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XVI. Report on the Recent Foraminifera from the Bay of Palermo, Sicily, 14-20 fms. (Off the Harbour.)

By HENRY SIDEBOTTOM.

Received and read May 3rd, 1910.

NOTE.

The following note was printed at the end of my Delos papers :—

> "I hope next year to deal with the Foraminifera from Palermo, describing and illustrating the species that occur there, and not at Delos. This contribution, taken in conjunction with my Delos papers, will give a complete record for Palermo."

A full description of the species not described in this work, will be found in my papers on the Delos Foraminifera.*

The material was dredged by my brother-in-law, C. H. Nevill, Esq., of Bramall Hall, Cheshire, in 1897, from the harbour of Palermo, 14-20 fms. He went carefully through the material, and mounted type-slides of the specimens, presenting them to me.

MILIOLIDÆ.

NUBECULARINÆ.

Nubecularia, Defrance.

Nubecularia tibia, Jones and Parker. (Pl. 1. fig. 1).

The tests are semi-transparent.

* Report on the Recent Foraminifera from the Coast of the Island of Delos. *Manchester Memoirs*, vol. 48 (1904) No. **5**., vol. 49 (1905) No. **5**., vol. 50 (1906) No. **5**, vol. 51 (1907) No. **9**, vol. 52 (1908) No. **13**, vol. 53 (1909) No. **21**.

June 24th, 1910.

Nubecularia lucifuga, Defrance.

Nubecularia bradyi, Millett. (= *N. inflata*, Brady).

MILIOLININÆ.

Biloculina, d'Orbigny.

Biloculina irregularis, d'Orbigny.

The tests are not typical, and may be the biloculine form of *Triloculina cuneata*, Karrer. This remark refers also to the Delos specimens.

Biloculina elongata, d'Orbigny.

Biloculina ringens, Lamarck, sp.

Good, but rather elongate, one nearly globular occurs.

Biloculina tubulosa, Costa.

A single specimen.

Spiroloculina, d'Orbigny.

Spiroloculina planulata, Lamarck, sp.

Spiroloculina excavata, d'Orbigny.

Spiroloculina dorsata Reuss (= *Sp. limbata*, d'Orb.).

Spiroloculina impressa, Terquem.

Spiroloculina nitida, d'Orbigny.

Spiroloculina grata, Terquem.

Very good examples of this species occur.

Spiroloculina inæquilateralis, Schlumberger. (Pl. 1, fig. 2).

Only three found, and they agree with Schlumberger's figure.

Sigmoïlina, Schlumberger.

Sigmoïlina tenuis, Czjzek, sp.

Only one found.

Sigmoïlina costata Schlumberger.

Miliolina, Williamson, 1858.

Miliolina oblonga, Montagu, sp.

Miliolina bosciana, d'Orbigny, sp.

Miliolina rotundata, d'Orbigny, sp.

Miliolina circularis, Borneman, sp.

Miliolina subrotunda, Montagu, sp.

See Delos work, *Manchester Memoirs*, vol. 48 (1904), No. 5, p. 8, for account of the two forms present in these gatherings.

Miliolina suborbicularis, d'Orbigny, sp.

Miliolina marioni, Schlumberger, sp.

See remarks in Delos paper, *Manchester Memoirs*, vol. 48 (1904), No. 5, p. 9.

Miliolina schreiberiana, d'Orbigny, sp.

This species appears to be very closely related to *M. trigonula*, Lamarck, sp.

Miliolina labiosa, d'Orbigny, sp.

As in the Delos examples no line of demarcation can be drawn between *Nubecularia bradyi* (=*N. inflata*, Brady) and *M. labiosa*, d'Orbigny, sp.; and Mr. Millett in his Malay work states that it ranges from *N. bradyi* to *M. valvularis*.

Miliolina reticulata, d'Orbigny, sp.

The examples are of the carinate and bi-carinate variety.

Miliolina seminulum, Linné, sp.

The flat variety, see Delos, (*Manchester Memoirs,* vol. 48 (1904), No. 5, p. 10, and pl. 3, figs. 13—15) is also present, but is evidently rare.

Miliolina auberiana, d'Orbigny, sp.

There are only two on the slide, and they are of the elongate variety.

Miliolina cuvieriana, d'Orbigny, sp.

The specimens are small. The *Q. seminuda* of Reuss, with the rounded periphery striate, is also present.

Miliolina boueana, d'Orbigny, sp.

These are all in the triloculine condition. (See Delos paper).

Miliolina lævigata, d'Orbigny, sp.

Miliolina undosa, Karrer, sp. (Pl. 1, fig. 3.)

The examples are finely striate.

Miliolina pygmæa, Reuss, sp.

They agree with the Delos forms of this species. One of the specimens is much stouter than the rest.

Miliolina contorta, d'Orbigny, sp.

The tests are slightly roughened.

Miliolina sclerotica, Karrer, sp.

The tests are rough and much broader in proportion to their length than *M. contorta.* They appear to be the same as those figured by Schlumberger under the name of

Q. rugosa, d'Orb., in his monograph of the *Miliolina* from the Gulf of Marseilles.

Miliolina stelligera, Schlumberger, sp.

See remarks in Delos paper.

Miliolina gracilis, d'Orbigny, sp.

Judging from the number on the slide, these must be of very frequent occurrence.

Miliolina agglutinans, d'Orbigny, sp.

The specimens are rather small and similar to the Delos examples.

Miliolina bicornis, Walker and Jacob, sp.

Very fine specimens are present of the form figured in the Delos work, although some of the specimens are much broader.

Miliolina disparilis, d'Orbigny, sp.

See remarks, Delos paper. The Palermo examples are very fine.

Miliolina costata, d'Orbigny, sp.

This is a neat, elongate variety, the test is rather finely costate.

Miliolina ferussacii, d'Orbigny, sp.

Only two specimens are on the slide, but there are five good examples of the form referred to under this heading in the appendix to my Delos work. I state there that they are probably a feeble variety of the elongate form of *M. ferussacii*.

Miliolina valvularis, Reuss, sp.

The extent to which the valve fills up the orifice varies very considerably. The biloculine form is also present, but is evidently very rare.

Miliolina linnæana, d'Orbigny, sp.

Only one on the slide.

Miliolina pulchella, d'Orbigny, sp.

HAUERININÆ.

Articulina, d'Orbigny.

Articulina funalis, Brady.

There is only a single specimen on the slide.

Articulina funalis, var. *inornata*, Brady.

Five good examples found.

Vertebralina, d'Orbigny.

Vertebralina striata, d'Orbigny.

Glancing through some of the material, this species seems fairly common.

Massilina, Schlumberger.

Massilina secans, d'Orbigny, sp.

Hauerina, d'Orbigny.

Hauerina compressa, d'Orbigny.

I must draw my readers' attention to the remarks on this form in my Delos paper (*Manchester Memoirs*, vol. 48 (1904) No. 5, p. 19, and pl. 5, figs. 7, 8). It is a curious fact that in the fourteen specimens on the Palermo slide not one has the aperture showing the cribrate arrangement, entire. Two specimens have partial indications of it; whereas, in the numerous examples from Delos, the majority have the cribrate aperture complete.

Planispirina, Seguenza.

Planispirina schlumbergeri, Sidebottom.

There are three examples of this species on the slide,

but they have not fully reached the hauerine stage, and, therefore, the outline of the test is oblong, instead of nearly circular. For full particulars see the Delos paper (1904).

Planispirina striata, Sidebottom.

See Delos paper (1904). This species must not be confused with the hauerine form of *Mil. suborbicularis*, d'Orb., which also has three chambers in the last whorl.

In *P. striata* the central chambers are exposed, but in *M. suborbicularis*, at any rate in the Delos examples, this is not the case.

Cornuspira, Schultze.

Cornuspira foliacea, Philippi, sp.

Fine examples occur.

Cornuspira involvans, Reuss.

Only one of them shows the microspheric condition.

PENEROPLIDINÆ.

Peneroplis, Montfort.

Peneroplis pertusus, Forskal, sp. var. a. *planatus*, Fichtel and Moll, sp.

Peneroplis pertusus, Forskål, sp. var. c. *arietinus*, Batsch, sp.

Peneroplis pertusus, Forskål, sp. var. d. *cylindraceus*, Lamarck, sp.

Peneroplis pertusus, Forskål, sp. var. g. *laevigatus*, Karrer.

Orbitolites, Lamarck.

Orbitolites duplex, Carpenter.

There are only two or three specimens on the slide, and although on their peripheral edges the chambers sometimes alternate and sometimes do not, still I think they may be referred to this variety, viz., *O. duplex*.

ARENACEA.

ASTRORHIZIDÆ

SACCAMMININÆ.

Psammosphæra, Schultze.

Psammosphæra fusca, F. E. Schultze. (Pl. 1, fig. 4).

Three were found. The test is composed of whitish sand grains, cemented together with dark brown material. They are very small and rough.

LITUOLIDÆ.

LITUOLINÆ.

Reophax, Montfort.

Reophax difflugiformis, Brady.

Reophax scottii, Chaster.

This flexible and curious species is well represented.

Reophax scorpiurus, Montfort.

Reophax bacillaris, Brady. (Pl. 1, fig. 5).

A single, rather distorted specimen. It answers well to Brady's description of the species, except as regards colour, which, instead of being the usual grey, is light yellow-brown.

Haplophragmium, Reuss.

Haplophragmium pseudospirale, Williamson, sp. (Pl. 1, fig. 6).

The five specimens are more compactly built than is usual with this species. They are brown in colour, and the spiral commencement of the test is much smaller than in the type.

Haplophragmium canariense, d'Orbigny, sp.

Frequent.

Haplophragmium nanum, Brady.

There is a single characteristic example on the slide.

Haplophragmium globigeriniforme, Parker and Jones, sp.

Haplophragmium agglutinans, d'Orbigny, sp.

A fragment.

Trochamminin*æ*.

Ammodiscus, Reuss.

Ammodiscus incertus, d'Orbigny, sp.

It occurs in two colours, yellowish-brown and white, the latter is the smaller of the two varieties.

Ammodiscus gordialis, Jones and Parker, sp.

A solitary specimen.

Ammodiscus perversus, n. sp. (Pl. 1, fig. 7).

There is only one specimen in fair condition on the slide, and this is the one figured, the remaining two being fragments. They are evidently adherent forms. The test is composed at its commencement of a simple coiled tube, but later on the tube is much larger, and is coiled over the earlier portion with the last part of the tube bent back irregularly. The test is rough, of a light brown colour, and is built up of fine sand grains. The under surface is flat.

Looking through some of the coarse material, I have come across another specimen which is perfect; but too late to make a drawing of it, as the plates were already set up. It only differs from the one illustrated in not having the central portion of the test completely covered up, and the end of the tube is not bent back on the upper surface, but is doubled back at the side of the test.

Trochammina, Parker and Jones.

Trochammina inflata, Montagu, sp.

Trochammina squamata, Parker and Jones.

The tests are very small, and the number of chambers in the last whorl varies from three to five. In some of the specimens the chambers are more inflated than in the type.

Trochammina ochracea, Williamson, sp.

Carterina, Brady.

Rotalia, Carter (1877).

Carterina spiculotesta, Carter, sp.

There are seven small examples of this interesting species on the slide.

TEXTULARIDÆ.

TEXTULARINÆ.

Textularia, Defrance.

Textularia concava, Karrer, sp.

The specimens are typical.

Textularia agglutinans, d'Orbigny.

The form *T. candeiana*, d'Orbigny is also present.

Textularia gramen, d'Orbigny.

Textularia trochus, d'Orbigny.

Two good examples are on the slide.

Textularia rhomboidalis, Millett.

Excellent examples occur.

Spiroplecta, Ehrenberg.

Spiroplecta sagittula, Defrance, sp.

One very good specimen is present.

Spiroplecta rosula, Ehrenberg. (Pl. 1, fig. 8.)

This is a hyaline and perforate form of *S. biformis*. Brady reports it from the North East Coast of England. There are seven specimens on the slide. They are quite transparent and very small. The perforations do not show quite so distinctly as those in my illustration.

Gaudryina, d'Orbigny.

Gaudryina filiformis, Berthelin. (Pl. 1, fig. 9.)

The tests are very small and of a light rusty-red colour. They correspond to some of the specimens from the Irish coast, and Mr. Wright of Belfast considers they are rightly placed under this heading. Most of the tests are nearly sharp at the commencement, and this may be the microspheric form.

Verneuilina, d'Orbigny.

Verneuilina polystropha, Reuss, sp.

Very large specimens are found in this material, and they are of a rusty-red hue as a rule. Among the examples on the slide are two which are short and stumpy.

Verneuilina spinulosa, Reuss.

Evidently very frequent.

Clavulina, d'Orbigny.

Clavulina angularis, d'Orbigny. (Pl. 1, fig. 10).

Two very good examples are shown on the slide. Brady in the Challenger Report states that it occurs in the Mediterranean and the Red Sea.

BULIMININÆ.

Bulimina, d'Orbigny.

Bulimina elegans, d'Orbigny.

Bulimina elegans, d'Orbigny, var. *exilis*, Brady. (Pl. 1, fig. 11).

A solitary specimen.

Bulimina subteres, Brady.

Frequent.

Bulimina elegantissima, d'Orbigny, var.

See Delos paper (1905) pl. 2, figs. 7-12, and pl. 3, fig. 1.

Bulimina elongata, d'Orbigny.

Bulimina marginata.

Excellent examples are on the slide and they are frequent.

Bulimina aculeata, d'Orbigny.

Present in two forms, one of which is short with the earlier chambers very small, and the rest rather suddenly increasing in size ; and the other is elongate with chambers more or less inflated. Some of the latter might be brought under *B. elegans* if it were not for a few spines about the base, and others under *B. pupoides* but for the same reason.

Bulimina pyrula, d'Orbigny.

Bulimina convoluta, Williamson, var. *nitida*, Millett.

One of the specimens on the slide is very large.

Virgulina, d'Orbigny.

Virgulina schreibersiana, Czjzek.

There are typical specimens on the slide, and also the variant figured in the Delos paper (1905), pl. 3, fig. 4.

Virgulina squamosa, d'Orbigny.

See Delos (1905) pl. 3, fig. 5.

Virgulina subsquamosa, Egger.

Bolivina, d'Orbigny.

Bolivina punctata, d'Orbigny.

Bolivina nobilis, Hantken.

The specimens vary a great deal as to the number of striæ; in one case the striæ are so numerous that the chambers of the lower half of the test are completely concealed by them. Most of the tests are broader at the oral end than those figured by Brady in the Challenger Report.

Bolivina textilarioides, Reuss.

The tests are small and transparent.

Bolivina tortuosa, Brady.

Bolivina dilitata, Reuss.

The specimens are typical.

Bolivina beyrichi, Reuss, var. *alata*, Sequenza.

Four large typical specimens are on the slide.

Bolivina plicata, d'Orbigny.

These agree with the British form of this species.

Bolivina limbata, Brady ?

See Delos paper, p. 15 (1905) for particulars of the specimens (line 10 from top of page).

Mimosina, Millett.

Mimosina hystrix, Millett, var.

They agree with the Delos form of this interesting species.

Cassidulina, d'Orbigny.

Cassidulina crassa, d'Orbigny.

The examples are small.

Cassidulina lævigata, d'Orbigny.

The tests of this species are of the usual milky hue, and are much larger than the previous form.

Cassidulina bradyi, Norman.

Evidently very rare.

CHILOSTOMELLIDÆ.

Chilostomella, Reuss.

Chilostomella ovoidea, Reuss.

There is a single specimen on the slide.

LAGENIDÆ.

LAGENINÆ.

Lagena, Walker and Boys.

Lagena globosa, Montagu.

Globular and slightly elongate examples are frequent.

Lagena apiculata, Reuss.

A single specimen of the globose form.

Lagena botelliformis, Brady, var.

One example, see Delos (1906), pl. 1, fig. 1.

Lagena ampulla-distoma, Rymer Jones.

Both the forms illustrated in the Delos paper are frequent, the smaller has the tubercles on the lower half of the test better developed than they are shown in the Delos illustration.

Lagena lineata, Williamson, sp.

Lagena variata, Brady.

Lagena lævis, Montagu, sp.

Frequent.

Lagena lævis, Montagu, var. *distoma*, Silvestri. (Pl. 1, fig. 12).

Both the globular and ovate forms are on the slide.

Lagena lyellii, Sequenza, sp. (Pl. 1, figs. 13, 14, 15, 17, 18?).

These range from the nearly globular form to the ovate, and are frequent; they nearly all have the neck decorated and a phialine lip.

Lagena striata, d'Orbigny, sp. (Pl. 1, figs. 16, 19, 20, Pl. 2, fig. 1).

Besides the oval form, there are elongate (frequent), and two or three somewhat club-shaped forms. . . . .

I would here draw particular attention to the fine "clusters" of *Lagena* found at this locality. They are apparently composed of *L. lyellii*, *L. striata* and *L. semi-striata*. The lower portion of their tests springs from an irregular chamber and is not embedded in it, the bases of the *Lagena* being part of the irregular chamber. This chamber is marked more or less by broken-up costæ, and small blunt spines or tubercles, and often has several orifices besides the one that opens into the body of the *Lagena*, which sometimes has three necks. The orifices of the irregular chamber are, I think, simply nipples. It looks as if this irregular chamber were the parent one. In Fig. 1, Pl. 2, it will be noticed that one of the tests is smaller than the other two, and has a short neck with everted lip. Would it have expanded its test, and increased the length of its neck as the others have done? The lowest test in this figure has its chief neck snapped

off. In Fig. 17, Pl. 1, two tests appear to be joined together. Is this a case of plastogamy? In one example the *Lagena* has evidently been broken off from the irregular chamber, and has left a circular mark with the small nipple orifice in the centre, the contour of the irregular chamber remaining undisturbed.

There are nine other examples on the slide, but most of them are smaller, and not in such good condition as those chosen for illustration.

Lagena semistrata, Williamson. (Pl. 2, fig. 2).

Very good examples are on the slide, and they are evidently of frequent occurrence. There is considerable variety in the shape of the tests.

Lagena sulcata, Walker and Jacob, sp.

Two examples.

Lagena sulcata (W. and J.), var. *interrupta*, Williamson.

Three or four only.

Lagena acuticosta, Reuss.

Very rare.

Lagena gracilis, Williamson.

One test is exactly like fig. 12, pl. 1 in Williamson's "Recent Foraminifera of Great Britain" (1858). In the other examples the number of costæ varies from four upwards.

Lagena clavata, d'Orbigny, sp.

Lagena gracillima Sequenza, sp.

Lagena distoma, Parker and Jones.

A single good specimen.

Lagena hexagona, Williamson, sp. (Pl. 2, fig. 3).

Present in two forms, one nearly globular, and the other very small. The hexagonal markings on the latter are large in comparison with the size of the test, and it also has a short neck with four very small wings running up it from the upper part of the body of the test.

Lagena reticulata, Macgillivray, sp. (Pl. 2, fig. 4).

A few good ones occur.

Lagena melo, d'Orbigny, sp.

Only one example on the slide.

Lagena striatopunctata, Parker and Jones. (Pl. 2, fig. 5).

There are thirty-seven specimens on the slide, of the form that has its sides parallel. All the necks are bent to one side, as was the case with the Delos specimens. The bottoms of the tests are rounded off. One example (see figure) has five costæ, and the body of the test is of a different form from the rest. The neck is apparently broken off.

Lagena desmophora, Rymer Jones. (Pl. 2, fig. 6).

A single, small specimen, of which the neck appears to be broken.

Lagena levigata, Reuss, sp.

Lagena levigata, Reuss, sp., var. *acuta*, Reuss, sp.

The form with the small ring at the base (which often projects very slightly at the sides into a delicate point) is also present.

Lagena lucida, Williamson, sp. (Pl. 2, fig. 7).

The three forms present are those represented by my drawings in the Delos paper (1906) pl. 1, figs. 9, 10, (also apiculate) and 11.

There is one example of trigonal form, see figure.

Lagena quadrata, Williamson, sp. (Pl. 2, fig. 8).

Besides the single specimen illustrated, there are solitary examples similar to those figured from Delos, pl. 1, fig. 22 (but without the frosted band), and pl. 2, fig. 2, also many like pl. 2, fig. 3.

Lagena staphylleria, Schwager, sp.

Apparently rare. There is a single test like fig. 20 on the Delos plate.

Lagena marginata, Walker and Boys.

The examples are small. There is a form present which seems to me to be half way between *L. marginata* and *L. marginata*, var. *semimarginata*, Reuss.

Lagena marginato-perforata, Sequenza.

Occurs in five forms. One like the Delos figure 5, pl. 2; another (the largest) approaching *L. quadrata* in contour; a single specimen, circular, with a slightly produced neck; two or three approaching *L. marginata*, var. *semimarginata*, Reuss, and two or three very small ones of *L. lævigata* form. All show the bare patch in the centre of the test.

Lagena marginata (W. & B.) var. *inæquilateralis*, Wright.

Very rare.

Lagena fasciata, Egger, sp.

See Delos paper (1906) pl. 1, figs. 15, 16. Only these two varieties are on the slide.

Lagena lagenoides, Williamson, sp. (Pl. 2, figs. 9, 10, 11).

There is one large specimen agreeing with Brady's Challenger figure, fig. 14, except that the test is twisted. There are likewise eleven very small tests of this variable species like the one illustrated, Fig. 9, Pl. 2, and three of

the trigonal form in which the keel is split, Fig. 11. There is a single example which is four-sided and has a neck produced. A very handsome variety (Fig. 10, Pl. 2) also occurs, but very rarely, which I have placed under this heading on the advice of Mr. Millett, as the band between the body of the test and the keel is unornamented, otherwise it would be placed under *L. formosa*, Schwager.

Lagena lagenoides (Williamson) var. *tenuistriata*, Brady.

A few like those figured in the Delos paper. They are very small.

Lagena orbignyana, Sequenza. (Pl. 2, fig. 12, and fig. 13, var.).

Occurs in various forms besides the following. Fig. 12, Pl. 2 is trigonal. Fig. 13 is a pretty variation.

Lagena orbignyana, var. *clathrata*, Brady.

Lagena orbignyana, var. *variabilis*, Wright.

Lagena orbignyana, var. *lucunata*, Burrows and Holland. (Pl. 2, fig. 14).

Lagena orbignyana, var. *walleriana*. (Pl. 2, fig. 15).

Very rare.

Lagena fimbriata, Brady.

Frequent.

Lagena alveolata, Brady.

They are like the Delos example of this species. Very rare.

Lagena exculpta, Brady. (Pl. 2, fig. 16).

One example of the compressed form.

Lagena protea, Chaster. (Pl. 2, figs. 17, 18).

Fine and varied specimens are on the slide.

NODOSARINÆ.

Nodosaria.

Nodosaria calomorpha, Reuss.

Very frequent. Some have as many as seven chambers, and are of similar form to the Delos figure, pl. 1, fig. 2 (1907).

Nodosaria communis, d'Orbigny.

Nodosaria scalaris, Batsch, sp. (Pl. 2, figs. 19, 20, 21).

A few good examples. There are about nine similar to Fig. 19, Pl. 2, and they are much larger than the ordinary form present. It is possible they may be double Lagenas, as the individual chambers bear a strong likeness to some of the Lagenas on the slide, both as regards size and markings.

Nodosaria chrysalis, Sidebottom.

About twenty good examples are on the slide; they are the same as those from Delos.

Lingulina, d'Orbigny.

Lingulina carinata, d'Orbigny.

Several of them are good examples of this species, and have the aperture normal. Forms similar to the Delos figures 18, 19, pl. 1 (1907), are on the slide.

Lingulina carinata (d'Orb.) var. *bi-carinata*, Sidebottom.

There is one test with four chambers on the slide; the bi-carinate condition is well marked.

Lingulina pellucida, Sidebottom.

There are thirty-four typical specimens on the slide and one with three segments. Their likeness to a pocket brandy flask is remarkable. A full account of this species is given in the Delos paper.

Frondicularia, Defrance.

Frondicularia spathulata, Brady, sp. (Pl. **2**, fig. 22.)

A solitary specimen.

Marginulina, d'Orbigny.

Marginulina costata, Batsch, sp. (Pl. 3, figs. 1, 2, 3.)

Frequent; see Delos paper for full account of this variety.

Intermediate forms between *Cristellaria*, and the genera *Vaginulina* and *Marginulina*. (Pl. 3, figs. 4—7.)

Fig. 5, Pl. 3, as Mr. Millett kindly pointed out, has the characters of *Amplicoryne*.

Cristellaria, Lamarck.

Cristellaria crepidula, Fichtel and Moll, sp.

Typical and non-typical examples are fairly frequent, and a few are of the ensiform variety.

Cristellaria rotulata, Lamarck, sp.

The specimens are very rare.

Cristellaria variabilis, Reuss.

Four good examples, with the last two chambers erect; they are without the keel. There is, however, a solitary one which is small, almost round in contour, and with a narrow keel.

Cristellaria acutauricularis, Fichtel and Moll. (Pl. 3, fig. 8.)

Amphicoryne, Schlumberger.

Amphicoryne, sp.?

They correspond to the Delos forms in every particular.

POLYMORPHININÆ.

Polymorphina, d'Orbigny.

Polymorphina lactea, Walker and Jacob, sp.

Polymorphina amygdaloides, Reuss.

The specimens on the slide are very good examples of this compressed form.

Polymorphina lactea (W. and J.), var. *oblonga*, Williamson.

One or two specimens occur, but they are not quite typical.

Polymorphina gibba, d'Orbigny.

Polymorphina communis, d'Orbigny.

Two examples only.

Polymorphina compressa, d'Orbigny.

Large examples ; fistulose forms also.

Polymorphina lactea, var. *concava*, Williamson.

A few small examples occur.

Polymorphina sorroria, Reuss.

The tests are not quite typical. Some are round at the base, approaching *P. gutta*, and others slightly pointed ; all are small.

Polymorphina spinosa, d'Orbigny, sp.

See Delos paper (1907) for an account of these.

Polymorphina complexa, Sidebottom.

There are ten tests of this protean species on the slide. They none of them correspond with the Delos examples, but the aperture and colour are the same.

Full particulars are given on page 16 in the Delos paper (1907).

Polymorphina, sp.

There are a few large masses of *Polymorphina*, which are, no doubt, monstrosities.

Uvigerina, d'Orbigny.

Uvigerina angulosa, Williamson.

Fair examples.

Uvigerina, sp.

See Delos paper (1908), fig. 7, pl. 1. The Palermo specimens are better examples of what appears to be an intermediate form, approaching *W. porecta*, Brady.

Uvigerina pygmæa, d'Orbigny.

There are three good ones on the slide.

Uvigerina auberiana (d'Orb.), var. *glabra*, Millett.

Very fine examples are present, and in considerable numbers.

Sagrina, Parker and Jones.

Sagrina nodosa, Parker and Jones. (Pl. 3, figs. 9, 10).

Occurs in two forms as illustrated. In one case the test is almost smooth, and in the other the striæ are well marked; in both the striæ are broken up into dots.

GLOBIGERINIDÆ.

Globigerina, d'Orbigny.

Globigerina bulloides, d'Orbigny.

Globigerina triloba, Reuss.

See remarks in the Delos paper.

Globigerina rubra, d'Orbigny.

Globigerina inæquilateralis, Brady.

Globigerina inflata, d'Orbigny.

These are in capital condition.

Orbulina, d'Orbigny.

Orbulina universa, d'Orbigny.

Besides the usual typical form, there is one specimen which is double, the *G. bilobata* of d'Orbigny.

ROTALIDÆ.

SPIRILLININÆ.

Spirillina, Ehrenberg.

Spirillina vivipara, Ehrenberg.

The largest examples on the slide are like the one figured in the Delos paper (1908), fig. 1, pl. 2. The others are represented by Fig. 13, Pl. 1. The Palermo examples of this form are composed of only two convolutions.

Spirillina obconica, Brady.

This is a rare form. There are three specimens of this small and delicate species. The swollen commencement of the tube, referred to by Brady in the Challenger Report, is well marked, especially in one of the tests, all three of which consist of about three and a half convolutions.

ROTALINÆ.

Patellina, Williamson.

Patellina corrugata, Williamson.

Frequent.

Cymbalopora, Hagenow.

Cymbalopora poeyi, d'Orbigny, var.

The tests are of the variety figured by Brady in the Challenger Report, pl. 102, fig. 14.

Discorbina, Parker and Jones.

Discorbina globularis, d'Orbigny, sp. and varieties.

The type is evidently rather rare, but the variations frequent. Forms like those figured in my Delos paper (1908) occur, viz., pl. 3, figs. 3, 5, and pl. 4, figs. 1, 2.

Discorbina rosacea, d'Orbigny, sp.

Large examples like the Delos specimens, pl. 4, figs. 3, 4, also fig. 5, which are rare, and one good test almost identical with the Challenger figure, pl. 87, fig. 1.

Discorbina orbicularis, Terquem, sp.

Discorbina araucana, d'Orbigny, sp.

Discorbina vilardeboana, d'Orbigny, sp.

Discorbina tabernacularis, Brady. (Pl. 3, fig. 12.)

I am much puzzled with these; they appear to be nearest to Brady's Challenger figure, pl. 89, fig. 7, but they show no limbation, and the sutures are slightly sunk. Some of the tests are tall, others much flattened, and with three exceptions they are all in the state known as plastogamy, that is joined together at their bases, and there are in some instances as many as four pairs clustered together. There are also cases of a tall cone-shaped test joined to a flattened one, as in the illustration, Fig. 12, Pl. 3. The striæ show on the inferior surface.

Discorbina tuberculata, Balkwill and Wright.

Very frequent.

Discorbina parisiensis, d'Orbigny, sp.

In the Palermo examples the final convolution never entirely covers the central portion of the test on the superior side. There is a set present which has much

shorter and more inflated segments, these have the edge of the test more rounded.

Discorbina nuda, n. sp.

In the appendix to my Delos papers (1909) reference is made to this species under the heading *Discorbina*, sp. p. 18 and figured on pl. 5, fig 11. On the Palermo slide are numerous specimens and they are so unvarying in their characteristics that I feel justified in giving a specific name to them. They are transparent, and have from six to eight segments showing on the superior surface, of which four or five constitute the final convolution. The pores can only be seen under a high power. The test is convex on the superior surface, and on the inferior the umbilical cavity is large and deeply sunk. The edge of the test is slightly rounded, the segments arched, the sutures sunk, and the margin of the test is lobulated. The initial chamber is round and conspicuous.

Discorbina vesicularis, Lamarck, sp.

Beautiful specimens of this species are on the slide, with well-developed astral flaps.

Discorbina bertheloti, d'Orbigny, sp.

Discorbina saulcii, d'Orbigny, sp. (Pl. 3, fig. 11).

The specimens are in good condition and agree with examples Mr. Millett sent to me from the coast of Algiers, 80 fms. Very frequent. Numerous in the Bay of Eleusis.

Discorbina rugosa, d'Orbigny, sp.

Planorbulina, d'Orbigny.

Planorbulina mediterranensis, d'Orbigny.

Forms similar to the Delos specimens, figs. 1, 2, pl. 1, (1909).

Planorbulina acervalis, Brady.

There is only a single specimen on the slide

Truncatulina, d'Orbigny.

Truncatulina lobatula, Walker and Jacob, sp.

Truncatulina variabilis, d'Orbigny.

A small complanate specimen, and several large ones like those figured in the Delos paper, where a full account is given of them.

Truncatulina reticulata, Czjzek, sp.

One only on the slide.

Truncatulina tenuimargo, Brady.

I think it is right to bring the two examples on the slide under this heading, although one of them has a very strong likeness to *D. rarescens*.

Carpenteria, Grey.

Carpenteria, sp.

One example agreeing with the specimen figured in the Delos paper (1909) in pl. 2, fig. 5.

Pulvinulina, Parker and Jones.

Pulvinulina lateralis, Terquem, sp.

Very good examples occur.

Pulvinulina oblonga, Williamson, sp.

There are on the slide some of the largest specimens I have seen.

Pulvinulina oblonga (Williamson), var. *scabra*, Brady ?

See Delos paper (1909) for a full account of this variety.

Frequent.

Pulvinulina concentrica, Parker and Jones.

The examples are not nearly so fine as those that occur in the Delos material.

Pulvinulina haueri, d'Orbigny, sp.

See Delos paper (1909), p. 7.

Pulvinulina karsteni, Reuss, sp.

Pulvinulina vermiculata, d'Orbigny.

Pulvinulina micheliniana, d'Orbigny, sp.

All the tests are in beautiful condition, and are of frequent occurrence.

Pulvinulina exigua, Brady?

The Palermo specimens, which are small, agree with the Challenger figure, pl. 103, fig. 14, both as regards the number of segments and the contour of the test; but they do not show the lines of opaque-white shell-substance on the superior face, mentioned by Brady.

Rotalia, Lamarck.

Rotalia beccarii, Linné, sp.

See Delos paper for description of the varieties present; they include the highly decorated form.

Rotalia orbicularis, d'Orbigny.

A single specimen.

TINOPORINÆ.

Gypsina, Carter.

Gypsina globulus, Reuss, sp.

One only on the slide.

Polytrema, Risso.

Polytrema mineaceum, Linné, sp.

Present both in the adult and embryonic states.

NUMMULINIDÆ.

POLYSTOMELLINÆ.

Nonionina, d'Orbigny.

Nonionina depressula, Walker and Jacob.

Several varieties occur, including the clear compressed tests, and those that are opaque.

Nonionina stelligera, d'Orbigny.

Large examples are of frequent occurrence.

Nonionina scapha, Fichtel and Moll, sp. (Pl. 3, fig. 13).

The one figured is commencing the linear manner of growth.

Nonionina asterizans, Fichtel and Moll, sp. (Pl. 3, fig. 14).

These Palermo specimens are nothing more than *N. stelligera*, with the stellate portion arrested.

Nonionina boneana, d'Orbigny.

These vary greatly as to their contour, and none of them are stoutly built.

Nonionina turgida, Williamson, sp.

This pretty form is well represented in this material.

Nonionina umbilicatula, Montagu, sp. (Pl. 3, fig. 15).

Only five are on the slide.

Polystomella, Lamarck.

Polystomella striatopunctata, Fichtel and Moll, sp. (Pl. 3, fig. 16).

The form figured in the Delos paper (1909) fig. 1, pl. 5, is common. The one I have chosen for illustration is opaque, and the pores do not show except under a high power. It is the only one of the kind on the slide.

Polystomella crispa, Linné, sp.

Very frequent, the spinous condition of the small tests is well marked.

Polystomella verriculata, Brady.

Several well-marked but small examples are on the slide.

Polystomella macella, Fichtel and Moll, sp.

Large and beautiful examples occur.

Polystomella subnodosa, Münster, sp.

The examples of this foraminifer are good, and are of the usual milky-blue colour.

Foraminifera. (Pl. 3, fig. 17).

This fragment is the only example on the slide, and as the initial part is wanting, it cannot very well be placed under a generic heading. The test is built up of fine sand-grains, and is of a light-brown colour, the surface slightly roughened.

Foraminifera? (Pl. 3, fig. 18).

Several specimens are on the slide. This is a doubtful foraminifer. It appears to be built up of very fine sand-grains, the test is thin, and its superior face varies in convexity. The under surface is concave in the centre. The orifice is small, round, and at the bottom of the cavity, but it is not always apparent. The colour is a silvery-

grey brown, but I have twelve specimens from La Liberstad, Salvador, West Coast of America, in which the colour varies from silvery-grey to light-brown.

My friend Dr. Chaster, of Southport, whose lamented death took place on May 5th, was greatly interested for many years in the study of the Foraminifera.

His chief work on this subject is a "Report upon the Foraminifera of the Southport Society of Natural History District," which is a valuable addition to the literature of the British Foraminifera.

Dr. Chaster was a very acute observer, a most genial man, and personally I owe much to him, as he was the means of my taking up the study of the Foraminifera. I cannot let this opportunity pass without stating how much his death is regretted, and especially by those who had the good fortune to know him intimately.

EXPLANATION OF PLATES.

PLATE I.

FIGS.			PAGE.
1.	*Nubecularia tibia*, Jones and Parker	× 75 ...	1
2.	*Spiroloculina inæquilateralis*, Schlumberger	× 50 ...	2
3.	*Miliolina undosa*, Karrer, sp.	× 50 ...	4
4.	*Psammosphæra fusca*, F. E. Schultze	× 50 ...	8
5.	*Reophax baccillaris*, Brady	× 25 ...	8
6.	*Haplophragmium pseudospirale*, Williamson	× 25 ...	8
7.	*Ammodiscus perversus*, n. sp.	× 50 ...	9
8.	*Spiroplecta rosula*, Ehrenberg	× 100 ...	11
9.	*Gaudryina filiformis*, Berthelin	× 75 ...	11
10.	*Clavulina angularis*, d'Orbigny	× 25 ...	11
11.	*Bulimina*, d'Orbigny, var. *exilis*, Brady	× 75 ...	12
12.	*Lagena lævis*, var. *distoma*, Silvestri	× 75 ...	15
13, 14, 15, 17, and 18.	*Lagena lyellii*, Seguenza	× 50 ...	15
16, 19, 20.	*Lagena striata*, d'Orbigny, sp.	× 50 ...	15, 16

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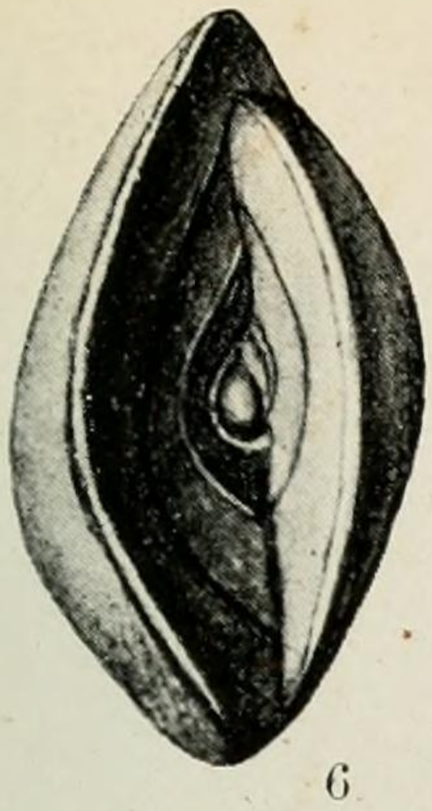

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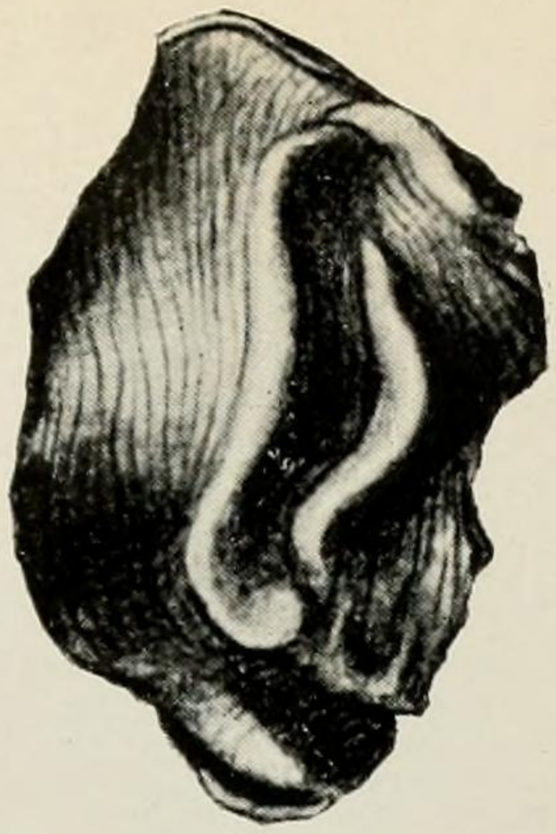

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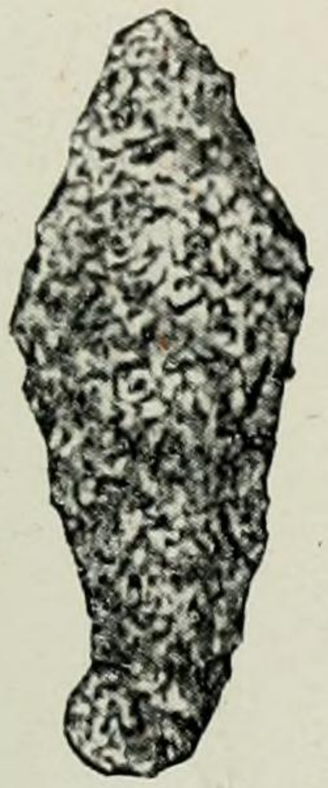

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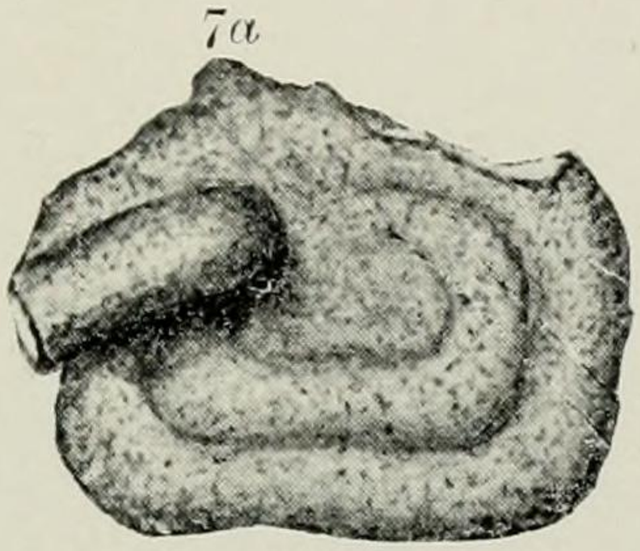

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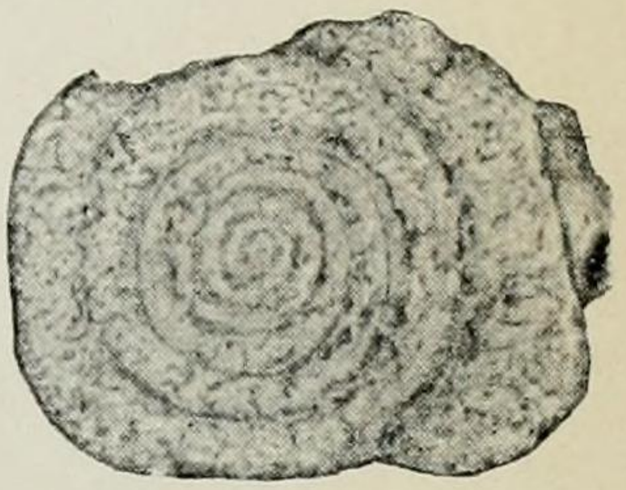

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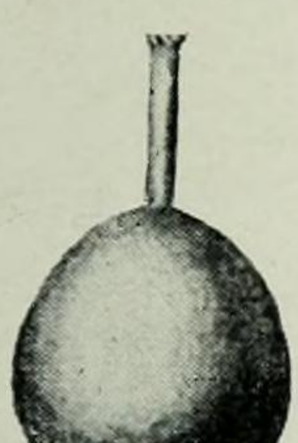

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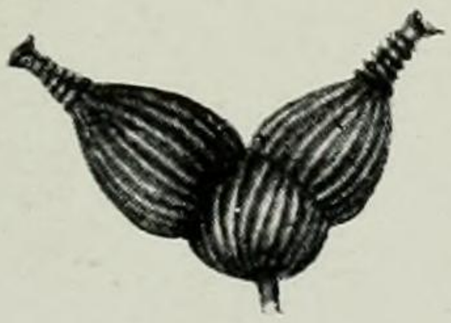

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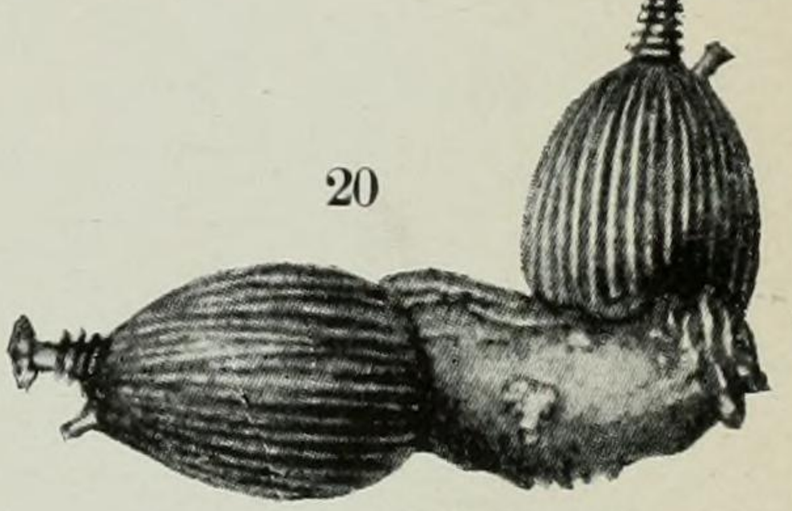

H Sidebottom del. ad nat.

Foraminifera from the Bay of Palermo.

PLATE II.

FIGS.		PAGE
1.	*Lagena striata*, d'Orbigny, sp.	× 50 ... 15, 16
2.	*Lagena semistriata*, Williamson	× 50 ... 16
3.	*Lagena hexagona*, Williamson, sp.	× 75 ... 17
4.	*Lagena reticulata*, Macgillivray	× 50 ... 17
5.	*Lagena striatopunctata*, Parker and Jones	× 100 ... 17
6.	*Lagena desmophora*, Rymer Jones	× 100 ... 17
7.	*Lagena lucida*, Williamson, sp.	× 75 ... 17
8.	*Lagena quadrata*, Williamson, sp.	× 75 ... 18
9, 10, 11.	*Lagena lagenoides*, Williamson, sp.	× 100 × 50, 50 .. 18, 19
12, 13.	var. *Lagena orbignyana*, Seguenza	× 75 × 100 ... 19
14.	*Lagena orbignyana* (Seg.), var. *lucunata*, Burrows and Holland	× 75 ... 19
15.	*Lagena orbignyana* (Seg.), var. *walleriana*, Wright	× 100 ... 19
16.	*Lagena excuipta*, Brady	× 75 ... 19
17, 18.	*Lagena protea*, Chaster	× 50 .. 19
19, 20, 21.	*Nodosaria scalaris*, Batsch, sp.	× 50 .. 20
22.	*Frondicularia spathulata*, Brady	× 75 ... 21

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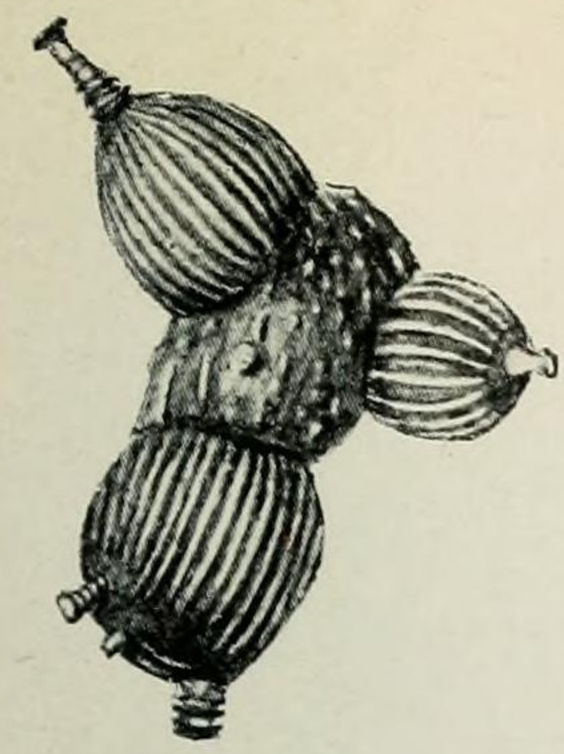

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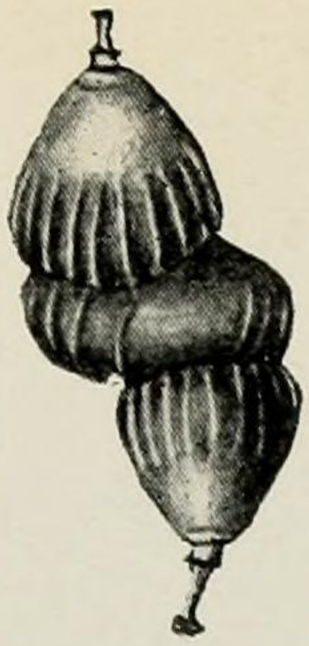

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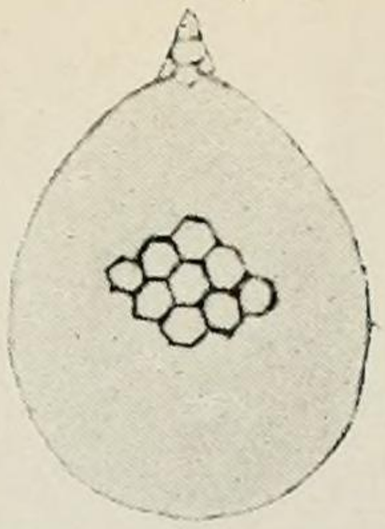

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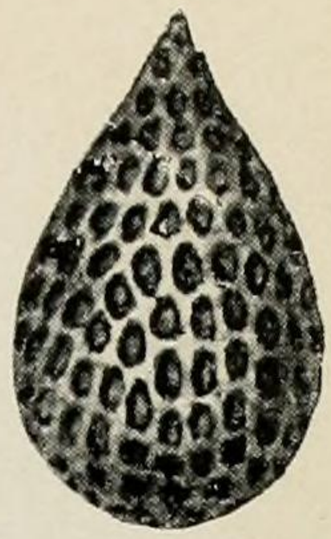

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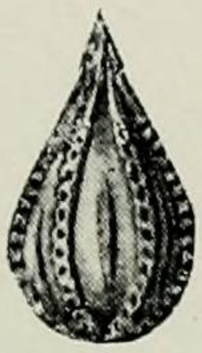

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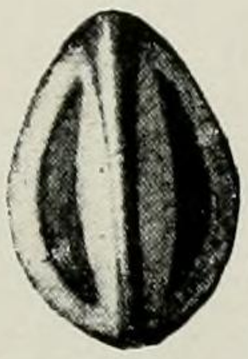

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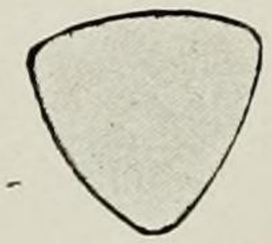

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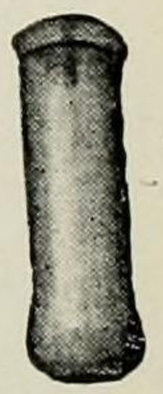

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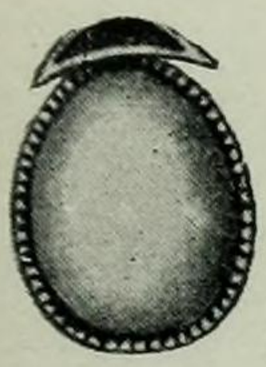

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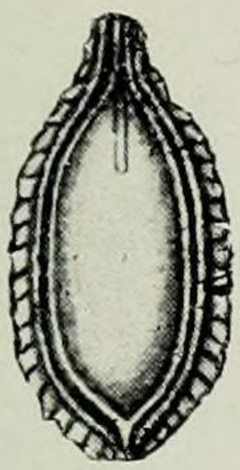

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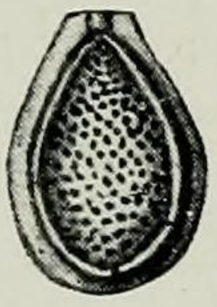

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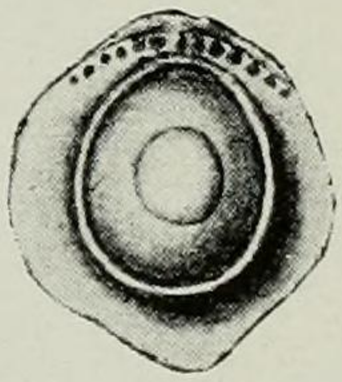

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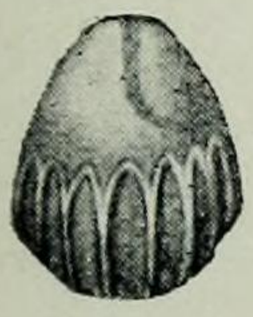

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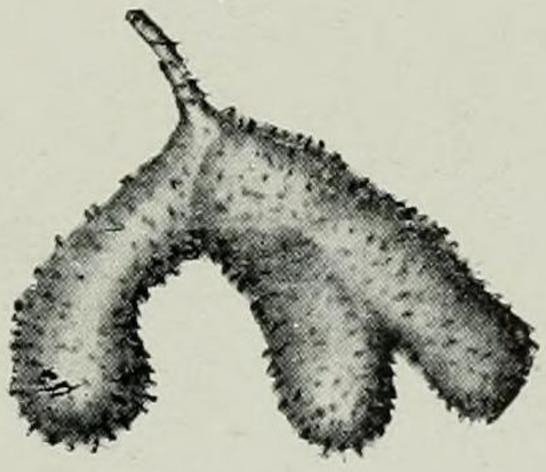

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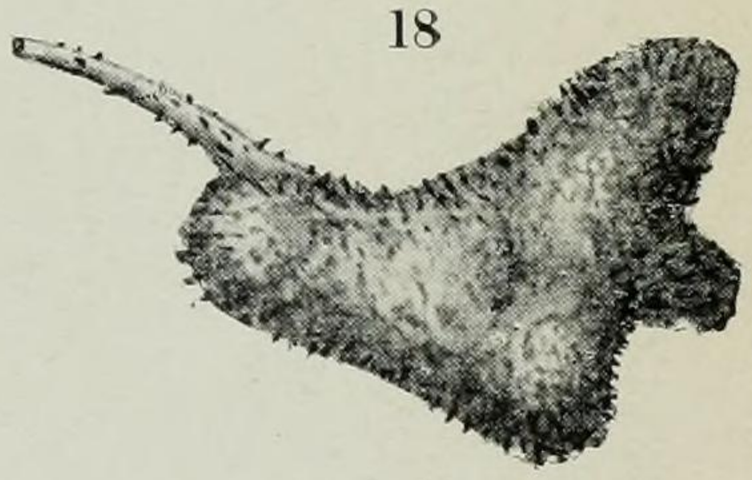

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Foraminifera from the Bay of Palermo.

PLATE III.

FIGS.			PAGE.
1, 2, 3.	*Marginulina costata*, Batsch, sp.	× 50 ...	21
4, 5, 6, 7.	Intermediate forms between *Cristellaria* and the Genera *Vaginulina* and *Marginulina*, figs. 4, 5	× 50 ...	21
	figs. 6, 7	× 75 ...	21
8.	*Cristellaria acutauricularis*, Fichtel and Moll, sp.	× 50 ...	21
9, 10.	*Sagrina nodosa*, Parker and Jones	× 50 ...	23
11.	*Discorbina saulcii*, d'Orbigny	× 50 ...	26
12.	*Discorbina tabernacularis*, Brady	× 75 ...	25
13.	*Nonionina scapha*, Fichtel and Moll, sp.	× 50 ...	29
14.	*Nonionina asterizans*, Fichtel and Moll, sp.	× 50 ...	29
15.	*Nonionina umbilicatula*, Montagu, sp.	× 50 ..	29
16.	*Polystomella striatopunctata*, Fichtel and Moll, sp.	× 50 ...	29, 30
17.	*Foraminifera*. A fragment	× 50 ...	30
18.	*Foraminifera ?*	× 75 ...	30

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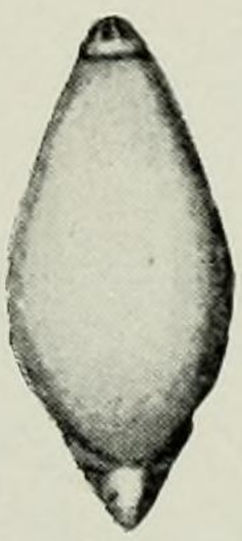

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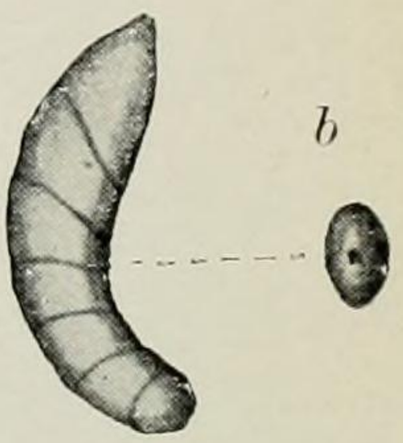

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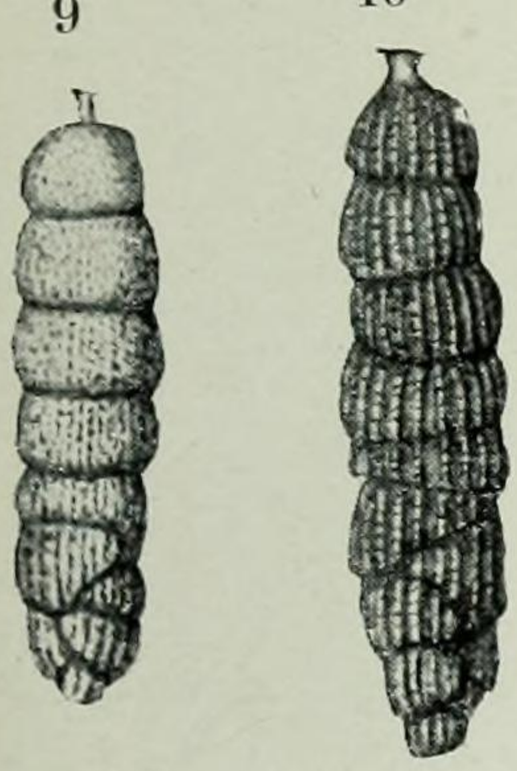

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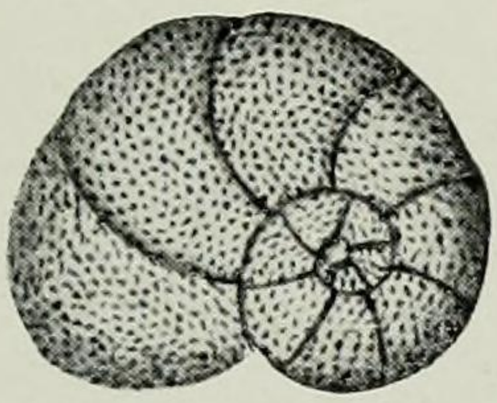

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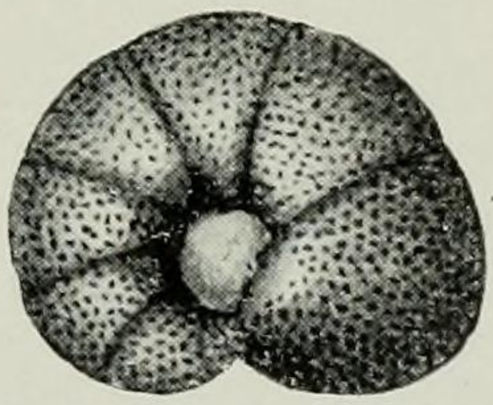

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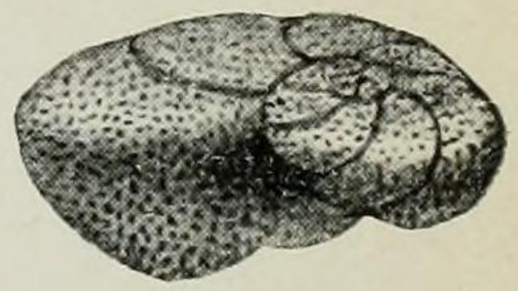
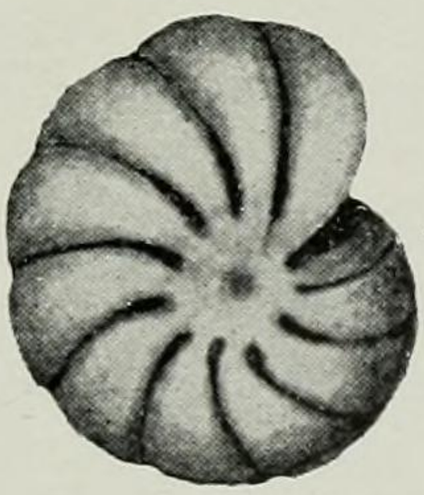


12

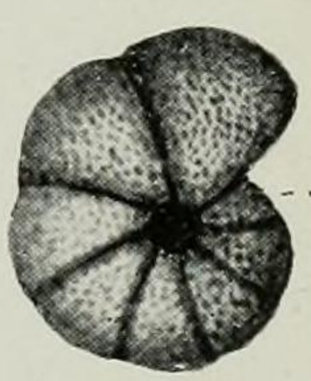
13

14*a*



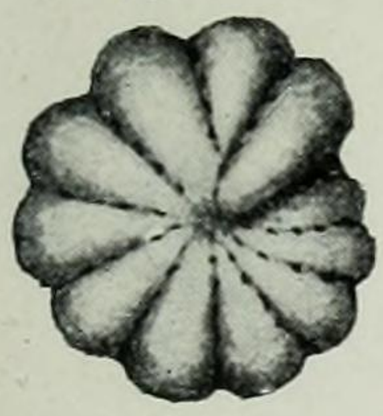
b

15*a*

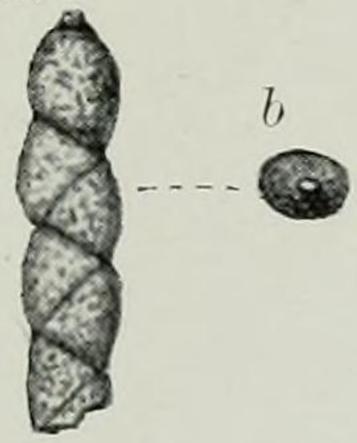


b

16



17*a*

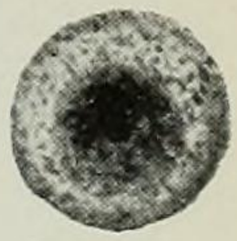


b

18*a*

b

c



H. Sidebottom, del. ad nat.

Foraminifera from the Bay of Palermo.

CORRIGENDA AND ADDENDA.

Page 2 line 22 for *inæquilateralis*, Schlumberger read *affixa*, Terquem.

„ 32 „ 5 „ *inæquilateralis*, Schlumberger read *affixa*, Terquem.

„ 7 „ 15 „ *involvans* read *involvens*.

„ 13 „ 16 „ *dilitata* „ *dilatata*.

„ 13* „ 18 „ Sequenza „ Seguenza.

„ 15 „ 7 „ „ „ „

„ 16 „ 26 „ „ „ „

„ 18 „ 13 „ „ „ „

„ 19 „ 11 „ „ „ „

„ 18 „ 6 „ *staphylleria* „ *staphyllearia*.

„ 19 „ 17 „ *lucunata* „ *lacunata*.

„ 34 „ 14 „ „ „ „

„ 22 „ 17 „ *sorroria* „ *sororia*.

„ 29 „ 2 „ *mineaceum* „ *miniaceum*.

„ 29 „ 18 „ *boneana* „ *boueana*.

„ 32 „ 8 „ *baccillaris* „ *bacillaris*.

„ 17 „ 2 after "one nearly globular" *add* ("with very deep cells of which the walls are exceedingly delicate");

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