

V. Report on the Recent Foraminifera from the Coast of the Island of Delos (Grecian Archipelago).

By HENRY SIDEBOTTOM.

Read October 13th. Received November 27th, 1903.

The material was procured by Mr. Nevill, of Bramall Hall, Cheshire, in the course of two cruises on board the S. Y. "Victoria" (Captain Lunham), in the years 1894, 1895, and consisted of anchor mud and dredgings; depth, eight to fourteen fathoms. The usual process of washing, floating, spinning and sifting into various sizes has been carried out. In the case of the dredgings very little washing was required, as they consisted chiefly of fine sand, shell débris, and Foraminifera. The anchor mud was composed of finer material, and lost more in weight in the process of washing, but the yield of Foraminifera in both cases was extraordinary. My brother-in-law, Mr. Nevill, very kindly examined a large quantity of the finest siftings, the examination of the rest of the material being done by myself. Mr. Nevill has also placed at my disposal a fine collection of Foraminifera from the coast at Palermo, and as they agree to a great extent with the Delos forms I have placed an asterisk before the name of the Delos species if it occurs at Palermo. I am greatly indebted to my friend, Mr. F. W. Millett, of Brixton, Devonshire, to whom my best thanks are due, both for his help in the determination of many species and for much information as regards the Foraminifera. My thanks must also be rendered to my friend, Dr. Chaster, of Southport, Mons. Chas. Schlumberger, of Paris, and Prof. A. Silvestri, of Spoleto, Italy, for their assistance and for their courtesy at all times.

February 13th, 1904.

MILIOLIDÆ.

NUBECULARIINÆ.

Nubecularia, Defrance.

***Nubecularia tibia**, Jones and Parker.

Nubecularia tibia, Jones and Parker ('60), p. 455, pl. 20, figs. 48-51. *N. tibia* (J. & P.), Brady ('84), p. 135, pl. 1, figs. 1-4.

Four specimens found with their initial chamber intact. Eight single segments also occur. Very rare.

***Nubecularia lucifuga**, Defrance. (Pl. 2, figs. 1-4).

Nubecularia lucifuga (Def.), Brady ('84), p. 134, pl. 1, figs. 9-16.

This variable species is present in great numbers.

A very pretty variety (see Pl. 2, figs. 1, 2), and regular in its habit of growth, has, when fully grown, three chambers (occasionally four) covering the under surface. The test is semi-translucent, of a milky blue colour and polished. The aperture is an arched slit, running along the furthest edge of the last chamber, from the base to halfway up the test. The complete shell consists of about ten chambers. Mr. F. W. Millett points out to me that this is an isomorph of *Carpenteria*. Frequent. Another small variety (see Pl. 2, figs. 3, 4) is present, of rather irregular lineal growth, and it always puts on a back chamber before commencing its lineal growth on the opposite side. The orifices are at the end of a group of small protuberances. Very rare.

Nubecularia divaricata, Brady. (Pl. 2, figs. 5-7).

Nubecularia divaricata, Brady ('84), p. 136, pl. 76, figs. 11-15.

The Delos forms are nearly all very large and robust, but the segments are not so much divided as shown in Brady's figures. The cement with which the various coloured sand-grains are fastened together is snow-white. Rare.

***Nubecularia bradyi**, Millett.

Nubecularia inflata, Brady ('84), p. 135, pl. 1, figs. 5-8, (*non N. inflata*, Terquem ('76), (2) 73, 8, 10a, b, c.) *N. bradyi*, Millett ('98), p. 261, pl. 5, fig. 6a, b.

The specimens are typical. Frequent.

MILIOLININÆ.

Biloculina, d'Orbigny.

***Biloculina irregularis**, d'Orbigny.

Biloculina irregularis (d'Orb.), Brady ('84), p. 140, pl. 1, figs. 17-18. *B. irregularis* (d'Orb.), Flint ('99), p. 295, pl. 41, fig. 3.

The specimens are not typical. The mouth is large and nearly circular, with thickened lip and T-shaped tooth. Common.

***Biloculina elongata**, d'Orbigny.

Biloculina elongata (d'Orb.), Brady ('84), p. 144, pl. 2, fig. 9.

The specimens are not so regular in growth as the one figured by Brady, the penultimate chamber being slightly constricted at the lower end, and wide and raised at the other, where it runs up to the mouth of the last chamber. Rare.

Biloculina elongata denticulate variety. (Pl. 2, fig. 8).

In this variety the base of the last chamber has five

4. **SIDEBOTTOM**, *Foraminifera from the Island of Delos*.

or six well marked teeth, the test also is wider than in the typical form, approaching *B. ringens* (Lam.) var. *denticulata*, Brady. Very rare.

***Biloculina ringens**, Lamarck, sp.

Biloculina ringens (Lam.), Brady ('84), p. 142, pl. 2, figs. 7, 8.

The type is very rare, as with few exceptions a third chamber is slightly exposed, causing it to be triloculine.

Biloculina depressa, d'Orbigny.

Biloculina depressa (d'Orb.), Brady ('84), p. 145, pl. 2, figs. 12, 15-17, pl. 3, figs. 1, 2.

B. depressa (d'Orb.), Flint ('99), p. 294, pl. 40, fig. 1. Very rare, only two found.

Biloculina bulloides, d'Orbigny.

Biloculina bulloides (d'Orb.), Brady ('84), p. 142, pl. 2, figs. 5-6.

The one specimen found is not typical, the penultimate chamber running up to the aperture and being more flush with the last chamber than is represented in Brady's figures. Very rare.

***Biloculina tubulosa**, Costa.

Biloculina tubulosa (Costa), Brady ('84), p. 147, pl. 3, fig. 6 a, b.

Only two found ; the edges of the chambers are very sharp, and in one of the specimens the mouth is deformed. Very rare.

Biloculina comata, Brady.

Biloculina comata, Brady ('84), p. 144, pl. 3, fig. 9.

Only two found and they are both small. Very rare.

***Spiroloculina, d'Orbigny.**

Spiroloculina planulata, Lamarck, sp.

Spiroloculina planulata (Lam. sp.), Brady ('84), p. 148, pl. 9, fig. 11 *a, b*. Frequent.

***Spiroloculina excavata, d'Orbigny.**

Spiroloculina excavata, d'Orbigny ('46), p. 271, pl. 16, figs. 19-21. *S. excavata* (d'Orb.), Brady ('84), p. 151, pl. 9, figs. 5, 6.

Many of the specimens are of the form as figured by Brady ('84), with the exception that the neck is not quite so much produced. Frequent.

Spiroloculina dorsata, Reuss.

Spiroloculina limbata (d'Orb.), Brady ('84), p. 150, pl. 9, figs. 15-17.

Many of the specimens become deeply excavated, and it is a question if these should not be treated as *S. excavata*. Frequent.

***Spiroloculina impressa, Terquem. (Pl. 2, figs. 9-11).**

Spiroloculina impressa (Terq.), Brady ('84), p. 151, pl. 10, figs. 3, 4.

The Delos form is occasionally tricarinate at the base of the last chamber. The specimens differ a good deal as to the amount of excavation. Frequent.

***Spiroloculina nitida, d'Orbigny.**

Spiroloculina nitida (d'Orb.), Brady ('84), p. 149, pl. 9, figs. 9, 10.

Most of the specimens are of the carinate variety, and the last two chambers show more inflation than the previous ones. Brady reports it from the Mediterranean. Frequent.

***Spiroloculina grata**, Terquem.

Spiroloculina grata (Terq.), Brady ('84), p. 155, pl. 10, figs. 16, 17, 22, 23.

This pretty form is well represented. Frequent.

Spiroloculina canaliculata, d'Orbigny.

Spiroloculina canaliculata, d'Orbigny ('46), p. 269, figs. 10-12.

Typical specimens are rare; specimens with only the last chamber channelled are frequent.

Spiroloculina acutimargo, Brady.

Spiroloculina acutimargo, Brady ('84), p. 154, pl. 10, figs. 12-15. *S. acutimargo* (Brady), Balkwill and Wright ('85), p. 323, fig. 1a, b, c.

Two only found; they come nearest to the one figured by Brady ('84), pl. 10, fig. 14, but they are a little more attenuated. Very rare.

Sigmoïlina, Schlumberger.

***Sigmoïlina tenuis**, Czjzek, sp.

Spiroloculina tenuis (Czj.), Brady ('84), p. 152, pl. 10, figs. 7-11.

The Delos forms are all carinate, but they have the slight twist in the test, characteristic of the species. Rare.

***Sigmoïlina costata**, Schlumberger.

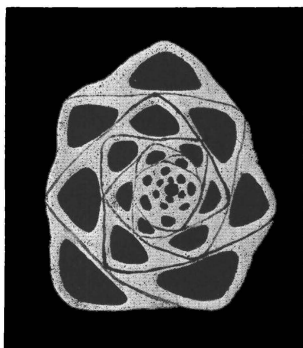
Sigmoïlina costata, Schlumberger ('93), p. 69, pl. 1, figs. 51, 52, and text-fig. 4.

The tests are all of a pale cream colour and strongly ribbed for the size of the specimens. They are more or less rough. Common.

Sigmoïlina ovata. n. sp. (Pl. 2, figs. 12, 13; Section 1).

The test in outline is an irregular oval, showing

generally five chambers, but occasionally six, and there is a slight flattening on one side. Semi-opaque shell substance shows along the margin of the embracing chambers. The



No. 1. *Sigmöilina ovata*, n. sp. $\times 60$.
Transverse section of the test.

tooth varies from a small projection to the well-known T-shape. The section shows the arrangement of the chambers. M. Schlumberger kindly assisted me in the verification of this form. Common.

Miliolina, Williamson, 1858.

***Miliolina oblonga**, Montagu, sp.

Miliolina oblonga (Montg.), Brady ('84), p. 160, pl. 5, fig. 4.

Full grown specimens are large and they appear to be the same as those figured by M. Schlumberger as *Triloculina lævigata* (d'Orb.), in his monograph of the *Miliolinæ* of the Gulf of Marseilles. Common.

***Miliolina bosciana**, d'Orbigny, sp.

Quinqueloculina bosciana, d'Orbigny ('39), p. 191, pl. 11, figs. 22-24.

Mr. F. W. Millett in his report on the recent Foraminifera of the Malay Archipelago, says "A form of

8. **SIDEBOTTOM, *Foraminifera from the Island of Delos.***

M. oblonga in which the chambers are more numerous and the sutures oblique." Frequent.

***Miliolina rotunda*, d'Orbigny, sp.**

Triloculina rotunda (d'Orb.), Schlumberger ('93), p. 206, pl. 1, figs. 48-50.

The Delos form agrees well with the one figured by M. Schlumberger in the above reference, but many of them do not have the central chamber so protuberant as his drawings indicate. Frequent.

****Miliolina circularis*, Borneman, sp.**

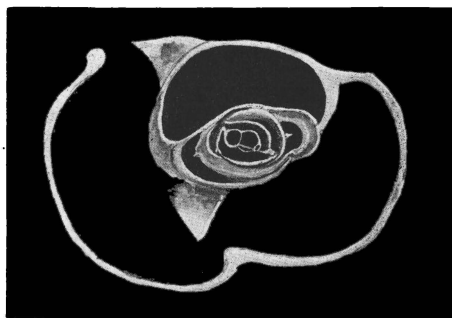
Miliolina circularis (Born.), Brady ('84), p. 169, pl. 5, figs. 13, 14.

The specimens are small, and they all have a slightly puckered-up lip on the penultimate chamber. Common.

****Miliolina subrotunda*, Montagu, sp.**

Miliolina subrotunda (Mont.), Brady ('84), p. 168 pl. 5, figs. 10, 11.

The specimens are small, and not quite typical. Frequent.



No. 2. *Miliolina subrotunda*, Montagu. $\times 75$.
Horizontal section of the test.

The forms figured by M. Schlumberger as *Quinqueloculina dilatata* (d'Orb.) ('93), p. 217, pl. 3, figs. 70-74, and pl. 4, figs. 87-90, are numerous. Yet another form of this variable species is present (Pl. 3, figs. 1-7; Section 2). The young, or biloculine form is common and the triloculine one frequent. The nearest figures I have seen of the triloculine specimens are the *Triloculina truncata*, Karrer ('64), p. 704, pl. 1, fig. 2.

***Miliolina suborbicularis**, d'Orbigny, sp.

Quinqueloculina suborbicularis (d'Orb.), Schlumberger ('93), p. 73, pl. 2, figs. 63, 64, pl. 3, fig. 67 and woodcuts, 26-28. *Miliolina suborbicularis* (d'Orb.), Millett ('98), p. 502, pl. 11, fig. 13.

Present in great numbers, and many of the specimens have a hauerine tendency, showing three chambers in the last whorl. My friend, Mr. F. W. Millett, tells me this tendency appears in fossil specimens as figured by Terquem. Common.

***Miliolina marioni**, Schlumberger, sp.

Triloculina marioni, Schlumberger ('93), p. 62, pl. 1, figs. 38-41, and text-figs. 7, 8.

M. Schlumberger kindly sent me specimens from the Mediterranean, and those from Delos agree with them. The groove in the centre of the back chamber, as represented in the above reference, does not show in the specimens submitted to me, nor is it present in the Delos forms. Many of them, especially in the young state, have a strong resemblance externally to *M. tricarinata*. Frequent.

***Miliolina schreiberiana**, d'Orbigny, sp.

Triloculina schreiberiana, d'Orbigny ('39), p. 174, pl. 9,

10 SIDEBOTTOM, *Foraminifera from the Island of Delos.*

figs. 20-22. *T. schreiberiana* (d'Orb.), Schlumberger ('93), p. 62, pl. 1, figs. 42-44, and text-figs. 5, 6.

M. Schlumberger's figures are drawn from specimens dredged in the Gulf of Marseilles; the Delos examples of this species are similar. It appears to be nearly related to *M. trigonula*. Frequent.

***Miliolina labiosa**, d'Orbigny, sp.

Miliolina labiosa (d'Orb.), Brady ('84), p. 170, pl. 6, figs. 3-5. *M. labiosa* (d'Orb.), Millett ('98), p. 502, pl. 11, figs. 8, 9.

This form seems to run into *Nubecularia bradyi*; Mr. F. W. Millett, in his Malay work, states that it ranges from *N. bradyi* to *M. valvularis*. Frequent.

***Miliolina reticulata**, d'Orbigny, sp. (Pl. 3, figs. 8-10).

Miliolina reticulata (d'Orb.), Brady ('84), p. 177, pl. 9, figs. 2-4.

This handsome species occurs at Delos in three varieties. The first has a rounded periphery, the second is carinated, and in the third the keel on the last chamber splits about half way down and becomes bi-carinate. They are all beautifully reticulated. The form with the rounded periphery is the smallest of the three varieties. Frequent.

***Miliolina seminulum**, Linné, sp.

Miliolina seminulum (Linné), Brady ('84), p. 157, pl. 5, fig. 6.

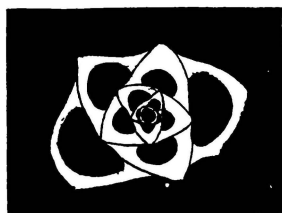
The specimens run large and are highly polished. Common.

There is present also in considerable quantity a very flat variety, as shown in the figures (Pl. 3, figs. 13-15),

of which the test is semi-translucent and the chamber walls thin. The mouth is very much compressed and almost closed by the long tooth.

Miliolina seminulum (Linné) var. **cornuta** nov.

(Pl. 3, figs. 11, 12 ; Section 3.)



No. 3. *Miliolina seminulum*, Linné var. *cornuta* nov. $\times 25$.
Transverse section of the test.

The test is almost as broad as long, sometimes triloculine, but generally a fourth chamber just shows on the underside. The protuberances are generally situated on the edge of the last chamber in a double row, but sometimes they appear on the penultimate chamber as well. The test is stout and polished. The mouth is compressed at the sides and the tooth is large and prominent.

The section shows the arrangement of the chambers. Frequent.

Miliolina vulgaris, d'Orbigny.

Quinqueloculina vulgaris (d'Orb.), Schlumberger ('93), p. 65, figs. 13, 14, pl. 2, figs. 65, 66.

The specimens are not so fully developed as those shown in the above reference, the test being not so broad and the edges of the chambers sharper. Common.

***Miliolina auberiana**, d'Orbigny, sp.

Miliolina auberiana (d'Orb.), Brady ('84), p. 162, pl. 5, figs. 8 a, b, 9.

The Delos forms of this variety of *M. seminulum* are not so broad in comparison with the length as those figured by Brady, otherwise they agree well. Frequent.

***Miliolina cuvieriana**, d'Orbigny, sp.

Miliolina cuvieriana (d'Orb.), Brady ('84), p. 162, pl. 5, fig. 12 a, b, c. *M. cuvieriana* (d'Orb.), Millett ('98), p. 505, pl. 12, fig. 2 a, b.

The unornamented specimens are small, with very few exceptions. Common.

*The *Q. seminuda* of Reuss with the rounded periphery striated, is also present, along with those which have the periphery square and costate; the test of the latter ones is generally more compressed. Both are small. Frequent.

***Miliolina boueana**, d'Orbigny, sp.

Quinqueloculina boueana, d'Orbigny ('46), p. 293, pl. 19, figs. 7-9. *M. boueana* (d'Orb.), Brady ('84), p. 173, pl. 7, fig. 13.

The neatness and compactness of the Delos form, together with the comparative boldness of the costæ, incline me to think that this is a young and triloculine condition of the above. Common.

***Miliolina lævigata**, d'Orbigny, sp. (Pl. 4, figs. 1-3 ; Section 4).



No. 4. *Miliolina lævigata*, d'Orb. × 40.
Transverse section of the test.

Adelosina lævigata, d'Orbigny ('46), p. 302, pl. 20, figs. 22-24. *A. lævigata* (d'Orb.), Schlumberger ('86), p. 549, fig. 6, pl. 16, figs. 19-21.

The amount of tilting of the central chamber varies considerably, and the last chamber is sometimes very faintly striated. The test is polished. Frequent.

***Miliolina undosa**, Karrer, sp.

Miliolina undosa (Karrer), Brady ('84), p. 176, pl. 6, figs. 6-8.

In the Delos form all the edges of the chambers are striated, and the striæ often run down the sides of the chambers. Frequent.

Miliolina undulata, d'Orbigny.

Quinqueloculina undulata (d'Orb.), Schlumberger ('93), p. 213, pl. 2, figs. 61, 62.

The specimens agree with the above reference. Common.

***Miliolina pygmæa**, Reuss, sp. (Pl. 4, figs. 4-6).

Miliolina pygmæa (Reuss), Brady ('84), p. 163, pl. 113, fig. 16 *a, b*.

The test is slightly roughened, the mouth circular and toothed. Frequent.

Miliolina contorta, d'Orbigny, sp.

Quinqueloculina contorta, d'Orbigny ('46), p. 298, pl. 20, figs. 4-6.

The test is not polished, but is slightly rough. The neck is rather more produced than in d'Orbigny's figures. Frequent.

The specimens (Pl. 4, figs. 7-9) I have figured are apparently a feeble variety of this variable species. Common.

***Miliolina sclerotica**, Karrer, sp.

Quinqueloculina sclerotica, Karrer ('68), p. 152, pl. 3, fig. 5.

This appears to be a rough form of *M. contorta*. The nearest figures to the Delos form which I have seen, are those by M. Schlumberger, under the name *Quinqueloculina rugosa*, d'Orbigny ('93), p. 210, pl. 4, figs. 91-93. Frequent.

***Miliolina stelligera**, Schlumberger, sp.

Quinqueloculina stelligera, Schlumberger ('93), p. 68, pl. 2, figs. 58, 59, and text-fig. 17.

M. Schlumberger very kindly sent me specimens from the Gulf of Marseilles, and those from Delos are similar. Frequent.

***Miliolina gracilis**, d'Orbigny, sp. (Pl. 4, figs. 10-12).

Triloculina gracilis, d'Orbigny ('39), p. 159, pl. 11, figs. 10-12.

All the specimens are keeled, and the test is striated. The striæ do not follow the curves of the chambers the whole way down, but run more or less obliquely across them. The walls of the chambers are thin and fragile. Frequent.

***Miliolina agglutinans**, d'Orbigny, sp.

Miliolina agglutinans (d'Orb.), Brady ('84), p. 180, pl. 8, figs. 6, 7.

The form of the test comes nearest to *M. sclerotica*. Many of the tests are very rough, fragments of what look like minute pieces of coal being mixed up with the sand grains. Common.

***Miliolina bicornis**, Walker and Jacob, sp. (Pl. 4, figs. 13, 14).

Miliolina bicornis (W. and J.), Brady ('84), p. 171,

pl. 6, figs. 9, 11, 12. *Adelosina bicornis* (W. and J.), Schlumberger ('86), pp. 546-552, figs. 1-5, 7 and 8, pl. 16, figs. 10-15.

This is one of the largest of the Delos *Miliolinæ*. In one case the test has opened out, forming very nearly an equilateral triangle, and thus approaching in mode of growth *M. separans*. Frequent.

****Miliolina disparilis***, d'Orbigny, sp.

Quinqueloculina disparilis (d'Orb.), Schlumberger ('93), p. 70, pl. 2, figs. 55-57.

These are well figured by M. Schlumberger in the above reference. Common.

****Miliolina costata***, d'Orbigny, sp.

Quinqueloculina costata (d'Orb.), Schlumberger ('93), p. 69, fig. 20, pl. 3, figs. 75, 76.

In some cases the costæ are absent on the face of the chamber. Common.

Miliolina pulchella, d'Orbigny, sp. (Pl. 4, fig. 15).

Miliolina pulchella (d'Orb.), Brady ('84), p. 174, pl. 6, figs. 13, 14. *Adelosina duthiersi*, Schlumberger ('86), pp. 553, 554, fig. 9, pl. 16, figs. 16-18.

This large and handsome Foraminifer varies a great deal as to its ornamentation; in some of the specimens the fine striæ are almost absent, and the bold costæ much broken up. Very rare.

Miliolina linnæana, d'Orbigny, sp.

Quinqueloculina josephina, d'Orbigny ('46), p. 297, pl. 19, figs. 25-27. *M. linnæana* (d'Orb.), Brady ('84), p. 174, pl. 6, figs. 15-20.

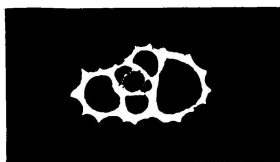
Judging from outward appearances, *M. linnæana* is an intermediate form between *M. pulchella* and *M. bicornis*. Rare.

HAUERININÆ.

Articulina, d'Orbigny.

Articulina sulcata, Reuss. (Pl. 4, figs. 16, 17 ;
Section 5).

Articulina sulcata (Reuss), Brady, Parker and Jones ('88), p. 215, pl. 40, fig. 11. *A. sulcata* (Reuss), Brady ('84), p. 183, pl. 12, figs. 12, 13. *A. sulcata* (Reuss), Egger ('93), p. 243, pl. 3, fig. 5.



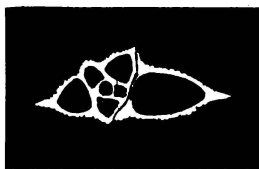
No. 5. *Articulina sulcata*, Reuss. $\times 75$.
Transverse section of the test.

This form as figured by Brady, and about which he raises the question as to its being a distinct species, or only the young form of one of the other species, is present in considerable quantity. A few of the specimens with apparently the same commencement, have another chamber added, after the manner of *A. sagra* or *A. conico-articulata*. The mouth is compressed (with the exception of three specimens, in which it approaches roundness), and it is a question if they should not be placed with *A. sagra*. The form figured by Brady, Parker and Jones, under the name *A. sulcata* comes very near to Pl. 4, fig. 19, which I have placed under *A. sagra*. It may be noted that near the base of the final chamber of the specimens as represented in Pl. 4, fig. 17, it becomes sometimes nearly round in section, as in *A. conico-articulata*, the mouth remaining flattened. The *Articulina gibbosula*, d'Orbigny ('46), p. 282, pl. 20, figs. 16-18, is almost similar to these. It is possible

that they should be placed under *A. conico-articulata*, but the milioline commencement is very much larger than in any I have seen of this species, and as this commencement appears to be a facsimile of Brady's figures I have put them under *A. sulcata*.

Milioline part common, with chamber added very rare.

Articulina sagra, d'Orbigny. (Pl. 4, figs. 18-20 ;
Section 6.)



No. 6. *Articulina sagra*, d'Orb. $\times 75$.
Transverse section of the test.

Articulina sagra, d'Orbigny ('39), p. 183, pl. 9, figs. 23-26.

A. sagra (d'Orb.), Brady ('84), p. 184, pl. 12, figs. 22-24.

The milioline commencement in the Delos forms is nearly always more or less keeled and only a few of the specimens have one lineal chamber added.

Looking at the whole of the Delos specimens together, viz., *A. sulcata* and *A. sagra*, it seems to me that they could very well be placed under the latter name. Only two large ones were found. (Pl. 4, fig. 18.) Frequent.

Articulina lineata, Brady. (Pl. 5, fig. 1.)†

Articulina lineata, Brady ('84), p. 183, pl. 12, figs. 19-21.

Brady speaks of this as being a rare species, about twenty have been found in the Delos material. In two cases the added chamber is smooth. Rare.

Vertebralina, d'Orbigny.

***Vertebralina striata**, d'Orbigny.

Vertebralina striata (d'Orb.), Brady ('84), p. 187, pl. 12, figs. 14-16.

This species is present in great numbers and in all stages of growth. Many are of large size, and some of them boldly striated and pitted as in *V. insignis*. Common.

Massilina, Schlumberger.

***Massilina secans**, d'Orbigny, sp.

Massilina secans (d'Orb.), Schlumberger ('93), p. 218, figs. 31-34, pl. 4, figs. 82, 83. *M. secans* (d'Orb.), Goës ('94), p. 112, pl. 20, fig. 856.

This occurs in two forms, the one which is frequent has the periphery plain, and the other, which is rare, has it beautifully denticulated; this latter form is well figured by M. Schlumberger.

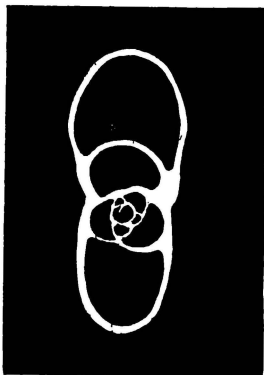
Massilina annectens, d'Orbigny, sp. (Pl. 5, figs. 2-4).

Massilina annectens, Schlumberger ('93), p. 220, pl. 3, figs. 77-79.

The tests are nearly as wide as they are long, deeply excavated on one side, and with the chamber on the side opposite to this excavation very protuberant and angular. Frequent.

Massilina rugosa, n. sp. (Pl. 5, figs. 5, 6; Section 7).

The test of this form is rough and compressed, and the two final chambers embracing. The amount of exposure of the third chamber varies slightly, and in one or two cases a fourth one shows. The mouth is very large and heavily bordered, and the tooth strong and



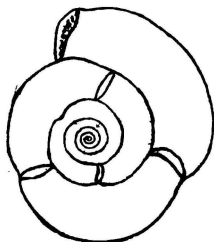
No. 7. *Massilina rugosa*, n. sp. $\times 50$.
Transverse section of the test.

prominent. The section shows the arrangements of the chambers. I am indebted to M. Schlumberger for his help in the identification of this species. Frequent.

Hauerina, d'Orbigny.

Hauerina compressa, d'Orbigny. (Pl. 5, figs. 7, 8 ; Cut 8).

Hauerina compressa, d'Orbigny ('46), p. 119, pl. 5, figs. 25-27. *H. compressa* (d'Orb.), Brady ('84), p. 190, pl. 11, figs. 12, 13.

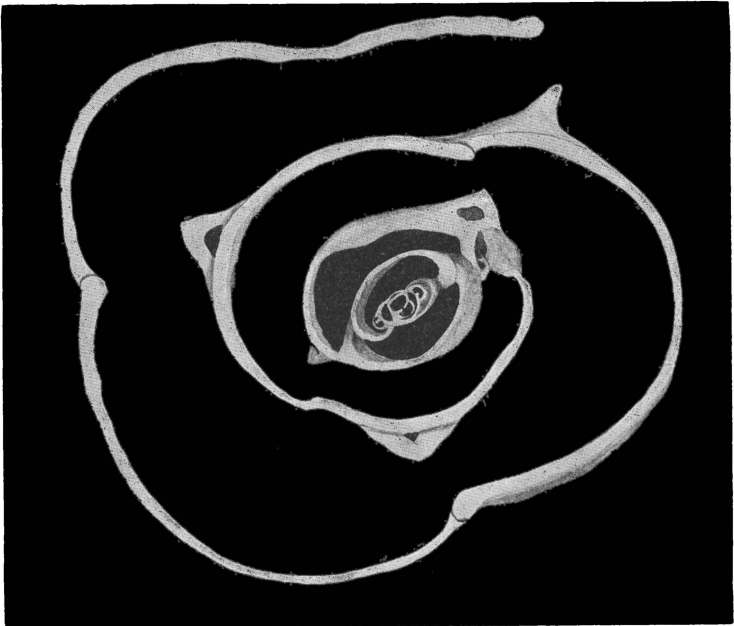


No. 8. *Hauerina compressa*, d'Orb. $\times 75$.
Mounted in Canada balsam, and viewed by transmitted light.

The test is semi-translucent and slightly compressed, and has a cribrate aperture which seems to be formed of very minute sand grains. I have been much puzzled concerning this form and by the different opinions expressed as to its identity, and feel I cannot do better than accept M. Schlumberger's decision that it is a *Hauerina* of megalospheric form A, and is most probably *H. compressa*, d'Orbigny. Frequent.

Planispirina, Seguenza.

Planispirina schlumbergeri, n. sp. (Pl. 5, figs. 9-11 ;
Section 10).

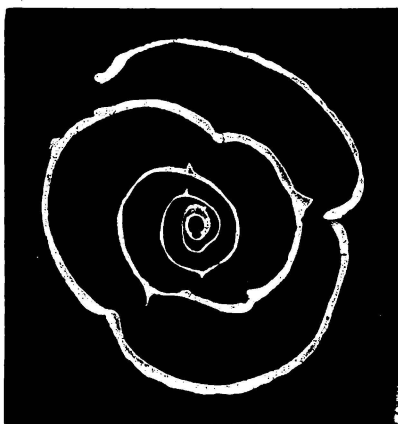


No. 10. *Planispirina schlumbergeri*, n. sp. $\times 50$.
Horizontal section of the test.

Test compressed, chambers embracing, the last three

nearly covering the earlier ones, periphery round. The mouth is large and toothed. It gives me much pleasure to associate M. Schlumberger's name with this form. The drawings and section were submitted to him for inspection. Rare.

Planispirina striata, n. sp. (Pl. 5, figs. 12-14 ;
Section 9.)



19. No. 9. *Planispirina striata*, n. sp. $\times 50$.
Horizontal section of the test.

This handsome form is frequent in these dredgings. The test is compressed, the underside much flattened, as if the test had been adherent ; the chambers are convex on the upperside, besides being more embracing than they are underneath. They are beautifully but irregularly striate, the striation following their curvature. On the underside these striæ are not so marked. The test is polished and thin and the underside is semi-translucent. The mouth is heavily lipped, and is partially closed by the flap on the anti-penultimate chamber. The section shows the arrangement of the chambers, the last few of which are constricted at their ends. Frequent.

PENEROPLIDINÆ.

Peneroplis, Montfort.**Peneroplis pertusus**, Forskål, sp.

- *Var *a. planatus*, Fichtel and Moll, sp. Very common.
 „ *b. pertusus*, Forskål, sp. Rare.
 * „ *c. arietinus*, Batsch, sp. Frequent.
 „ *d. cylindraceus*, Lamarck, sp. Frequent.
 „ *e. lituus*, Gmelin, sp. Does not occur.
 „ *f. carinatus*, d'Orbigny. Very rare.
 * „ *g. lævigatus*, Karrer. Rare.

The above arrangement is taken from Brady ('84), pl. 13, figs. 12-25.

Brady states in the Challenger work, that "as regards *Peneroplis pertusus* and its varieties nothing can be more easy than to pick out a number of striking specimens and give to each a distinctive name, but in no other way can they be divided into species," and as regards the Delos forms, var. *f.* may be only the young of var. *g. lævigatus* being in some cases a stout nautiloid form at its commencement, and becoming thin and complanate as the growth enlarges. In these gatherings var. *f.* is never larger than the spiral commencement of var. *g.* Var. *a.* is present in great quantity, and is large. Var. *d.* is often very long, having as many as eleven chambers in the lineal series. Some of the specimens are stout and coarse, and others just the reverse.

Orbitolites, Lamarck.**Orbitolites marginalis**, Lamarck, sp.

Orbitolites marginalis (Lamk.), Carpenter ('83), p. 2 pl. 3, figs. 1-7; pl. 4, figs. 1-5. *O. marginalis* (Lamk. Brady ('84), p. 214, pl. 15, figs. 1-5.

The specimens are small. Frequent.

Orbitolites duplex, Carpenter.

Orbitolites duplex, Carpenter ('83), p. 25, pl. 3, figs. 8-14; pl. 4, figs. 6-10; pl. 5, figs. 1-10.

The specimens are small and seldom exceed one-eighth of an inch in diameter. The double row of pores shows distinctly on the edge of the disk. These pores lie in depressions, but the ridges between them are not developed as in the typical form. The upper and lower rows of pores do not lie opposite one another but alternate. Carpenter ('83, p. 43) in his "concluding summary, with a study of the theory of descent" of the Orbitolites, states, "First, that the remoter ancestry, instead of being indicated (as it commonly is in the developmental history of the higher organisms) by obscure and transitory phases, is here distinctly represented in the earlier stages of the completed form. Thus, if the development of a very young *Orbitolites tenuissima* were checked in its early Milioline stage it would be accounted a *Spiroloculina*; if checked in its short Peneropline stage, it would be accounted a true *Peneroplis*; and if checked in its Orbiculine stage, it would be accounted a true *Orbiculina*. And so, if the development of the "sub-typical" variety of *Orbitolites complanata* were checked in its first stage, it would rank as *Orbitolites marginalis*; if checked in its second, as an *Orbitolites duplex*; and if checked in its third, as the earlier (fossil) form of *Orbitolites complanata*."

This shows the difficulty that arises in attempting to separate specimens into their respective species. Frequent.

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EXPLANATION OF PLATES.

PLATE II.

Figs. 1, 2.	<i>Nubecularia lucifuga</i> , Defrance.	× 50.
„ 3, 4.	„ „ „ var.	× 50.
„ 5-7.	„ <i>divaricata</i> , Brady.	× 50.
„ 8.	<i>Biloculina elongata</i> , d'Orb., denticulate var.	× 50.
„ 9-11.	<i>Spiroloculina impressa</i> , Terquem.	× 50.
„ 12, 13.	<i>Sigmoëlina ovata</i> , n. sp.	× 50.

PLATE III.

Figs. 1-7.	<i>Miliolina subrotunda</i> , Montagu, sp.	× 50.
„ 8-10.	„ <i>reticulata</i> , d'Orbigny, sp.	× 25.
„ 11, 12.	„ <i>seminulum</i> , Linné, sp. var. <i>cornuta</i> ,	nov. × 25.
„ 13-15.	„ <i>seminulum</i> , Linné, sp.	× 50.

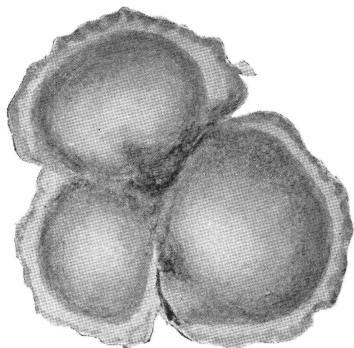
PLATE IV.

Figs. 1-3.	<i>Miliolina lævigata</i> , d'Orbigny.	× 25.
„ 4-6.	„ <i>pygmæa</i> , Reuss, sp.	× 50.
„ 7-9.	„ <i>contorta</i> , d'Orbigny.	× 50.
„ 10-12.	„ <i>gracilis</i> , d'Orbigny, sp.	× 50.
„ 13, 14.	„ <i>bicornis</i> , Walker and Jacob, sp.	× 25.
„ 15.	„ <i>pulchella</i> , d'Orbigny, sp.	× 25.
„ 16, 17.	<i>Articulina sulcata</i> , Reuss.	× 50.
„ 18-20.	„ <i>sagra</i> , d'Orbigny.	× 50.

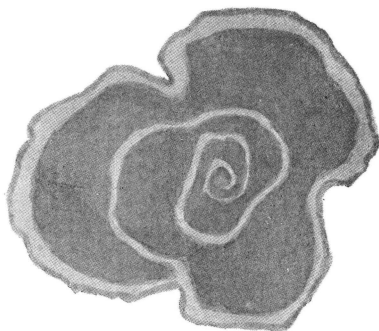
PLATE V.

Fig. 1.	<i>Articulina lineata</i> , Brady.	× 50.
„ 2-4.	<i>Massilina annectens</i> , d'Orbigny, sp.	× 25.
„ 5, 6.	„ <i>rugosa</i> , n. sp.	× 50.
„ 7, 8.	<i>Hauerina compressa</i> , d'Orbigny.	× 75.
„ 9-11.	<i>Planispirina schlumbergeri</i> , n. sp.	× 25.
„ 12-14.	„ <i>striata</i> , n. sp.	× 50.

1.



2.



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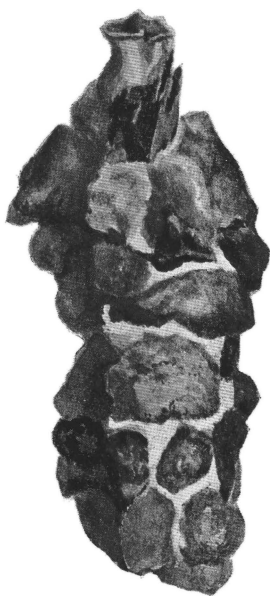
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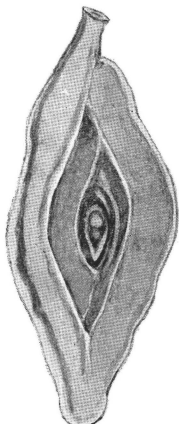
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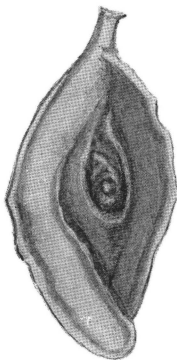
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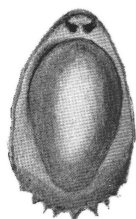
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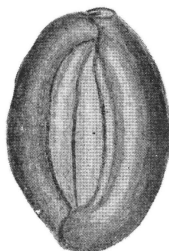
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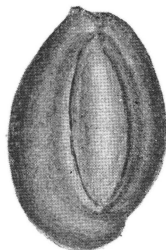
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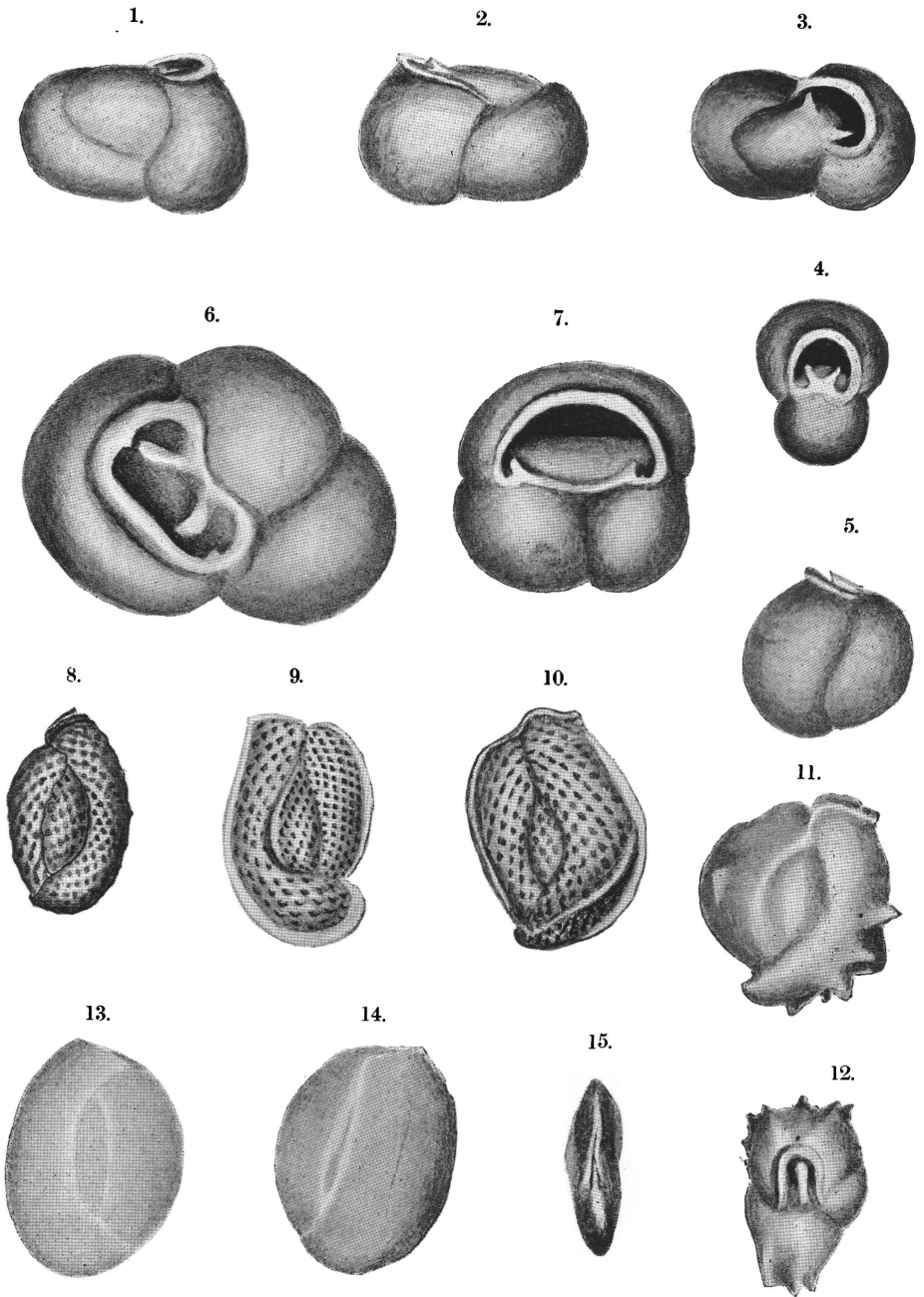


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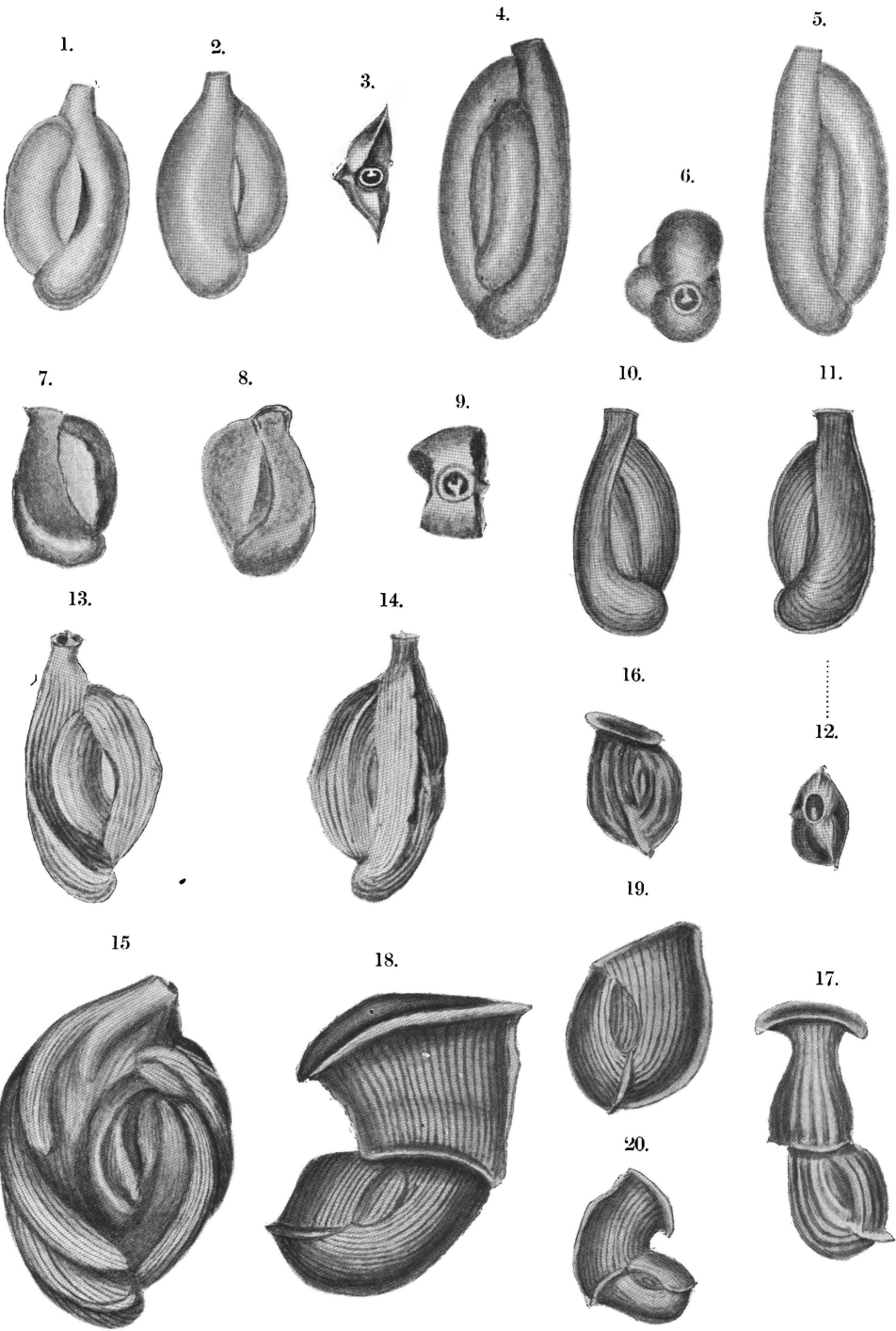
H. Sidelottm, del. ad nat.

Foraminifera from the coast of the island of Delos.



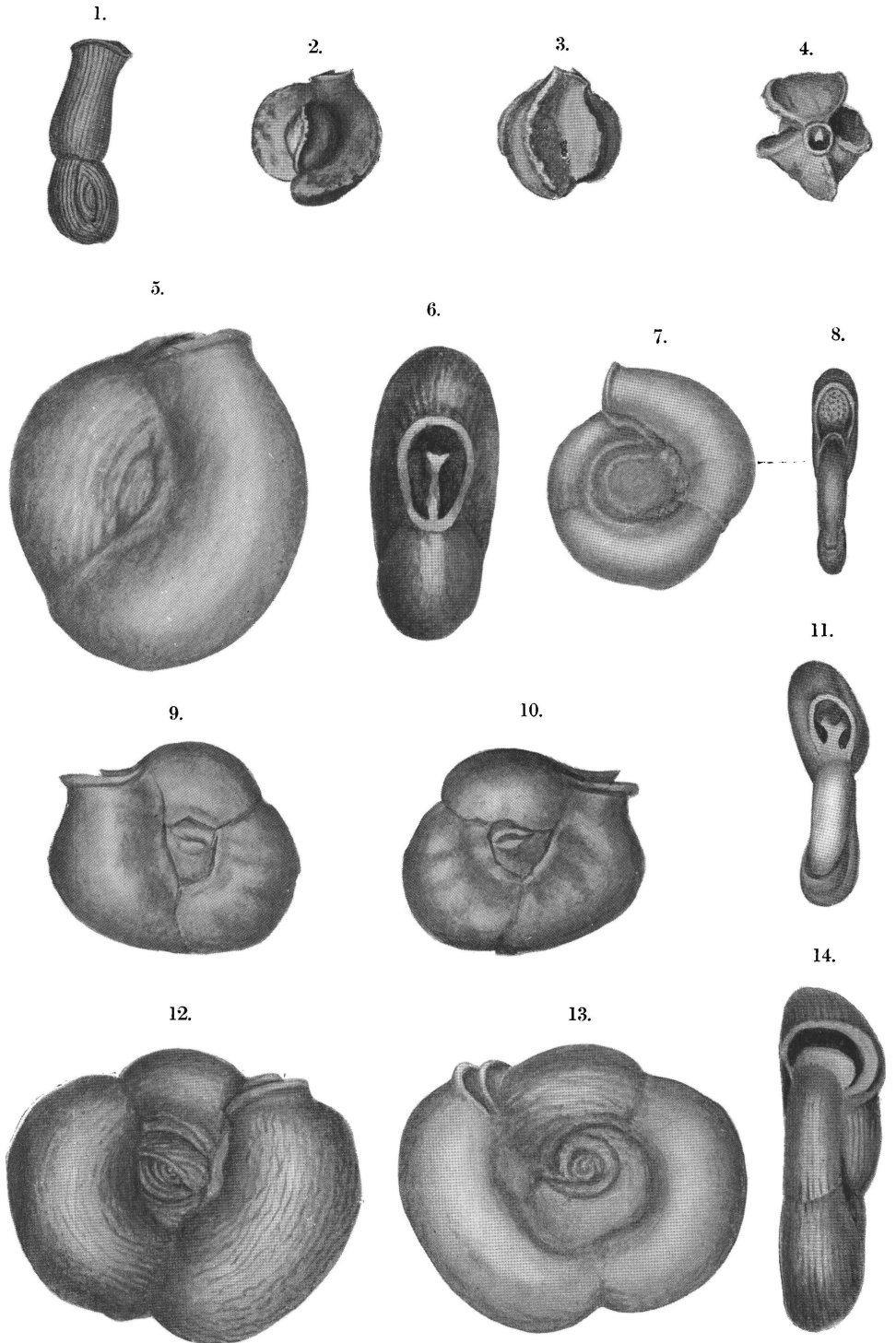
H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.



r. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.



H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.