brady's diagnosis of the species was made from ill-grown examples, and is necessarily imperfect. Having myself been especially fortunate in finding examples in the material from Raine Island, kindly sent me by Sir John Murray of the 'Challenger' office, I am in a position to add to Brady's description. Essentially the test is composed of a series of elongate-oval chambers, usually four in number, as shown by fig. 18; these chambers, as in *S. tessellata*, are subdivided into chamberlets by transverse septa which are well shown in the abraded specimen, fig. 19. Brady was unaware of these characters until he had examined my specimens shortly after the publication of the 'Challenger' Report on the Foraminifera, and his figure does not represent them. Howchin's drawing represents a much more characteristic example and indicates the division of the test into chambers. In several specimens the initial chamber is broad at the base, and obliquely truncated as shown in fig. 18.

The division of the chambers by transverse septa is not a character of the genus *Sagrina*, and further researches will prob-



ably render it necessary to constitute a new genus embracing the species *tessellata*, *limbata*, and probably *annulata*.

With regard to its hitherto recorded distribution, Brady writes, "*Sagrina limbata* has only been encountered at a single locality,—off Raine Island, Torres Strait, depth 155 fathoms."

Howchin writes, "A single specimen of this very rare form was obtained from the Lower-Bed. The test is longer and more slender than Mr. Brady's figure and is also more curved in outline, but in all essential features agrees with the type." The "Lower-Bed," mentioned above, is a portion of the Older Tertiary of Muddy Creek, Victoria, Australia.

### Sub-family **Ramulininæ.**

#### *Ramulina* Rupert Jones.

#### *Ramulina lævis* Jones.

*Ramulina lævis* (Jones) Wright, 1875, Proc. Belfast Nat. Field Club, 1873–1874, App. iii. p. 88, pl. iii. fig. 19; and *R. brachiata* (Jones), p. 88, pl. iii. fig. 20. *Ramulina* sp., Balkwill and Millett, 1884, Journ. Micr., vol. iii. p. 83, pl. iv. fig. 7. *R. Bradyi* Rzehak, 1895, Ann. k. k. Naturh. Hofmuseums, vol. x. p. 223, pl. vi. fig. 5; and *R. exigua*, p. 223, pl. vi. fig. 4. *R. lævis* (Jones) Chapman, 1896, Journ. R. Micr. Soc., p. 582, pl. xii. fig. 2; and 1898, p. 2, pl. ii. fig. 15. *R. lævis* (Jones) Jones and Chapman, 1897, Journ. Linn. Soc. (Zool.), vol. xxvi. p. 339, figs. 1–4. *R. proteiformis* Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 321, pl. lxviii. fig. 7. *R. lævis* (Jones) Schubert, 1901, Zeitschr. deutsch. geol. Gesell., Jahrg. 1901, p. 19, fig. 1.

This smooth variety of *Ramulina* is represented by a few fragments from Station 13, in Area 1.

It is much more abundant as a fossil than as a recent form.

#### *Ramulina globulifera* Brady.

*Ramulina globulifera* Brady, 1879, Quart. Journ. Micr. Sci., n.s. vol. xix. p. 272, pl. viii. figs. 32, 33; and 1884, Chall. Rept., p. 587, pl. lxxvi. figs. 22–28. *Tinoporus baculatus* Sherborn and Chapman, 1886, Journ. R. Micr. Soc., ser. ii. vol. vi. p. 758, pl. xvi. fig. 24. *Lagena lævis* (Montagu) Terrigi, 1899, Mem. R. Accad. Lincei, ser. 4, vol. vi. p. 112, pl. vi. figs. 2, 3. *Lagena protea* Chaster, 1892, First Rept. of the Southport Soc. of Nat. Sci., 1890–1891 (1892), p. 62, pl. i. fig. 14. *Ramulina globulifera* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 310, pl. ix. fig. 62. *R. globulifera* (Brady) De Amicis, 1895, Naturalista Siciliano, anno xiv. p. 112, pl. i. fig. 14. *R. globulifera* (Brady) Chapman, 1896, Journ.

R. Micr. Soc., p. 582, pl. xii. figs. 3-6. *R. globulifera* (Brady) Jones and Chapman, 1897, Journ. Linn. Soc. (Zool.), vol. xxvi. p. 340, figs. 5-22. *R. globulifera* (Brady) Egger, 1899, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xxi. p. 135, pl. ii. fig. 2; and pl. xxii. fig. 33. *R. globulifera* (Brady) Flint, 1899, Rep. U.S. Nat. Mus. for 1897 (1899), p. 321, pl. lxviii. fig. 6.

This fragile form is well represented in the Malay Archipelago, and occurs in more or less abundance at many Stations in both Areas.

Brady and other authorities record the species from numerous localities widely apart, but it appears to be most at home in the South Pacific.



# 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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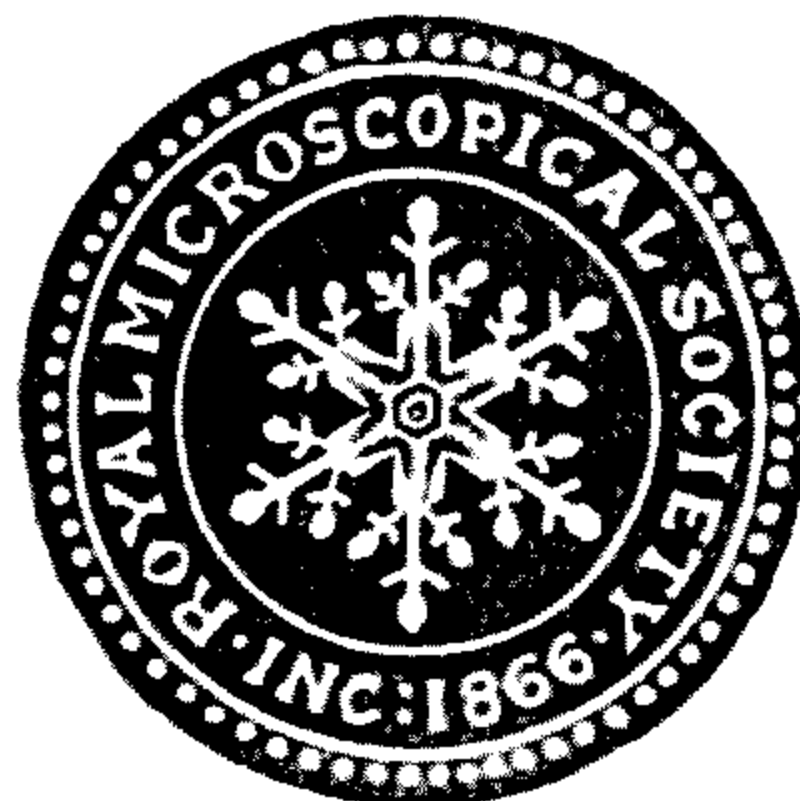
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