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

By Fortescue William Millett, F.R.M.S.

(*Read* 21*st December*, 1899.)

Plate I.

Bigenerina digitata d'Orbigny var., plate I. fig. 1.

Bigenerina (*Gemmulina*) *digitata* d'Orb., 1826, Ann. Sci. Nat., vol. vii. p. 262, No. 4; Modèle No. 58. *B. digitata* (d'Orb.) Brady, 1864, Trans. Linn. Soc. London, vol. xxiv. p. 468, pl. xlviii. fig. 8. *B. arcuata* Haeusler, 1890, Abhandl. schweizer. Pal. Gesell., vol. xvii. p. 73, pl. xii. figs. 5–7. *B. digitata* (d'Orb.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 38, pl. vii. figs. 324–341.

This species has hitherto been recorded only from Europe. The Malay variety is confined to Station 9, and the examples, although minute, are moderately abundant. The test is finely arenaceous and of the usual reddish-brown colour. The aperture is a large circular orifice occupying nearly the whole of the distal face. This appears to be the only feature in which it differs from the type.

Bigenerina fimbriata sp. n., plate I. figs. 2–4.

Test hyaline, elongate, straight, compressed. Chambers of the biserial portion numerous, having the outer margin projecting and the surface granular. Chambers of the linear series broad at the base, tapering towards the aperture; the base encircled by a fringed band. Aperture elliptical, with a bordered margin. Length 1·20 mm.

This form may be described as a dimorphous *Bolivina*, the biserial

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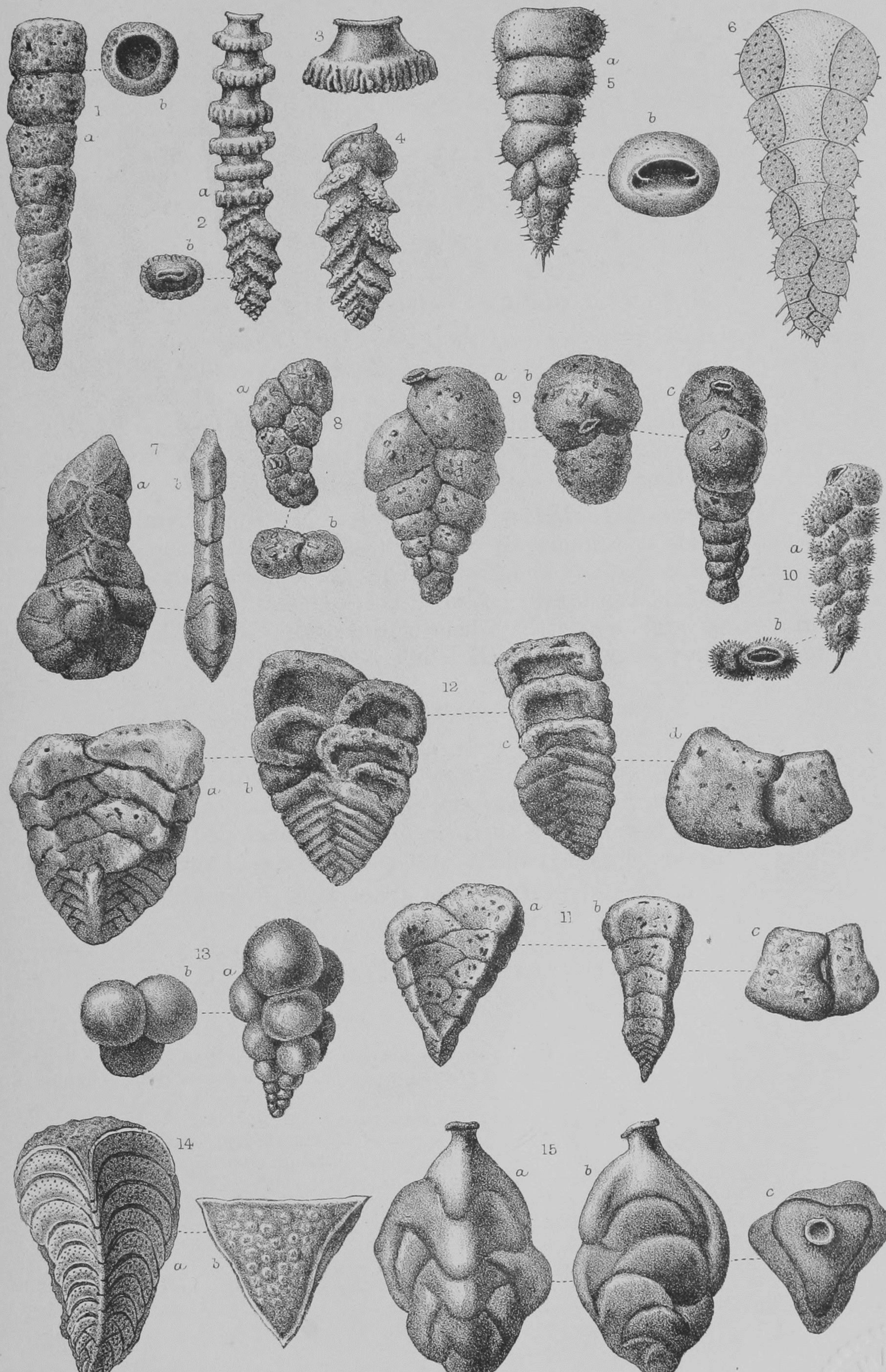
EXPLANATION OF PLATE.

Fig. 1.—*Bigenerina digitata* d'Orbigny var. × 135.
„ 2. „ *fimbriata* sp. n. × 40.
„ 3. „ „ One of the chambers of the linear series. × 80.
„ 4. „ „ Biserial portion, equal to *Bolivina lobata* Brady, changing to the dimorphous condition. × 75.
„ 5. „ (*Siphogenerina*) *Schlumbergerii* sp. n. × 75.
„ 6. „ „ „ By transmitted light showing the internal siphon. × 95.
„ 7.—*Spiroplecta annectens* Parker and Jones sp. × 100.
„ 8. „ *biformis* Parker and Jones sp. × 135.
„ 9.—*Gaudryina siphonella* Reuss. × 75.
„ 10. „ *hirta* sp. n. × 90.
„ 11. „ *Wrightiana* sp. n. × 90.
„ 12. „ „ Specimen with limbate sutures. × 100.
„ 13.—*Verneuilina pygmæa* Reuss. × 135.
„ 14.—*Chrysalidina dimorpha* Brady. × 60.
„ 15.—*Tritaxia lepida* Brady. × 135.



F.W.Millett del. ad nat.

West, Newman lith.

FORAMINIFERA OF MALAY ARCHIPELAGO.

portion being identical in all points, even in magnitude, with *Bolivina lobata* Brady; whilst the chambers composing the linear series resemble *Lagena fimbriata* Brady.

It is found at several Stations in both Areas, but is nowhere abundant.

Bigenerina (*Siphogenerina*) *Schlumbergerii* sp. n., plate I. figs. 5, 6.

Test hyaline, thin, elongate, tapering, slightly compressed; biserial and uniserial chambers both inflated, and both having short spines scattered over the surface. Aperture large and curved. Throughout the uniserial chambers a tube connects the aperture of each chamber with that of the one preceding it. Length 0·46 mm.

The genera *Bigenerina* and *Sagrina* are superficially so much alike that it is difficult to distinguish one from the other by their external characters, The *Sagrinæ* have the test composed of the dense vitreous substance usually found in the family *Lagenidæ*; whilst in *Bigenerina* the test, when hyaline, is thinner and more porous. The internal siphon is common in the *Lagenidæ*, and also occurs, in a modified form, in many of the Malay species of the *Textularidæ*, as will be shown in due course; consequently it cannot be accepted as a feature distinguishing one family from the other. In M. Schlumberger's genus *Siphogenerina* are to be found arenaceous as well as hyaline forms. His *S. ocracea* from New Caledonia differs from *Bigenerina digitata* in little more than the possession of the internal siphon and the consequent alteration in the position of the aperture.

It may be observed that the aperture of *B. Schlumbergerii* closely resembles that of the *B. calcarata* of Berthelin,* as shown by his figures and also by that of Chapman from the Gault of Folkestone.†

From the characters of *B. Schlumbergerii* it seems to be more nearly allied to *Bigenerina* than to *Sagrina*, although there is here plenty of room for a difference of opinion.

Fig. 3 is from a drawing by the late M. Berthelin showing the test viewed by transmitted light.

The species is very common in the Malay Archipelago, and occurs at numerous Stations in both areas.

Pavonina d'Orbigny.

Pavonina flabelliformis d'Orbigny.

P. flabelliformis d'Orb., 1826, Ann. Sci. Nat., vol. vii. p. 260, pl. x. figs. 10–12; Modèle No. 56.

* Mém. Soc. Géol. France, sér. 3, vol. i. 1880, pl. xxiv. figs. 14–16, and pl. xxv. fig. 2.

† Journ. R. Micr. Soc., 1898, p. 15, pl. ii. fig. 14 (*Sagrina calcarata* Berthelin sp.).

Of this rare although widely diffused species there is a solitary example from Station 22. It is almost identical in form with the specimen figured by Brady in the Quarterly Journal of Microscopical Science, vol. xix. 1879, pl. viii. fig. 30.

Spiroplecta Ehrenberg.

Spiroplecta annectens Parker and Jones sp., plate I. fig. 7.

Textularia annectens Parker and Jones, 1863, Ann. and Mag. Nat. Hist., ser. 3, vol. xi. p. 92, woodcut fig. 1. *Spiroplecta annectens* (P. & J.) Brady, 1884, Chall. Rept., p. 376, pl. xlv. figs. 22, 23. *S. annectens* (P. & J.) Chapman, 1892, Journ. R. Micr. Soc., p. 750, pl. xi. fig. 3. *S. annectens* (P. & J.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 275, pl. vi. fig. 14. *S. annectens* (P. & J.) Chapman, 1894, Ann. and Mag. Nat. Hist., ser. 7, vol. iii. p. 58, woodcut fig. 4.

Of this form there is a solitary specimen from Station 30.

Brady says that it had only been found at Raine Island, Torres Strait, and off a neighbouring locality, Ki Island. The 'Gazelle' specimens are from West Australia and New Guinea.

Fossil it is found in the Gault and Cambridge Greensand (Chapman).

Spiroplecta biformis Parker and Jones sp., plate I. fig. 8.

Textularia agglutinans var. *biformis* Parker and Jones, 1865, Phil. Trans., vol. clv. p. 370, pl. xv. figs. 23, 24. *Spiroplecta biformis* (P. & J.) Brady, 1884, Chall. Rept., p. 376, pl. xlv. figs. 25–27. *S. biformis* (P. & J.) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. Sci., p. 333, pl. xiii. fig. 21 and woodcut fig. 2. *S. biformis* (P. & J.) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 554, pl. viii. fig. 21. *S. biformis* (P. & J.) Haeusler, 1890, Abhandl. schweizer. Pal. Gesell., vol. xvii. p. 74, pl. xi. figs. 48, 49–51. *S. biformis* (P. & J.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 275, pl. vi. figs. 48–50. *S. biformis* (P. & J.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 38, pl. vii. figs. 308–312.

Of this arenaceous form a few specimens have been found at Station 9. They are very minute and of the usual rusty colour.

This species is most common in the Arctic regions. The 'Gazelle' examples, which are described as colourless, are from West Africa and West Australia.

Gaudryina d'Orbigny.

Gaudryina pupoides d'Orbigny.

Gaudryina pupoides d'Orbigny, 1840, Mém. Soc. Géol. France, vol. iv. p. 44, pl. iv. figs. 22–24. *Textularia pupoides* (d'Orb.) Goës,

1882, K. Svenska Vet.-Akad. Handl., vol. xix. p. 81, pl. vi. figs. 179, 180. *Gaudryina pupoides* (d'Orb.) Woodward and Thomas, 1885, 13th Ann. Rept. Geol. and Nat. Hist. Survey of Minnesota for 1884, p. 168, pl. iii. fig. 10. *G. pupoides* Sherborn and Chapman, 1886, Journ. R. Micr. Soc., vol. vi. p. 743, pl. xiv. fig. 7. *G. pupoides* (d'Orb.) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 219, pl. xlii. figs. 7, 8. *G. pupoides* (d'Orb.) Fornasini, 1889, Boll. Soc. Geol. Ital., vol. v. (p. 25) pl. i. fig. 7. *G. pupoides* (d'Orb.) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 554, pl. viii. fig. 22. *G. pupoides* (d'Orb.) Chapman, 1892, Ibid., p. 752, pl. xi. fig. 8. *G. pupoides* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 278, pl. vii. figs. 1–3, 49–51. *G. pupoides* (d'Orb.) Woodward and Thomas, 1893, Final Rept. Geol. and Nat. Hist. Survey of Minnesota, vol. iii. p. 31, pl. C, figs. 15, 16. *G. pupoides* (d'Orb.) Grzybowski, 1894, Rozprawy Wydz. mat.-Przyr. Akad. Umiej-Krakowie, vol. xxix. p. 188, pl. i. fig. 9. *G. pupoides* (d'Orb.) Egger, 1895, 16. Jahresbericht Naturhist. Ver. Passau (p. 9), pl. i. fig. 19. *G. pupoides* (d'Orb.) A. Silvestri, 1896, Mem. Pontif. Accad. Nuovi Lincei, vol. xii. p. 85, pl. ii. fig. 7.

This species is represented by a very few feeble examples, and appears to be restricted to Area 1.

Gaudryina siphonella Reuss, plate I. fig. 9.

Gaudryina siphonella Reuss, 1851, Zeitschr. deutsch. Geol. Gesell., vol. iii. p. 78, pl. v. figs. 40–42.

Is represented by a solitary, although well-developed, example from Station 25.

Brady speaks of the species as being comparatively rare in the living condition, although widely distributed.

Gaudryina filiformis Berthelin.

Gaudryina filiformis Berthelin, 1880, Mém. Soc. Géol. France, ser. 3, vol. i. p. 25, pl. xxiv. fig. 8. *G. filiformis* (Berthelin) Wright, 1882, Proc. Belfast Nat. Field Club, 1880–1881, Appendix, p. 180, pl. viii. fig. 3. *G. filiformis* (Berthelin) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 219, pl. xlii. fig. 6. *G. filiformis* (Berthelin) Chapman, 1892, Journ. R. Micr. Soc, p. 752, pl. xi. fig. 7. *G. filiformis* (Berthelin) Perner, 1897, Česká Akad. Císare Františka Josefa (Palæont. Bohemica) No. 4, p. 17, pl. vii. fig. 10.

This species occurs at several Stations in both Areas, and in some of them is fairly abundant. The examples are stout, and well developed.

Found at only four 'Challenger' Stations, but occurs at several places on the coast of the United Kingdom. Brady, Parker, and Jones record a single specimen from the Abrolhos Bank.

Gaudryina hirta sp. n., plate I. fig. 10.

Test hyaline, elongate, tapering towards the aboral end, compressed; triserial portion small and obscure. Biserial chambers numerous and inflated. Aperture erect, oval, with a depressed margin. Surface of test covered with short spines. Length 0·29 mm.

In this species the biserial portion appears to be more Bulimine than Textularian, as well in the texture of the test as in the position of the aperture. In the *Gaudryinæ* there is admittedly considerable variation in these features, and it is not necessary to establish a new genus for the reception of this form. The specimens are remarkably uniform in size and structure, and in the number of chambers.

It is very abundant in the Malay Archipelago, and is found at most of the Stations.

This is one of the forms which illustrate the peculiarity of the Malay Region in containing numerous species, widely distributed and in vast profusion, which have not been recorded from any other locality.

Gaudryina rugosa d'Orbigny.

Gaudryina rugosa d'Orbigny, 1840, Mém. Soc. Géol. France, vol. iv. p. 44, pl. iv. figs. 20, 21. *G. rugosa* (d'Orb.) Chapman, 1892, Journ. R. Micr. Soc., p. 752, pl. xi. fig. 9. *G. rugosa* (d'Orb.) Fornasini, 1893, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. iii. p. 437, pl. i. fig. 9.

Is represented by a few feeble specimens from Station 13.

Brady names seven localities at which it has been found in the living condition. It seems to be at its best in Torres Strait.

Gaudryina Wrightiana sp. n., plate I. figs. 11, 12.

Gaudryina rugosa (d'Orb.) Beissel, 1891, Abhandl. k. Preuss. Geol. Landesanstalt, Heft 3, p. 69, pl. xiii. figs. 30–33.

Test wedge-shaped; triserial portion with flat faces and acute or carinate edges; biserial portion quadrilateral, one of the lateral faces convex, the other concave. Peripheral margins broad and flat, and inclined towards the concave lateral face. Length 0·30 mm.

This is an interesting form of the *G. rugosa* group, and is closely allied to *G. Jonesiana*-Wright, from which it differs in its length, and in having one of the lateral faces convex. The sutures of the biserial portion are sometimes limbate.

It is not uncommon at Station 13, and occurs also at Station 2.

The specimen figured by Beissel is from the chalk-marl of Aix-la-Chapelle.

Verneuilina d'Orbigny.

Verneuilina triquetra Münster sp.

Textularia triquetra Münster, 1838, Romer, Neues Jahrb. für Min., p. 384, pl. iii. fig. 19. *Verneuilina triquetra* (Münster) Parker

and Jones, 1863, Ann. and Mag. Nat. Hist., ser. 3, vol. xi. p. 92. *V. triquetra* (Münster) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 553, pl. viii. figs. 19, 20. *V. triquetra* (Münster) Chapman, 1892, Journ. R. Micr. Soc., p. 329, pl. vi. fig. 24. *V. triquetra* (Münster) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 280, pl. vii. figs. 12, 13.

This form, rather rare in the living condition, is represented by a somewhat feeble specimen from Station 30.

The Gazelle Stations are Mauritius and off the east coast of Patagonia.

Verneuilina spinulosa Reuss.

Verneuilina spinulosa Reuss, 1850, Denkschr. k. Akad. Wiss. Wien, vol. i. p. 374, pl. xlvii. fig. 12. *V. spinulosa* (Reuss) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 219, pl. xlii. fig. 15. *V. spinulosa* (Reuss) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 281, pl. vii. figs. 11, 14–16.

Occurs in great abundance, and with the usual variety of form at nearly all the Stations in both Areas.

Verneuilina pygmæa Egger sp., plate I. fig. 13.

Bulimina pygmæa Egger, 1857, Neues Jahrb. für Min., p. 284, pl. xii. figs. 10, 11. *Verneuilina pygmæa* (Egger) Parker and Jones, 1863, Ann. and Mag. Nat. Hist., ser. 3, vol. xi. p. 92. *V. pygmæa* (Egger) Woodward and Thomas, 1893, Final Rept. Geol. and Nat. Hist. Survey of Minnesota, vol. iii. p. 32, pl. C, figs. 17, 18. *V. pygmæa* (Egger) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. p. 279, pl. vii. figs. 8–10. *V. pygmæa* (Egger) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 32, pl. vii. figs. 262, 263.

The arenaceous form of the species is not represented in the anchor mud from the Malay Archipelago, but the beautiful little hyaline form here figured is scattered all over the region. It is as transparent as glass, and as usual the aperture is not apparent. Of all the published figures of the species the one which most resembles it is that of *Textilaria triseriata* Terquem.* The arenaceous form is a common deep-water species, but there appears to be no previous record of the hyaline variety.

Verneuilina polystropha Reuss sp.

Bulimina polystropha Reuss, 1846, Verstein. böhm. Kreid., part 2, p. 109, pl. xxiv. fig. 53. *Verneuilina polystropha* (Reuss) Parker and Jones, 1862, Introd. Foram., Appendix, p. 311. *V.* sp. indet. Andreæ, 1884, Abhandl. geol. Special-Karte Elsass-Lothringen, vol. ii. p. 296, pl. vi. fig. 15. *Bulimina polystropha* (Reuss) Chapman, 1892, Journ. R. Micr. Soc., p. 756, pl. xii. fig. 11. *V. polystropha* (Reuss) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II.

* Mém. Soc. Géol. France, sér. 3, vol. ii. 1882, p. 145, pl. xxiii. fig. 10.

vol. xiii. p. 280, pl. vii. figs. 17, 18. *V. polystropha* (Reuss) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 32, pl. vii. figs. 247–255. *Bulimina polystropha* (Reuss) Chapman, 1894, Quart. Journ. Geol. Soc., vol. l. p. 701, pl. xxxiv. fig. 5.

All the Malay specimens of this species are roughly arenaceous and for the most part colourless. The aperture is more Textularian than Bulimine.

It is abundant at Stations 2 and 12, and is found sparingly at other Stations in both Areas.

Chrysalidina d'Orbigny.

Chrysalidina dimorpha Brady, plate I. fig. 14.

Chrysalidina dimorpha Brady, 1884, Chall. Rept., p. 388, pl. xlvi. figs. 20, 21. *C. dimorpha* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 274, pl. vi. figs. 47, 51, 52.

Rare at Station 14, less rare at Station 22. The examples are characteristic, but show a considerable variation in the proportion of the length to the breadth.

Of the five localities given by Brady, one is off Raine Island, Torres Strait. The 'Gazelle' Stations are Mauritius and West Australia.

Tritaxia Reuss.

Tritaxia lepida Brady, plate I. fig. 15.

Tritaxia lepida Brady, 1881, Quart. Journ. Micr. Sci., n.s. vol. xxi. p. 55. *T. lepida* (Brady) Brady, 1884, Chall. Rept., p. 389, pl. xlix. fig. 12.

Of this very rare form there is a solitary but typical example from Station 3.

The only 'Challenger' locality given by Brady is Station 45 off the coast of North America, a little south of the latitude of New York, 1240 fathoms, but I have found several specimens in the rich dredging from Station 185, off Raine Island, Torres Strait, 155 fathoms.

Clavulina d'Orbigny.

Clavulina communis d'Orbigny.

Clavulina communis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 268, No. 4. *C. communis* (d'Orb.) Fornasini, 1885, Boll. Soc. Geol. Ital., vol. iv. p. 106, pl. vi. figs. 1, 2. *C. communis* (d'Orb.) Sherborn and Chapman, 1886, Journ. R. Micr. Soc., vol. vi. p. 743, pl. xv. fig. 1. *C. communis* (d'Orb.) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 220, pl. xlii. fig. 11. *C. communis* (d'Orb.) Fornasini, 1891, Foram. Plioc. del Ponticello di Savena, pl. ii. fig. 7. *C. communis* (d'Orb.) Murray and Renard, 1891, Chall. Rept., " On Deep-

Sea Deposits," pp. 101, 135, pl. xiv. fig. 2[26]. *C. communis* (d'Orb.) Mariani, 1891, Boll. Soc. Geol. Ital., vol. x. fasc. 2, p. 172, pl. vi. fig. 3. *C. communis* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 275, pl. vi. figs. 42, 43. *C. communis* (d'Orb.) Fornasini, 1893, Mem. R. Accad. Sci. Istit. Bologna, ser 5, vol. iii. p. 436, pl. i. figs. 10–12; and 1894, vol. v. p. 14, pl. iv. fig. 3.

The genus *Valvulina* in its simple form is not represented in the gatherings from the Malay Archipelago; and of the dimorphous forms the examples are rare and local. *Clavulina communis* has been noticed only at Station 14.

Clavulina angularis d'Orbigny,

Clavulina angularis d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 268, No. 2, pl. xii. fig. 7.

Has been found only at Station 2, and there very sparingly. The examples are however large and characteristic.

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