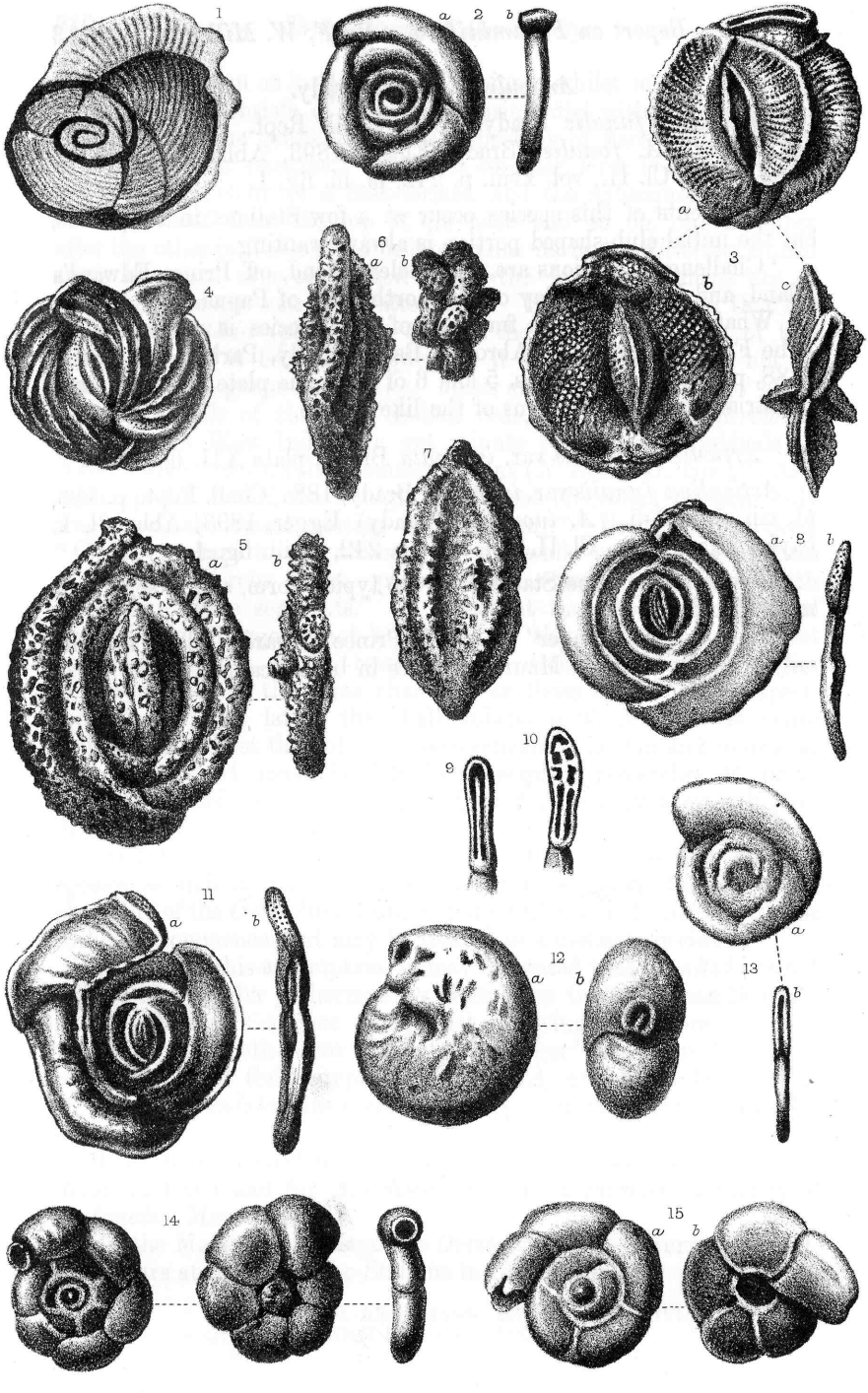

F.W.Millett del. ad nat.

West, Newman lith.

Foraminifera of Malay Archipelago.

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TRANSACTIONS OF THE SOCIETY.

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

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

(*Read 19th October*, 1898.)

Plate XIII.

Vertebralina d'Orbigny.

Vertebralina striata d'Orb., plate XIII. fig. 1.

Vertebralina striata d'Orb., 1826, Ann. Sci. Nat., vol. vii. p. 283, No. 1; Modèle, No. 81. *V. striata* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II., vol. xviii. p. 243, pl. iii. figs. 33, 34.

The majority of the Malay specimens have the peripheral margin angular or carinate, as in *V. insignis* Brady, but in all the test is inequilateral, and one lip of the aperture protrudes beyond the other. Thus, although most of the specimens combine certain of the characters of the two species, the typical *V. insignis* is not represented. As will be seen from the figure, which is drawn as viewed by transmitted light, the test commences with a planospiral chamber.

It occurs at several Stations, but the specimens are small and feeble.

EXPLANATION OF PLATE XIII.

Fig. 1.—*Vertebralina striata* d'Orbigny. × 90.
„ 2.—*Ophthalmidium tumidulum* Brady. × 90.
„ 3.—*Massilina secans* d'Orbigny. × 40.
„ 4. „ „ var. *macilenta* Brady. × 40.
„ 5, 6, 7. „ *alveoliniformis* sp. n. × 30.
„ 8.—*Hauerina fragilissima* Brady sp. × 45.
„ 9, 10. „ „ various forms of aperture. × 90.
„ 11. „ *compressa* d'Orbigny. × 40.
„ 12.—*Planispirina contraria* d'Orbigny sp. × 45.
„ 13. „ *exigua* Brady. × 45.
„ 14, 15.—*Fischerina pellucida* sp. n. × 90.

Ophthalmidium Kübler.

Ophthalmidium inconstans Brady.

Hauerina inconstans Brady, 1879, Quart. Journ. Micr. Sci., vol. xix. n.s. p. 54. *O. inconstans* Brady, 1884, Chall. Rept., p. 189, pl. xii. figs. 5, 7, 8. *O. inconstans* (Brady) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 216, pl. xl. figs. 12, 13. *O. inconstans* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II., vol. xviii. p. 244, pl. iii. figs. 6, 49.

The Malay specimens are few in number, and are mostly of the Spiroloculine form from the Abrolhos Bank, figured by Brady, Parker, and Jones. Brady writes of the species, "Specimens of *Ophthalmidium inconstans* in their fullest development partake more or less of the characters of *Cornuspira*, *Spiroculina*, and *Hauerina*." *

Found only at Stations 2 and 17. The 'Gazelle' Stations are West Australia and Amboyna.

Ophthalmidium tumidulum Brady, plate XIII. fig. 2.

O. tumidulum Brady, 1884, Chall. Rept., p. 189, pl. xii. fig. 6.

A solitary specimen from Station 25. It is rather more angular than Brady's figure, and has three segments to each of the later convolutions. The surface has indications of faint oblique striæ.

Brady names but one 'Challenger' Station, "off Cubebra Island, West Indies," but says it is found in a few other localities.

Massilina Schlumberger.

In all the *Miliolidæ* which at certain stages change their plan of growth, there are two well-defined groups. In one of these the first stage is planospiral, consequently they may be regarded as dimorphic forms of *Cornuspira*. This arrangement prevails in the genera *Vertebralina*, *Ophthalmidium*, and *Planispirina*. In the other group the earlier chambers are aggregated on one or other of the Milioline plans, as in *Articulina*, *Massilina*, and *Hauerina*.

The genus *Massilina*, as constituted by Schlumberger, contains those forms which, commencing as *Miliolina*, subsequently change to *Spiroloculina*. Undoubtedly the accepted classification of this family stands greatly in need of improvement, but at present there is hardly sufficient material available to warrant the proposal of a new system.

Massilina secans d'Orbigny sp., plate XIII. fig. 3.

Quinqueloculina secans d'Orb., 1826, Ann. Sci. Nat., vol. vii. p. 303, No. 43; Modèle, No. 96. *Miliolina secans* (d'Orb.) Sherborn and Chapman, 1886, Journ. Roy. Micr. Soc., p. 742, pl. xiv. fig. 4. *Sigmoilina secans* (d'Orb.) var. *obliquistriata* Halkyard, 1889, Trans.

* Brady, 'Challenger' Report, 1884, p. 189.

Manchester Micr. Soc., p. 61, pl. i. fig. 7. *Massilina secans* (d'Orb.) Schlumberger, 1893, Mém. Soc. Zool. de France, vol. vi. p. 218, w.c. figs. 31–34 and pl. iv. figs. 82, 83. *Miliolina secans* (d'Orb.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 112, pl. xx. fig. 856.

This species is very abundant and occurs in various forms, some with the surface smooth, others covered with papillæ arranged in irregular curved lines, as shown in the figure, which is taken from one of the most aberrant forms of the species, the earlier chambers being large in proportion, and unusually angular and protruding.

It occurs at Stations in both areas, but mostly in Area 2.

Massilina secans var. *macilenta* Brady, plate XIII. fig. 4.

Miliolina macilenta Brady, 1884, Chall. Rept., p. 167, pl. vii. figs. 5, 6.

The Malay specimens confirm Brady's suspicion that this is but a costate variety of *M. secans*, and it is scarcely possible to separate the two forms.

M. macilenta is more widely diffused than the type, but occurs in less abundance.

The 'Challenger' Stations are Nares Harbour, Admiralty Islands; Humboldt Bay, Papua; and off Honolulu, Sandwich Islands.

There appears to be no other record of its occurrence.

Massilina alveoliniformis sp. n., plate XIII. figs. 5, 6, 7.

Test elliptical, chambers tubular, the earlier ones arranged irregularly around the long axis, the later ones in a Spiroloculine series, periphery rounded, aperture terminal, radiate or cribrate, obscured by sand-grains. Texture arenaceous. Length 1·40 mm.

This species in some respects resembles *Sigmoilina tenuis*, but differs from it in the composition of the test and the character of the aperture. It may be regarded as a dimorphous form of *Miliolina alveoliniformis*, the earlier chambers, as shown by fig. 6, having all the characters of that species. *Quinqueloculina fabularoides* Karrer * has a similar aperture, and the arrangement of the chambers is not unlike.

It has been observed at Stations 2, 13, and 22, but the specimens are not numerous.

Hauerina d'Orbigny.

As represented by the Malay specimens, this genus has the earlier chambers arranged after the fashion of *Miliolina alveoliniformis*. These are succeeded by a series on the Spiroloculine plan, and these again by the arrangement characteristic of the genus, in which there are three or more segments in each convolution. The aperture is invariably much compressed, but is not always cribrate.

* Sitzber. k. Akad. Wiss. Wien, vol. l. Abth. i. 1864, p. 704, pl. i. fig. 3.

Hauerina fragilissima Brady sp. n., plate XIII. figs. 8, 9, 10.

Spiroloculina fragilissima Brady, 1884, Chall. Rept., p. 149, pl. ix. figs. 12–14.

The 'Challenger' specimens of this form, as stated by Brady, might be assigned either to *Spiroloculina* or to *Hauerina*, but there is in the Malay gatherings a much compressed variety of *Hauerina compressa*, which in all but the final development of the three segments to a convolution, is the exact counterpart of *S. fragilissima*. In this latter form the aperture is sometimes cribrate, sometimes has an elongated tooth, and frequently the dentate and cribrate forms of aperture are combined in the same specimens. Various forms of aperture are figured on plate XIII. It is a very interesting and instructive passage form combining the characters of the genera *Spiroloculina*, *Massilina*, and *Hauerina*.

It is moderately abundant at several Stations in both Areas.

S. fragilissima occurs at seven 'Challenger' Stations, four of which are off the coast of Papua.

Hauerina compressa d'Orbigny, plate XIII. fig. 11.

H. compressa d'Orb., 1846, For. Foss. Vienne, p. 119, pl. v. figs. 25–27. *H. compressa* (d'Orb.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II., vol. xviii. p. 244, pl. iii. figs. 9, 10, 23, 24.

This rare species occurs both in the compressed form represented by Brady and in the more robust form figured by Egger. Usually it is only in the outermost convolution that there are more than two segments. The earlier chambers are indistinguishable from those of *H. fragilissima*.

In the Malay Archipelago it is found rather sparingly at a few Stations in both Areas.

Brady writes, "So far as can be gathered from the 'Challenger' material, the present distribution of *Hauerina compressa* is restricted to a very small area. It occurs in two dredgings in the narrow sea between the northernmost part of Australia and the island of New Guinea, namely off Booby Island, 6 to 8 fathoms, and off Raine Island, 155 fathoms, and a few small and doubtful specimens have been found in an adjoining locality; but beyond these limits it has not been observed."* The 'Gazelle' specimens were from Mauritius.

Hauerina ornatissima Karrer sp.

Quinqueloculina ornatissima Karrer, 1868, Sitzber. k. Akad. Wiss. Wien, vol. lviii. Abth. I. p. 151, pl. iii. fig. 2. *Hauerina ornatissima* Brady, 1884. Chall. Rept., p. 192, pl. vii. figs. 15–22.

This handsome species, so commonly found in coral sand and so seldom recorded, occurs sparingly at several Stations in both areas. The specimens, although not very large, are characteristic.

* 'Challenger' Report, 1884, p. 191.

Planispirina Seguenza.

Planispirina contraria d'Orbigny sp., plate XIII. fig. 12.

Biloculina contraria d'Orb., 1848, For. Foss. Vienne, p. 266, pl. xvi. figs. 4–6. *Planispirina contraria* Brady, 1884, Chall. Rept., p. 195, pl. xi. figs. 10, 11 and woodcut fig. 5 *a*.

From Station 27 there is a single specimen of this rather rare although widely distributed species.

It is recorded from six 'Challenger' Stations, amongst them being north of Papua and off Amboyna. A somewhat doubtful example appears on pl. iii. figs. 35, 36 of Egger's 'Gazelle' Report, but there is no reference to it in the text.

Planispirina exigua Brady, plate XIII. fig. 13.

Hauerina exigua Brady, 1879, Quart. Journ. Micr. Sci., vol. xix. n.s., p. 53. *P. exigua* Brady, 1884, Chall. Rept., p. 196, pl. xii. figs. 1–4 and woodcut fig. 5 *b*. *P. exigua* (Brady) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 216, pl. xl. fig. 4. *P. exigua* (Brady) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II. vol. xviii. p. 245, pl. iii. figs. 11, 12.

This common tropical shallow water species occurs in considerable abundance, and is widely distributed in both areas. The specimens exhibit remarkable persistency of form.

Sub-Family **Fischerininæ**.

Test free; segments numerous, arranged on a Rotaliform or inæquilaterally planospiral plan; aperture large, terminal.

This sub-family, unique amongst the Porcellanea in having the chambers arranged in a more or less Rotaliform manner, embraces the genera *Fischerina* of Terquem and *Ceratina* of Goës.

The genus *Fischerina* was instituted by Terquem in 1878 to accommodate a rare aberrant form from the Upper Pliocene of the Island of Rhodes. As usual with him, taking no notice of the shell structure, he assigned it a place between *Rotalina* and *Nonionina*, and named the species *F. Rhodiensis*.*

In 1894, Goës † described a porcellanous species from the Azores, which in form resembles *Trochammina proteus* Karrer. To this form he gave the name of *Ceratina trochamminoides*, remarking that through lack of specimens he was unable thoroughly to investigate the genus. Its affinities with *Fischerina* are, however, tolerably well marked, and it may be assigned provisionally to the same sub-family.

Fischerina Terquem.

Fischerina pellucida sp. n., plate XIII. figs. 14, 15.

Test Rotaliform, depressed, consisting of about three convolutions, each containing five or six chambers, which are all visible on the

* Mém. Soc. Géol. France, sér. 3, vol. i. 1878, p. 80, pl. xiv. fig. 25.

† K. Svenska Vet.-Akad. Handl., vol. xxv. p. 122, pl. xxv. fig. 930.

superior face. Inferior face excavated at the umbilicus, periphery rounded, slightly lobulated; sutures sunk. Aperture circular, with an everted margin. Shell smooth and translucent. Length 0·25 mm.

This interesting little form is widely distributed in the Malay Archipelago, and is by no means rare. It differs from *F. Rhodiensis* in the inflation of the chambers, in the lesser exposure of the convolutions on the inferior face of the test, and in the form of the aperture.

Sub-Family **Peneroplidinæ.**

Cornuspira Schultze.

Cornuspira foliacea Philippi sp.

Orbis foliaceus Philippi, 1844, Enum. Moll. Siciliæ, vol. ii. p. 147, pl. xxiv. fig. 26. *Cornuspira foliacea* (Phil.) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. p. 326, pl. xii. fig. 1. *C. foliacea* (Phil.) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II., vol. xviii. p. 247, pl. iii. figs. 20, 21. *C. foliacea* (Phil.) Fornasini, 1893, Mem. R. Accad. Sci. Ist. Bologna, ser. 5, vol. iii. p. 431, pl. i. fig. 4. *C. foliacea* (Phil.) Goës, 1894, K. Svenska Vet.-Akad. Handl., vol. xxv. p. 106, pl. xviii. fig. 834. *C. foliacea* (Phil.) Morton, 1897, Proc. Portland Soc. Nat. Hist., vol. ii. p. 114, pl. i. fig. 16.

Although tolerably abundant and widely diffused, the specimens are feeble, none of them exhibiting the rapid increase in size of the outer convolution which is characteristic of the species.

Cornuspira involvens Reuss.

Operculina involvens Reuss, 1850, Denkschr. k. Akad. Wiss. Wien, vol. i. p. 370, pl. xlvi. fig. 20. *Cornuspira involvens* Reuss, 1863, Sitzber. k. Akad. Wiss. Wien, vol. xlviii. p. 39, pl. i. fig. 2. *C. involvens* (Reuss) Balkwill and Wright, 1885, Trans. R. Irish Acad., vol. xxviii. p. 327, pl. xii. fig. 2. *C. involvens* (Reuss) Brady, Parker, and Jones, 1888, Trans. Zool. Soc., vol. xii. p. 216, pl. xl. figs. 1–3. *C. involvens* (Reuss) Sherborn and Chapman, 1889, Journ. R. Micr. Soc., p. 484, pl. xi. figs. 4, 5. *C. cretacea* (Reuss) Burrows, Sherborn, and Bailey, 1890, Journ. R. Micr. Soc., p. 552, pl. viii. fig. 6. *C. involvens* (Reuss) Egger, 1893, Abhandl. k. bayer. Akad. Wiss., Cl. II., vol. xviii. p. 246, pl. iii. figs. 18, 19. *C. involvens* (Reuss) T. Rupert Jones, 1895, Pal. Soc., p. 128, pl. iii. figs. 52–54 and woodcuts figs. 11 *a*, 11 *b*.

Is more abundant than *C. foliacea*, and occurs in two forms; in one of these the tube is very small at the commencement, and the convolutions numerous; in the other the whorls are few, and the tube, having its origin in a spherical chamber, increases but little in size. This latter is the more abundant.

Probably these represent the *Microspheric* and *Megalospheric*

forms of the species. Both are figured on plate xl. of the Memoir on the Foraminifera of the Abrolhos Bank, by Brady, Parker, and Jones, referred to above.

Peneroplis Montfort.

Peneroplis pertusus Forskål sp.

Var. *a. planatus* Fichtel and Moll sp.
„ *b. pertusus* Forskål sp.
„ *c. arietinus* Batsch sp.
„ *d. cylindraceus* Lamarck sp.
„ *e. lituus* Gmelin sp.
„ *f. carinatus* d'Orbigny.

Accepting Brady's convenient arrangement of the forms composing this genus,* the above mentioned varieties are found in moderate numbers at most of the Malay Stations, but are most abundant in Area 1.

The specimens as a rule are not large, and call for little mention; it may however be observed, that although there are numerous examples of the fragile form *P. lituus*, not one of them possesses the initial chambers.

Orbitolites Lamarck.

Orbitolites marginalis Lamarck sp.

Orbulites marginalis Lamarck, 1816, Hist. Nat. Anim. sans Vert., vol. ii. p. 196, No. 1. *Orbitolites marginalis* Carpenter, 1883, Phil. Trans., vol. clxxiv. p. 559, fig. 1.

This simple form occurs in some abundance at several Stations in both areas, but the specimens are small.

Orbitolites complanata Lamarck.

Orbitolites complanata Lamarck, 1801, Syst. Anim. sans Vert., p. 376. *O. complanata* (Lam.) Egger, 1893, Abhandl. k. bayer. Akad., Cl. II., vol. xviii. p. 249, pl. iii. fig. 40. *O. complanata* (Lam.) T. Rupert Jones, 1895, Pal. Soc., p. 136, pl. iii. figs. 45–47. *O. complanata* (Lam.) Lister, 1895, Phil. Trans., vol. clxxxvi. p. 431, pl. ix. figs. 41–51.

Distribution similar to that of *O. marginalis*, and some of the specimens attain a considerable size.

Alveolina d'Orbigny.

Alveolina Boscii Defrance sp.

Oryzaria boscii Defrance, 1820, Dict. Sci. Nat., vol. xvi. p. 106 *Alveolina Boscii* (Defr.) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii p. 306, No. 5; Modèle No. 50. *A. longa* (Czjzek) Egger, 1893 Abhandl. k. bayer. Akad., Cl. II., vol. xviii. p. 249, pl. iii. fig. 32.

* 'Challenger' Report, 1884, p. 204.

Occurs at a few Stations in both areas. The specimens are moderate in size.

The 'Gazelle' examples are from Mauritius.

Alveolina melo Fichtel and Moll. sp.

Nautilus melo Fichtel and Moll, 1798, Testac. Micr., p. 118, pl. xxiv. *Alveolina melo* (F. and M.) d'Orbigny, 1826, Ann. Sci. Nat., vol. vii. p. 306, No. 5. *A. melo* (Brady) Egger, 1893, Abhandl. k. bayer. Akad., Cl. II., vol. xviii. p. 249, pl. iii. fig. 31.

This species is very rare in the Malay Archipelago and has been found only at Stations 2 and 22.

The 'Gazelle' Stations are Mauritius and West Australia.