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XXI. "Report on the Recent Foraminifera from the Coast of the Island of Delos (Grecian Archipelago)." Part VI. (Conclusion.)

By HENRY SIDEBOTTOM.

(Received and read April 6th, 1909.)

Planorbulina, d'Orbigny.

***Planorbulina mediterranensis**, d'Orbigny. (Pl. 1, Figs. 1-3).

Planorbulina vulgaris, d'Orbigny ('**39**), p. 134, pl. 2, fig. 30.

P. vulgaris (d'Orb.), Williamson ('**58**), p. 57, pl. 5, figs. 119, 120.

P. mediterranensis (d'Orb.), Brady ('**84**), p. 656, pl. 92, figs. 1—3.

P. mediterranensis (d'Orb.), Silvestri ('**98**), p. 286, pl. 6 (11), figs. 4-7.

P. mediterranensis (d'Orb.), Flint ('**99**), p. 328, pl. 72, fig. 6.

This form occurs in three varieties. The first,* Fig. 1, Pl. 1, is often of irregular growth, with inflated chambers, and has the peripheral edge rounded. The second,* Fig. 2, Pl. 1, has the peripheral edge sharp, and the under surface quite flat. The third variety, Fig. 3, Pl. 1, has also the peripheral edge sharp, or slightly blunted, but the central portion of the free surface is covered with irregular chambers. The planorbuline arrangement of the segments on the underside (superior) is quite distinct, as also are the apertures, though small. The first and second varieties are frequent, and the third not quite so frequent.

* The asterisk denotes that this species occurs at Palermo.

June 11th, 1909.

Planorbulina acervalis, Brady. (Pl. 1, Fig. 4.)

Planorbulina acervalis, Brady ('84), p. 657, pl. 92, fig. 4.

P. acervalis (Brady), Brady, Parker and Jones ('88), p. 227, pl. 46, fig. 11.

P. acervalis (Brady), Flint ('99), p. 328, pl. 72, fig. 7.

Brady ('84) reports this species from the Red Sea and other places. It resembles certain forms of *Gypsina*, but is distinguished from them by its peripheral apertures. Rather rare.

Truncatulina, d'Orbigny.

***Truncatulina lobatula,** Walker and Jacob, sp.

Truncatulina lobatula, (W. & J.) d'Orbigny ('46), p. 168, pl. 9, figs. 18-23,

T. lobatula, (W. & J.) Williamson ('58), p. 59, pl. 5, figs. 121-123.

Planorbulina lobatula, (W. & J.), Goës ('94) p. 88, pl. 15, fig. 774.

This common foraminifer in the Delos gatherings, is subject to a great deal of variation, both as to size and contour. Common.

***Truncatulina refulgens,** Montfort, sp.

Truncatulina refulgens (Montfort), Brady ('65), p. 105, pl. 12, fig. 9.

T. refulgens (Montfort), Brady, ('84), p. 659, pl. 92, figs. 7-9.

The specimens are small, and good bell-shaped tests are very rare. Rare.

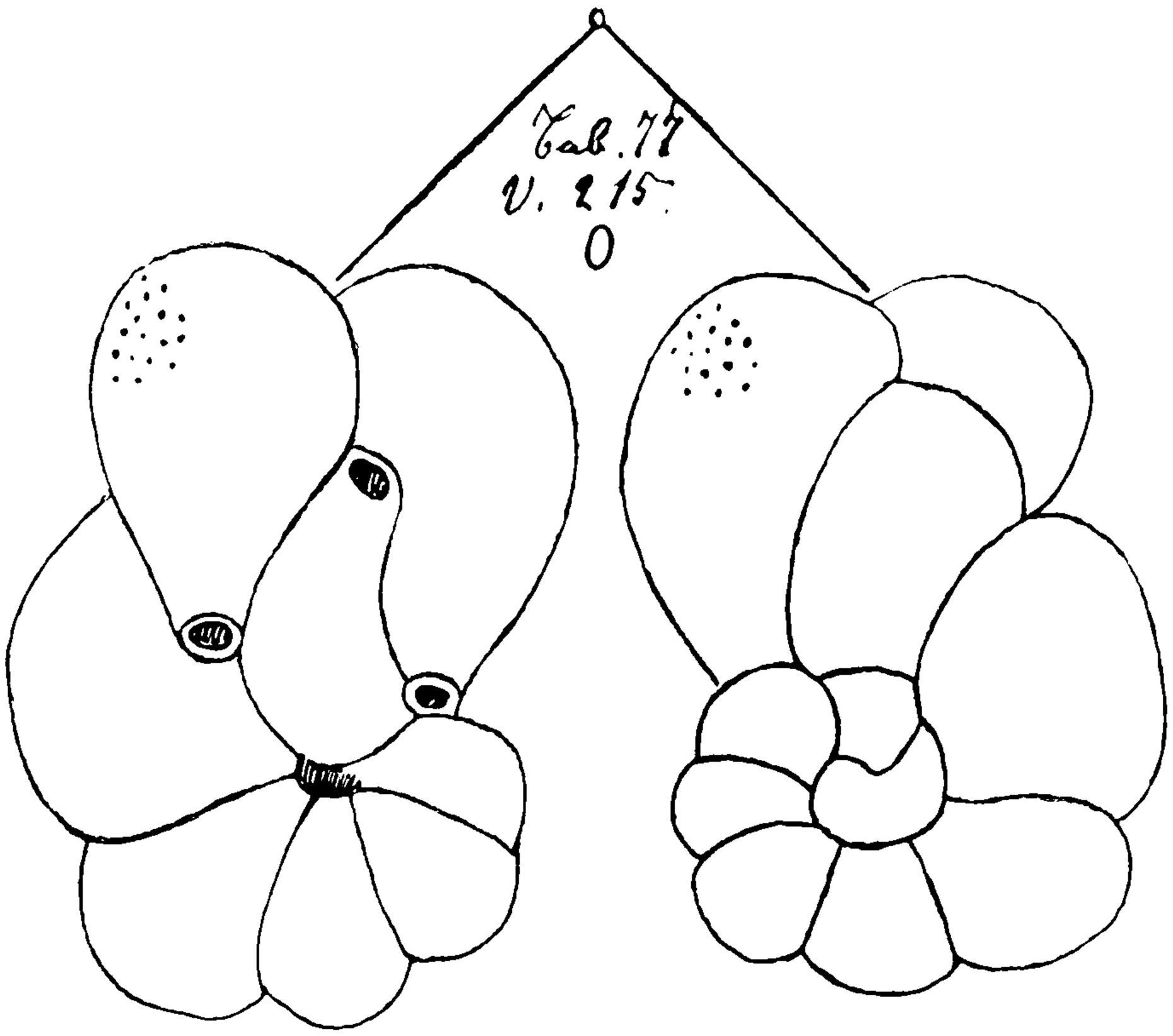
***Truncatulina variabilis,** d'Orbigny. (Pl. 1, Figs. 5, 6, and Pl. 2, Figs. 1-3).

Truncatulina variabilis (d'Orb., Brady, ('84), p. 661, pl. 93, figs. 6, 7.

T. variabilis (d'Orb.), Brady, Parker and Jones, ('88), p. 227, pl. 45, fig. 17.

T. variabilis (d'Orb.), Jones and others, ('96), p. 309, pl. 6, fig. 23.

This occurs in two forms, one,* a small and rather feeble outspread and complanate variety, and the other * which is present in great numbers, very large, coarsely perforated, and often showing a number of heavily lipped



Truncatulina variabilis, d'Orb. After Soldani.

orifices. Except in the young stage, this latter variety shows hardly two specimens alike. The contour of the tests is often extraordinary, and the specimens are in some cases, found enveloping the stalks of weeds. In large examples, the perforations are very plainly seen, even under low powers, and the coalescing of their edges often forms an areolation over the whole surface. I had been puzzled over the identification of these forms, but

Professor A. Silvestri, of Spoleto, Italy, kindly sent me tracings of some of Soldani's figures in the "Testaceographia" of wild-growing *Truncatulina*, which d'Orbigny grouped under *Truncatulina variabilis*. Some of these tracings are almost identical with the Delos examples. I reproduce one of them in the text-figure on p. 3.

Many of the tests found are larger than those I have figured on Pl. 2.

***Truncatulina reticulata,** Czjzek, sp. (Pl. 2, Fig. 4).

Rotalina reticulata, Czjzek ('48), p. 145, pl. 13, figs. 7-9.

Siphonina fimbriata, Terrigi ('80), p. 212, pl. 4, fig. 69.

Truncatulina reticulata (Czjzek) Brady ('84), p. 669, pl. 96, figs. 5-8.

T. reticulata (Czjzek) Brady, Parker and Jones ('88), p. 228, pl. 45, figs. 23, 24.

T. reticulata (Czjzek) Chaster ('92), p. 66, pl. 1, fig. 16.

The examples are characteristic of the species. Rare.

Carpenteria, Gray.

***Carpenteria,** sp. ? (Pl. 2, Fig. 5).

Having found only one specimen from Delos, and one from Palermo, I have not been able to decide definitely as to the genus of this foraminifer. The planorbuline arrangement of the chambers shows distinctly on the superior side (adherent surface) of the test. The edge of the test slightly spreads out, and is fimbriated; the aperture is an arched slit, and shows plainly, as will be seen from the figure. The perforations on both sides of the test show plainly. I have placed it under the head of *Carpenteria* provisionally.

Pulvinulina, Parker and Jones.

Pulvinulina repanda, Fichtel and Moll, sp.

Nautilus repandus, Fichtel and Moll ('03), p. 35, pl. 3, figs. *a*—*d*.

Pulvinulina repanda (F. & M.), Terrigi ('80), p. 206, pl. 3, fig. 61.

P. repanda (F. & M.) Brady ('84), p. 684, pl. 104, fig. 18.

P. repanda (F. & M.) Egger ('93), p. 405, pl. 18, figs. 28-30, 34, 35.

Very good examples occur. Frequent.

***Pulvinulina lateralis**, Terquem sp. (Pl. 2, Fig. 6, Pl. 3, Figs. 1, 2 (?)).

Rosalina lateralis, Terquem ('78), p. 25, pl. 2, fig. 11.

Pulvinulina lateralis (Terquem) Brady ('84), p. 689, pl. 106, figs. 2, 3.

P. lateralis (Terquem) Egger ('93), p. 413, pl. 18, figs. 48-50.

Mr. Millett in his Malay Report ('98—:04) states that this species in the living condition appears to be nothing more than a wild-growing variety of *P. repanda*, and that our knowledge of its distribution in the existing seas, is confined to the localities mentioned by Brady ('84) and the solitary station recorded by Egger. Mr. Millett states also that it "is tolerably plentiful at St. 22 of the Malay Report and is represented at a few stations mostly in Area 2." I can report it also from the Bay of Eleusis (not quite typical), Gulf of Oman, Madeira, Tuticoran, and White Dog's anchorage, off River Min, China. All the Delos examples (with one exception) are, I believe, wild growing specimens of this species. Those from Palermo do not suffer quite so much in this respect. Rare.

I am doubtful about the odd specimen Fig. 2, Pl. 3, as it bears a certain resemblance to Fornasini's 1900) outline figure on page 396, fig. 45, under the name *Pulvinulina adriatica*, of which it might possibly be an immature example. This specimen is much more complanate than the others.

* Pulvinulina oblonga, Williamson, sp.

Nautilus auricular, var. β, Fichtel and Moll (:03), p. 108, pl. 20, figs. *d*, *e*, *f*.

Rotalina oblonga, Williamson ('58), p. 51, pl. 4, figs. 98-100.

Pulvinulina oblonga, (Williamson), Brady ('84), p. 688, pl. 106, fig. 4.

Only about six of moderate size were found. Some of the Palermo tests are large. Very rare.

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

(Pl. 3, Figs. 3, 4).

Pulvinulina oblonga (Williamson), var. *scabra*, Brady ('84), p. 689, pl. 106, fig. 8.

I am a little doubtful as to whether these should be placed under this species, or under *P. oblonga*. The tests run smaller than the Delos or Palermo examples of *P. oblonga*, but they can be distinguished by the fact that the surfaces of the earlier chambers on the superior side are concave, or flat, whereas in *P. oblonga* they are more or less convex.

In the Delos and Palermo specimens the rugosity of the superior surface is very seldom present. The final chambers of the tests are not so much inflated on the superior side, as are the specimens I have from Cebu, and especially those from Bermuda, nor is the amount of

rugosity so great. Brady's fig. 8*a*, pl. 106 ('84) does not convey the impression of having been drawn from the same example as fig. 8*c*, and it will be noticed that this latter figure gives the idea of the earlier chambers being convex, whereas all the tests in my collection show them to be flat or concave. Both the smooth and rugose condition are here figured. Rare.

* **Pulvinulina concentrica**, Parker and Jones, (Pl. 3, Fig. 5).

Pulvinulina concentrica (P. & J. Ms.), Brady ('64), p. 470, pl. 48, fig. 14.

P. concentrica (P. & J.), Brady ('84), p. 686, pl. 105. fig. 1.

Large examples occur of this beautiful foraminifer, the characteristic broad band bordering the chambers being well marked. Frequent.

***Pulvinulina hauerii**, d'Orbigny sp. (Pl. 3, Fig. 6).

Rotalina hauerii, d'Orbigny ('46), p. 151, pl. 7, figs. 22-24.

Pulvinulina hauerii (d'Orb.), Brady ('84), p. 690, pl. 106, figs. 6, 7.

The tests are not typical, their peripheral edges inclining to angularity. The clear portion of the surface of the final chamber on the inferior side is well marked and characteristic of the species. Rather rare.

***Pulvinulina karsteni**, Reuss, sp. (Pl. 3, Fig. 7).

Pulvinulina karsteni (Reuss), Brady ('64), p. 470, pl. 48, fig. 15.

P. repanda v. karsteni, Parker and Jones ('65), p. 396 pl. 14, figs. 14, 15, 17, and pl. 16, figs. 38-40.

P. karsteni (Reuss), Brady ('84), p. 698, pl. 105, figs. 8, 9.

The Delos examples of this species are not quite typical, the umbilical region being covered with granulations. Similar tests occur in the Bay of Naples. Rather rare.

Pulvinulina schreibersii, d'Orbigny, sp. (Pl. 3, Fig. 8).

Rotalina schreibersii, d'Orbigny ('46), p. 154, pl. 8, figs. 4-6.

R. badensis, Czjzek ('48), p. 144, pl. 13, figs. 1-3.

Pulvinulina schreibersii (d'Orb.), Brady ('84), p. 697 pl. 115, fig. 1.

The Delos specimens reveal this to be one of the most beautiful of the foraminifera, of which it is impossible to give adequate illustrations.

The test is very transparent, and looking down upon its apex the minute tubuli appear like very small delicate feathers. There is generally a "boss" in the centre of the lower surface, and the amount of stellate sutural limbation varies considerably, as also does the height of the spire. The examples are in splendid condition, and of a very pale, light-brown colour. Brady ('84), states that Parker and Jones record its occurrence in the Red Sea, 40 fathoms, and in the Mediterranean, 90 fathoms Very frequent.

* **Pulvinulina vermiculata**. d'Orbigny, sp. (Pl. 4, Fig. 1).

Pulvinulina vermiculata (d'Orb.), Carpenter ('62), p. 211, pl. 13, figs. 4-6.

P. vermiculata (d'Orb.), Brady ('84), p. 687, pl. 115, fig. 2.

This is an interesting form, and large and characteristic specimens occur in these Delos gatherings. Rather rare.

Pulvinulina nitidula, Chaster. (Pl. 4, Fig. 2).

Pulvinulina nitidula, Chaster (**92**), p. 66, pl. 1, fig. 17.

Dr. Chaster's description of this pretty little species, which occurs off Southport, Lancashire, runs as follows:

"Test small, much depressed, highly polished; convolutions about two in number, there being seven or eight segments in the last; superior surface slightly convex; sutures not depressed; inferior surface concave; aperture large and oblique; periphery acute. Diameter, ·125 mm. The test is so thin that the sutures on the inferior surface are seen through the shell, and give it a pseudo-Cassiduline appearance. Shore mud and in shallow water. Very rare."

The tests from Delos are quite typical. I have also three specimens from the coast of Iceland. Rather rare.

Pulvinulina globosa, n. sp. (Pl. 4, Fig. 3).

Test clear and delicate, composed of three convolutions, made up of about thirteen inflated chambers, consequently the sutures are deeply sunk. The aperture appears to be concealed in the deeply sunk umbilical region by granular shell growth. The final convolution consists of five chambers, and these are adorned on the inner surface by very fine lines, radiating from the umbilicus. The test is very smooth, and finely perforated, and of an irregular globular shape.

About ten specimens were found of this minute species. The one figured is the largest of the set. Very rare.

Pulvinulina simplex, n. sp. (Pl. 4, Figs. 4, 5).

The test is transparent, and consists of four, five, or six segments, having generally only four peripheral segments. The initial chamber is comparatively large.

The test is compressed, elongated. and has the periphery rounded. The umbilical cavity is deeply sunk, and has a few very fine lines ornamenting its sides. The sutural lines are slightly sunk. This simple *Pulvinulina* appears to belong to the "*oblonga*" group. Rare.

Rotalia. Lamarck.

*Rotalia beccarii, Linné, sp. (Pl. 4, Fig. 6).

Rotalina beccarii (Linné), Williamson ('58), p. 48, pl. 4, figs. 90-92.

Rotalia beccarii (Linné), Parker and Jones ('65), p. 388, pl. 16, figs. 29, 30.

R. beccarii (Linné), Brady ('84), p. 704, pl. 107, figs. 2, 3.

R. beccarii (Linné) Goës ('94), p. 99, pl. 16, fig. 811.

R. beccarii (Linné), Flint ('99), p. 331, pl. 75, fig. 2.

Three varieties of this common species are present, one* small, with the outermost whorl consisting of six to eight chambers, and a second* variety, much larger, with ten or eleven chambers in the final convolution. The former rather rare, the latter common. In this latter the septal lines are often limbate and raised. The third* variety, which is very rare (*Fig. 6, Pl. 4*), is the largest of the set, and highly decorated with tubercles, and exogenous shell-growth. Mr. Millett kindly sent me a couple of examples of this decorated form from the Pliocene of St. Erth, and they agree well with those from Delos. He writes me that he had listed them as *Rotalia punctatogranosa*, Seguenza, but now considers them to be a variety of *R. beccarii*, and also states that as far as he knows this is its first recorded occurrence in the recent condition. It is not quite so rare off Palermo.

TINOPORINÆ.

Gypsina, Carter,

***Gypsina globulus**, Reuss, sp.

Ceriopora globulus, Reuss ('47), p. 33, pl. 5, fig. 7.

Gypsina globulus, (Reuss) Brady ('84) p. 717, pl. 101, fig. 8.

G. globulus (Reuss) Brady, Parker and Jones ('88), p. 229, pl. 46, fig. 13.

The specimens are not quite so symmetrical as the one figured by Brady ('84), and it is possible that some of them might be brought under *G. vesicularis*. Rare.

Gypsina inhœrens, Schultze, sp.

Acervulina inhærens, Schultze ('54), p. 68, pl. 6, fig. 12.

Gypsina inhærens (Schultze) Brady ('84), p. 718, pl. 102, figs 1-6.

One of the examples is very similar to Brady's fig. 3 in the above reference, being wrapped round the stem of some object. Several also agree with Brady's figs, 1, 2. Very rare.

Polytrema, Risso.

*** Polytrema miniaceum**, Linné, sp. (Pl. 4, Fig. 7.)

Polytrema miniaceum (Linné) Brady ('84), p. 721, pl. 100, figs. 5-9, and pl. 101, fig. 1.

P. miniaceum (Linné) Schlumberger ('92), p. 196, fig. 5.

This common Mediterranean form is present in great numbers, many of the specimens being finely branched. In the above reference Schlumberger states that he found this species in the embryonic stage in material from the Azores. This stage is represented by a small irregular globular test, rosy in colour, and free. I have found

about twenty-five* in the Delos gatherings. Schlumberger also refers to the fact that a section made through the trunk of an adult specimen, not far from the attached surface, reveals the embryo embedded in it.

My own sections shewed them very plainly. Very common.

*__Polytrema miniaceum__ (Linné), var. __alba__, Carter.

Polytrema miniaceum, var. Carter ('77), p. 213, pl. 13, fig. 14.

P. miniaceum (Linné), var. *alba* (Carter), Brady ('84), p. 721, pl. 101, figs. 2, 3.

This variation occurs both in the adult and embryonic stages, but is very rare. The colour is not snow-white, but rather a *very* light shade of cream-colour.

They agree with specimens I have from Cebu.

NUMMULINIDÆ.

POLYSTOMELLINÆ.

__Nonionina__, d'Orbigny.

__Nonionina depressula__, Walker and Jacob, sp
(Pl. 4, Fig. 8).

Nonionina umbilicatula, Williamson ('58), p. 97, pl. 3, figs. 70, 71.

Polystomella crispa, var. (*Nonionina*) *depressula*, Parker and Jones ('65), p. 403, pl. 14, fig. 39.

N. depressula (W. & J.), Terrigi ('80), p. 218, pl. 4, fig. 77.

N. depressula (W. & J.), Brady ('84), p. 725, pl. 109, figs. 6, 7.

N. depressula (W. & J.), Goës ('94), p. 103, pl. 17, figs. 825, 826.

The tests agree well with the "Challenger" figures, although they do not all show the granular markings at the umbilicus. Rather rare.

***Nonionina stelligera,** d'Orbigny, (Pl. 4, Fig. 9).

Nonionina stelligera, d'Orbigny ('39), p. 128, pl. 3, figs. 1, 2 (*stellifera* on plate).

Polystomella crispa, var. (*Nonionina*) *stelligera*, d'Orb., sp., Parker and Jones ('65), p. 404, pl. 14. figs. 40, 41.

Nonionina stelligera (d'Orb.), Brady ('84), p. 728, pl. 109, figs. 3-5.

N. stelligera (d'Orb.), Morton ('97), p. 121, pl. 1, fig. 18.

The Delos tests of this species are much more stoutly built than those of the former, which are delicate and colourless, while the latter are semi-opaque and of a pale ivory colour. Rather frequent.

***Nonionina scapha,** Fichtel and Moll, sp.

Nautilus scapha, Fichtel and Moll (:03), p. 105, pl. 19, figs. *d-f*.

Nonionina sloanii, d'Orbigny ('39), p. 46, pl. 6, fig. 18.

N. scapha (F. & M.), Brady ('84), p. 730, pl. 109, figs. 14, 15.

N. scapha (F. & M.), Brady, Parker, and Jones ('88), p. 230, pl. 43, fig. 20.

N. scapha (F. & M.), Flint ('99), p. 337, pl. 80, fig. 1.

The Delos examples are small and transparent. Very rare.

***Nonionina turgida,** Williamson, sp.

Rotalina turgida, Williamson ('58), p. 50, pl. 4, figs. 95-97.

Polystomella crispa, var. (*nonionina*) *turgida*, Parker and Jones ('65), p. 405, pl. 17, fig. 57.

Nonionina turgida (Williamson), Brady ('84), p. 731, pl. 109, figs. 17-19.

All the specimens are developed inequilaterally. Rare.

Polystomella, Lamarck.

*Polystomella striatopunctata, Fichtel and Moll, sp.

(Pl. 4, Fig. 10, and Pl. 5, Figs. 1, 2.)

Nautilus striatopunctatus, Fichtel and Moll (:03) p. 61, pl. 9, figs. *a-c*.

P. striatopunctata (F. & M.). Terrigi ('80), p. 216, pl. 4., figs. 73, 74.

P. striatopunctata (F. & M.) Brady ('84), p. 733, pl. 109, figs. 22, 23.

Polystomella striatopunctata (F. & M.), Brady, Parker, and Jones ('88), p. 230, pl. 43, fig. 17.

This common and variable species occurs in three forms. The first, as figured Pl. 4, Fig. 10, is transparent and much flattened, and the "fossettes" are feebly marked. In the second* variety, Pl. 5, Fig. 1, the test is much stouter, the perforations shew distinctly, and the "fossettes" in certain lights shew a fine, or a dotted line, on either side, proceeding from the umbilicus to the periphery. These lines are somewhat too distinct in the illustration. The third form, Pl. 5, Fig. 2, has the whole of the test (in most cases) apparently very finely granulated, especially in the region of the "fossettes," this giving the test a banded appearance. When damped the "fossettes" shew quite plainly.

The first variety, rather rare; the second, frequent; and the last, not so frequent.

*Polystomella crispa** (Linné), sp.

Polystomella crispa (Linné), Williamson ('58), p. 40, pl. 3, figs. 78-80.

P. crispa (Linné), Carpenter ('62), p. 278, pl. 16, figs. 4-6.

P. crispa (Linné), Brady ('84), p. 736, pl. 110, figs. 6, 7.

P. crispa (Linné), Flint ('99), p. 338, pl. 80, fig. 3.

Fine and typical examples are common from this locality.

*Polystomella verriculata**, Brady. (Pl. 5, Fig. 3).

Polystomella verriculata, Brady ('84), p. 738, pl. 110, fig. 12.

P. verriculata (Brady), Millett (:04), p. 604, pl, 11, fig. 3.

The Delos examples are small, and not very well developed. The net-work appearance caused by the joining of the septal ridges and retral bars, as a rule, only shows on the earlier chambers. Very rare.

*Polystomella macella**, Fichtel and Moll, sp. (Pl. 5, Fig. 4).

Nautilus macellus, var. *a*, Fichtel and Moll, (:03), p. 66, pl. 10, figs. *c-g*.

Polystomella lessonii, d'Orbigny ('39), p. 29, pl. 3, figs. 1-2.

P. fichteliana, d'Orbigny ('46), p. 125, pl. 6, figs. 7, 8.

P. macella (F. and M.), Brady ('84), p. 737, pl. 110, figs. 8, 9, 11.

Good examples of this species are present. The tests are typical, with a slightly depressed umbilicus, and acute peripheral edge. Some of the tests are flatter than the one illustrated, and have spines projecting from the edge of the earlier chambers. I have still finer specimens from dredgings near Mount Athos. Rather rare.

***Polystomella macella**, Fichtel & Moll., var. **granulosa**, nov. (Pl. 5, Fig. 5).

This is an interesting variation, in which the limbate sutures are broken up into exogenous beads, and the whole of the test is likewise covered with minute granules or tubercles. The "fossettes" show quite plainly when the test is damped. Two or three poor examples occur at Palermo. Rather rare.

***Polystomella subnodosa**, Münster, sp. (Pl. 5, Fig 6).

Polystomella submodosa, (Münster) Reuss, ('55), p. 240, pl. 4, fig. 51.

P. submodosa (Münster) Brady ('84) p. 734, pl. 110, fig. 1.

P. submodosa (Münster) Goës ('94) p. 102, pl. 17, figs. 817-819.

The tests are of a very pale milky-blue colour, slightly transparent. The surface is polished, and the pores hardly apparent under moderate powers. I have a note from Mr. Millett, dated a few years ago, in which he says "Goës figures specimens under this name from Newfoundland and Nova Zemlya. His figures are doubtful. As a recent shell it had only been found in the Eastern Archipelago until you obtained it from Delos."

Since this note, Mr. Millett reports its occurrence in the Malay Archipelago, saying it is found in both areas, and is abundant at stations 13, 18, and 21. I have also examples from the Bays of Salona and Eleusis. Very frequent.

Appendix.

***Miliolina ferussacii,** d'Orbigny, sp. (Pl. 5, Fig. 7.)

Quinqueloculina rodolphina, d'Orbigny ('**46**), p. 299, pl. 20, figs. 7-9.

Q. Maria, d'Orbigny ('**46**), p. 300, pl. 20, figs. 13-15.

Miliolina ferussacii (d'Orb.), Brady ('**84**), p. 175, pl. 113, fig. 17.

The specimens found are apparently very feeble examples of the elongated variety of *M. ferussacii*. Those from Palermo are also elongated, but better developed, and finer in every way. Rare.

Miliolina contorta, d'Orbigny, sp. (Pl. 5, Fig. 8.)

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

This appears to be a weak form of this variable foraminifer, in which the chambers have lost most of their angularity. The specimens vary a good deal in this respect, and in the one selected for illustration the angularity is hardly apparent. Frequent.

Miliolina, sp. (Pl. 5, Fig. 9.)

There are four or five of these, of which the one figured is the largest, and has the costæ much more developed than the others have. All the tests appear to be distorted, and I feel doubtful under which species they should be placed. The test is very much compressed, and keeled, and the mouth is a narrow slit. Terquem figures specimens from the Pliocene of the Isle of Rhodes ('**78**), p. 70, pl. 13 (pl. 8), figs. 4, 8, under the name of *Quinqueloculina depressa* d'Orbigny, which bear a certain amount of likeness to the Delos forms, especially his

fig. 8, which appears to resemble one of the smallest of the Delos examples. Very rare.

***Discorbina parisiensis**, d'Orbigny, sp. (Pl. 5, Fig. 10).

Discorbina parisiensis (d'Orb.), Wright ('77), p. 105, pl 4, fig. 1.

D. parisiensis (d'Orb.), Brady ('84), p. 648, pl. 90, figs. 5, 6, 9-12.

Five were found, of which the one figured has the highest spire, and shows only four chambers in the outermost convolution. One of the tests is quite flat, and excepting the figured specimen, they all have five chambers in the final convolution. Very rare.

***Discorbina**, sp. (Pl. 5, Fig. 11).

I am unable to determine to what species this belongs, and Mr. Millett "thinks it may be an immature form of *Discorbina rilardeboana*, or *D. vesicularis*, or even *D. globularis*, and should be judged by its associates," but in this respect there appears to be nothing to guide me. The tests are very transparent, and the umbilical cavity deeply sunk. Very rare. Not so rare at Palermo.

NOTE.

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.

BIBLIOGRAPHY.

BRADY, H. B. ('64). "Contributions to our knowledge of the Foraminifera. On the Rhizopodal Fauna of the Shetlands." *Trans. Linnean Soc.*, vol. 24, pp. 463-475, pl. 18, 1864.

—— ('65). "A Catalogue of the recent Foraminifera of Northumberland and Durham." *Nat. Hist. Trans. Northd. and Durham*, vol. 1, pp. 83-107, pl. 12, 1865.

—— ('84). "Report on the Foraminifera collected by H.M.S. 'Challenger' during the years 1873-76." *Zool. Chall. Exp.*, vol. 9, 814 pp., 115 pls., 1884.

BRADY, H. B., W. K. PARKER, and T. R. JONES ('88). "On some Foraminifera from the Abrohlos Bank." *Trans. Zool. Soc.*, vol. 12, pt. 7, pp. 211-239, pls. 40-46 and chart, 1888.

CARPENTER, W. B., W. K. PARKER, and T. R. JONES ('62). "Introduction to the Study of the Foraminifera." *Ray. Society*, 319 pp. 22 pls., 1862.

CHASTER, G. W. ('92). "Report upon the Foraminifera of the Southport Society of Natural Science District." *First Rep. Southport Soc. Nat. Sci.*, pp. 54-71, pl 1, 1892.

CZJZEK, J. ('48). "Beitrag zur Kenntniss der fossilen Foraminiferen des Wiener Beckens." *Haidinger's Naturwiss. Abhandl.*, vol. 2, pp. 137-150, pls. 12-13, 1848.

EGGER, J. G. ('93). "Foraminiferen aus Meeresgrundproben, gelothet von 1874 bis 1876 von S. M. Sch. 'Gazelle.'" *Abhandl. k. Bayer. Akad. Wiss.*, 2 cl., vol. 18. part 2, pp. 193-458, 21 pls., 1893.

FICHTEL, L. VON, ET J. P. C. VON MOLL. (:03). "Testacea Microscopica aliaque minuta ex generibus *Argonauta* et *Nautilus* ad naturam delineata et descripta." 124 pp., 24 pls., Wien, 1803.

FLINT, J. M. ('99). "Recent Foraminifera, a descriptive catalogue of specimens dredged by the U.S. Fish Commission, steamer 'Albatross.'" *Rep. U.S. Nat. Mus.*, pp. 249-349, 80 pls., 1897.

FORNASINI, C. (:00). "Foraminiferi Adriatici." *Mem. R. Accad. Sci. Ist. Bologna*, [5], vol. 8, pp. 357-402, figs. 1-50, 1900.

GOËS, A. ('94). "A synopsis of the Arctic and Scandinavian Recent Marine Foraminifera hitherto discovered." *K. Svenska. Vetensk.-Akad. Handl. Stockholm*, vol 25, no. 9, 127 pp., 25 pls., 1894.

JONES, T. R. ('96) and others. "A monograph of the Foraminifera of the Crag." *Palæontographical Society*, 402 pp., 7 pls., 1866-1897.

MILLETT, F. W. ('98 '99 :00 :01 :02 :03 :04). "Report on the Recent Foraminifera of the Malay Archipelago, collected by Mr. A. Durrand, F.R.M.S." *Journ. R. Micr. Soc.*, 1898-1904.

MORTON, F. S. ('97). *Proc. Portland Soc. Nat. Hist., Portland, Maine*, vol. 11, pp. 105-122, pl. 1, 1897.

ORBIGNY, A. D. d'. ('39). "Foraminifères," *in*: Ramon De la Sagra, "Histoire physique, politique et naturelle de l'Ile de Cuba," pp. 48, 1-224, 12 pls., 1839.

—— ('39). "Foraminifères," *in*: Barker-Webb and Berthelot, "Histoire naturelle des Isles Canaries," vol. 2, pp. 119-146, 3 pls, 1839.

—— ('46). "Foraminifères fossiles du Bassin tertiaire de Vienne," p. 1-36, 1-312, 21 pls., 1846.

PARKER, W. K. and T. R. JONES ('65). "On some Foraminifera from the North Atlantic and Arctic Oceans, including Davis Straits and Baffin's Bay." *Phil. Trans.*, vol. 155, pp. 325-441, pls. 12-19, 1865.

REUSS, A. E. ('55). "Beiträge zur Charakteristik der Tertiärschichten des nördlichen und mittleren Deutschlands." *Sitzungsb. K. Ak. Wiss. Wien.*, vol. 18, pp. 197-272, 12 pls., 1855.

SCHLUMBERGER, C. ('92). "Note préliminaire sur les Foraminifères draqués par S. A. Le Prince Albert de Monaco." *Mém. de la Soc. Zool. de France*, vol. 5, pp. 193-198, pl. 8, and figs. in text, 1892.

SCHULTZE, M. S. ('54). "Ueber den Organismus der Polythalamien (Foraminiferen) nebst Bemerkungen über die Rhizopoden im Allgemeinen." 4to, Leipzig, 68 pp., 7 pls., 1854.

SILVESTRI, A. ('98). "Foraminiferi Pliocenici della Provincia di Siena." *Mem. Accad. Pont. Nuovi Lincei*, part 2, pp. 155-381, 6 pls., 1898.

TERQUEM, O. ('78). "Les Foraminifères et les Entomostracés Ostracodes du Pliocène supérieur de l'Ile de Rhodes." *Mém. Soc. Géol. France*, sér. 3, vol. 1, 1-133, pls. 1.14., 1878.

TERRIGI, G. ('80). "Fauna Vaticana a Foraminiferi delle Sabbie Gialle nel Pliocene subapennino superiore." *Atti Accad. Pont. Nuovi Lincei*, vol. 33, pp. 127-219, pl. 1-4, 1880.

WILLIAMSON, W. C. ('58). "On the recent Foraminifera of Great Britain." *Ray Society*, pls. 7, 1858.

WRIGHT, J. ('77). "Recent Foraminifera of Down and Antrim." *Proc. Belfast Nat. Field Club*, 1876-1877, *Appendix*, pp. 101-104, pl. 4, 1877.

ERRATA.

Line 18, vol. 48, 1904, p. 18, for d'Orbigny sp. read Schlumberger.

,, 2, from foot, p. 24, for Chelaston, near Derby, read Lias of Leicestershire.

,, 5, from foot, p. 26, for d'Orbigny sp. read Schlumberger.

,, 13, from foot, vol. 51, 1907, p. 7, for **fragraria** read **fragaria**.

,, 10, from foot, p. 7, for *fragraria* read *fragaria*.

,, 5, from top, p. 24, for *fragreria* read *fragaria*.

Plate 3, erase lines between figs. 12 and 13.

EXPLANATION OF PLATES.

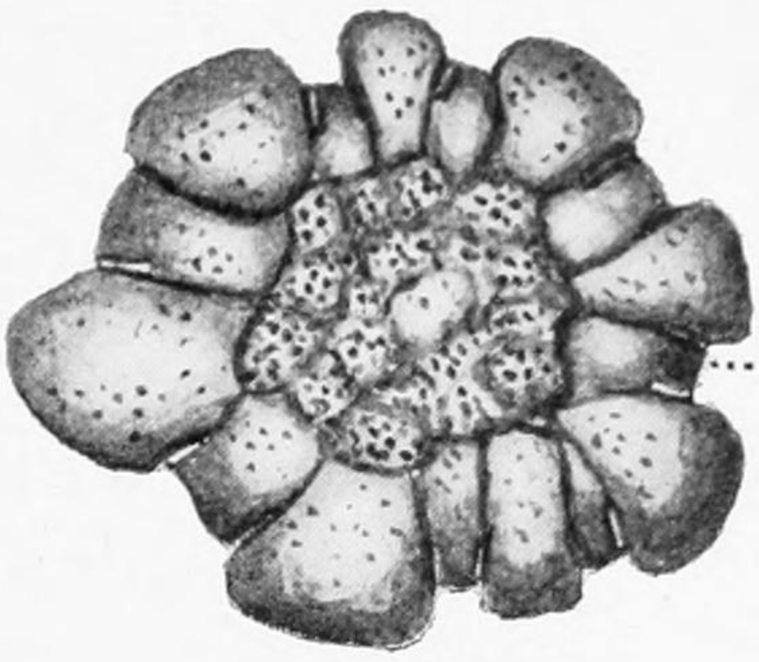
PLATE I.

FIGS.			PAGE.
1—3.	*Planorbulina mediterranensis*, d'Orbigny	× 25	1
4.	*Planorbulina acervalis*, Brady	× 25	2
5, 6.	*Truncatulina variabilis*, d'Orbigny	× 50	2

1*a*

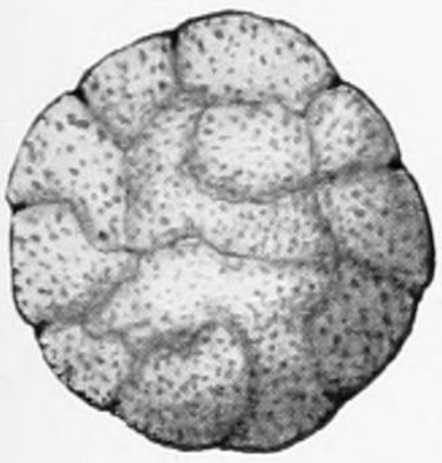
b

2*a*



b

3*a*



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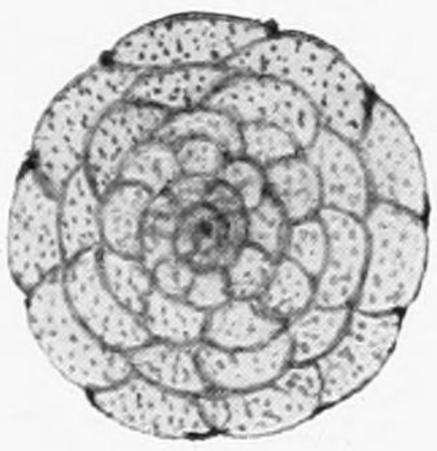

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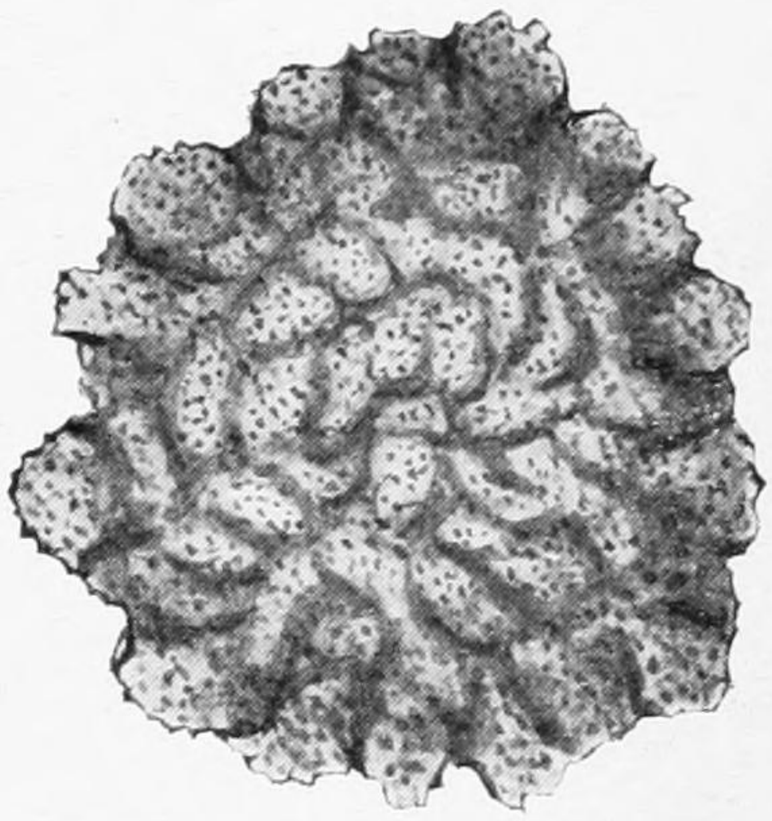

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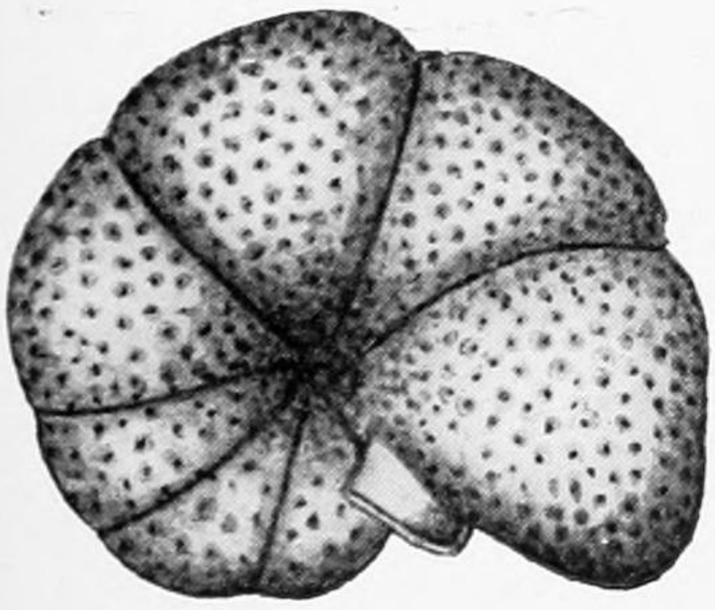

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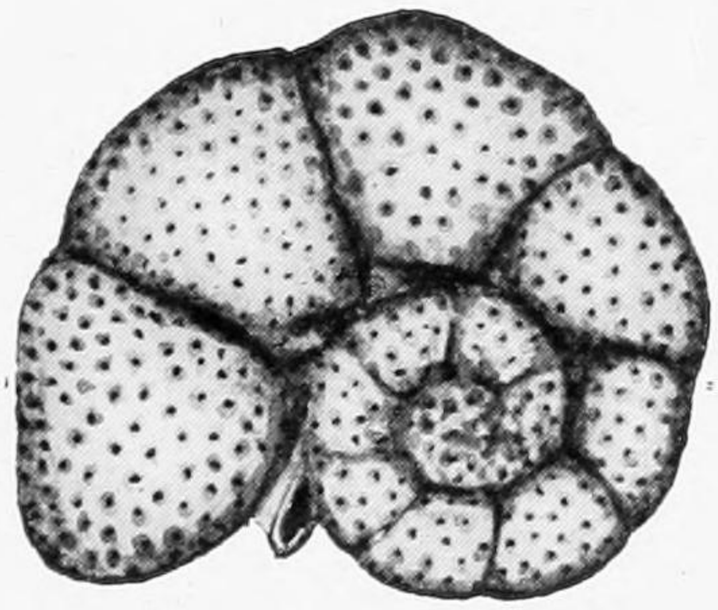

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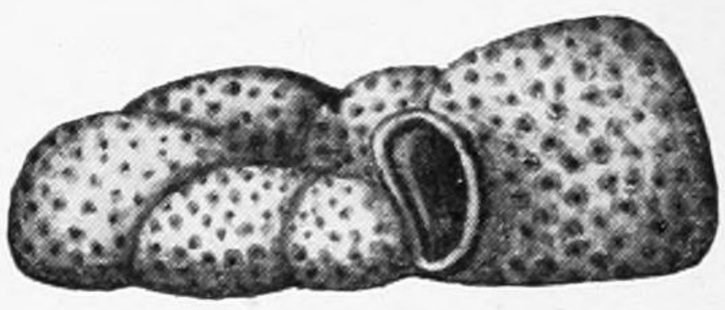


6*a*

b

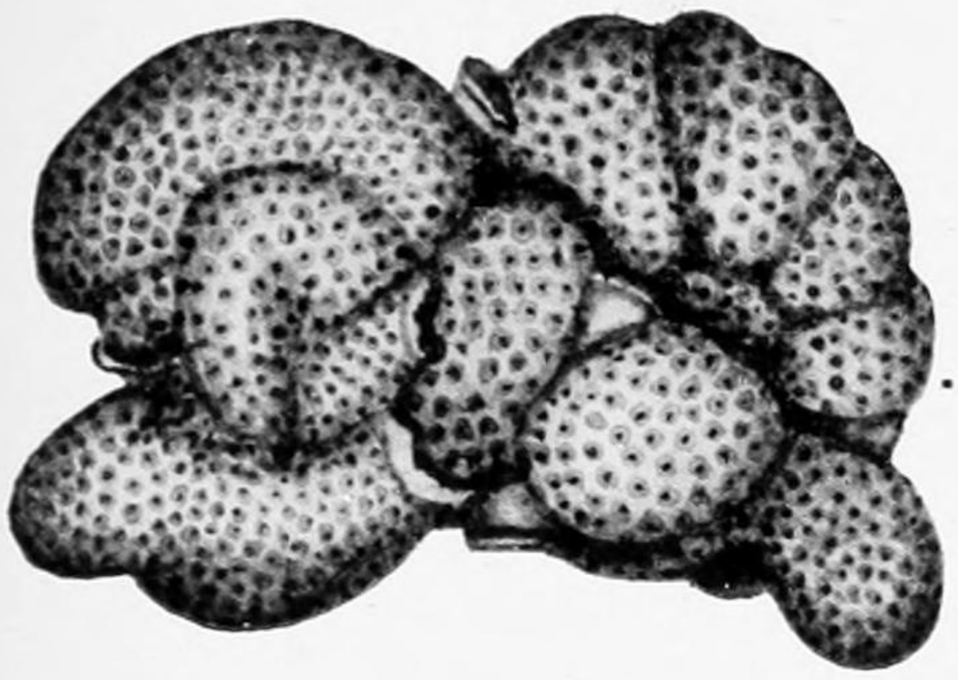
H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.

PLATE II.

FIGS.			PAGE.
1—3.	*Truncatulina variabilis*, d'Orbigny	× 25	2
4.	,, *reticulata*, Czjzek, sp.	× 50	4
5.	*Carpenteria*, sp ?	× 25	4
6.	*Pulvinulina lateralis*, Terquem, sp.	× 25	5

1*a*



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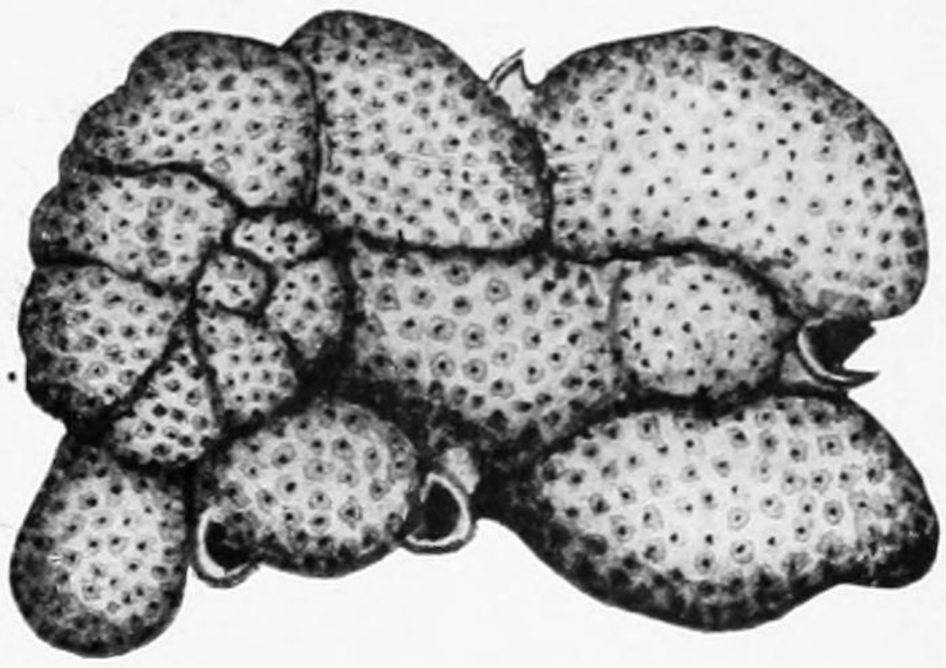
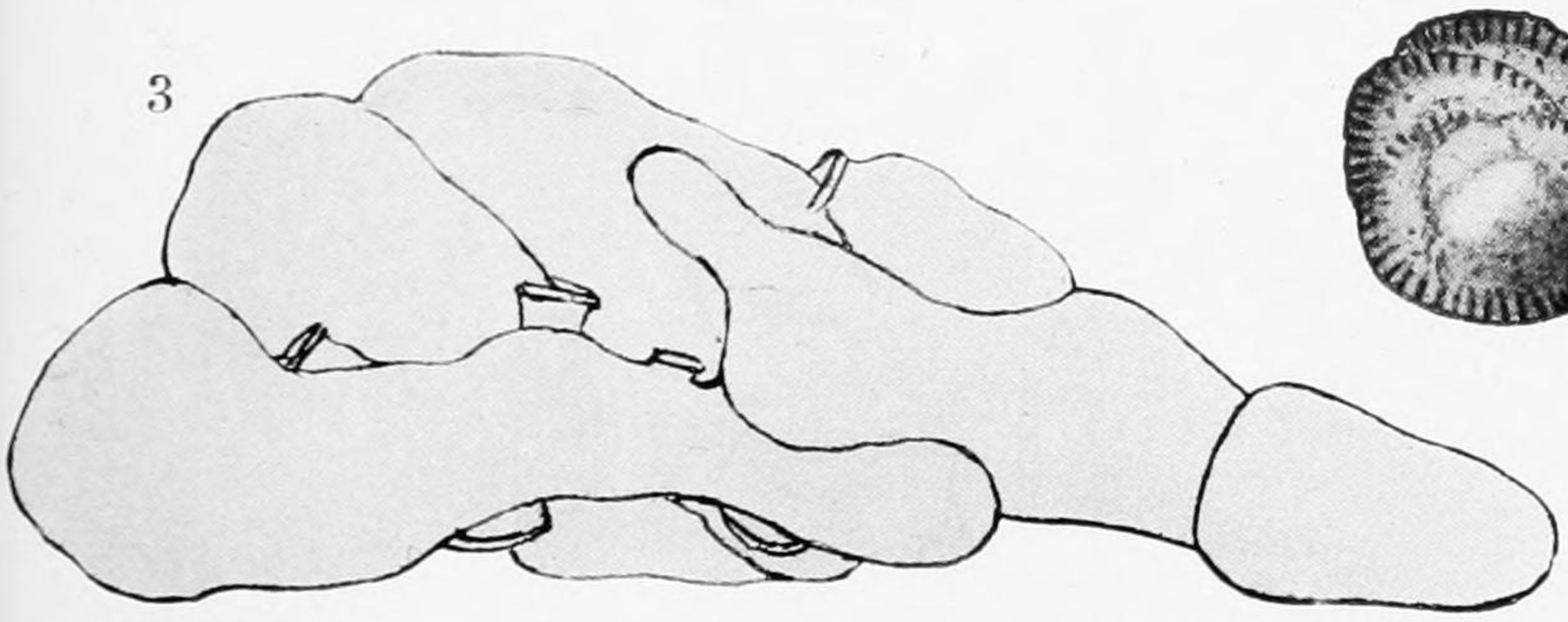


2*a*

b

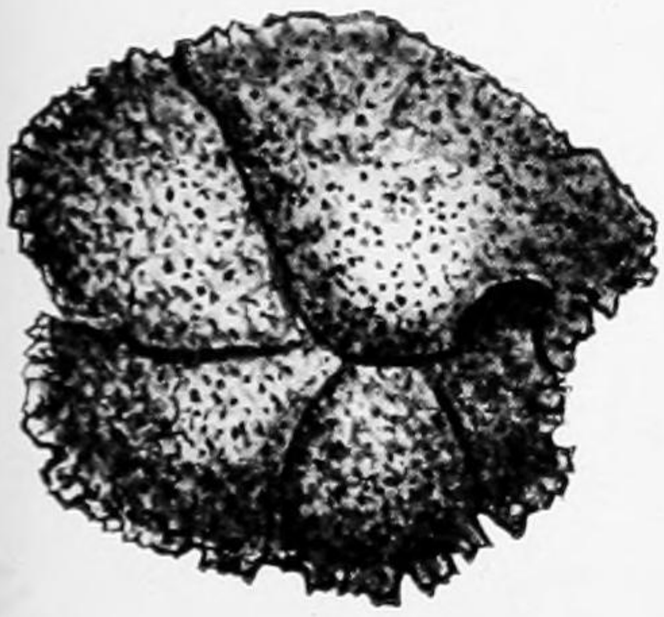
3



4*a*

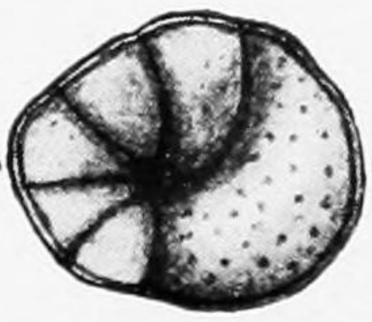
b

5



6*a*

6*b*



c

H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.

PLATE III.

FIGS.				PAGE.
1, 2 (?)	*Pulvinulina lateralis*, Terquem, sp.	× 25	...	5
3, 4.	,, *oblonga* (Williamson), var. *scabra*, Brady ?	× 50	...	6
5.	,, *concentrica*, Parker and Jones	× 25	...	7
6.	,, *hauerii*, d'Orbigny, sp.	× 50	...	7
7.	,, *karsteni*, Reuss, sp.	× 50	...	7
8.	,, *schreibersii*, d'Orbigny	× 25	...	8

1*a* *b* *c*

2*a* *b*

3 **4***a* *b*

c **5***a* *b* *c*

6*a* *b* **7***a* *b* *c*

c **8***a* *b* *c*

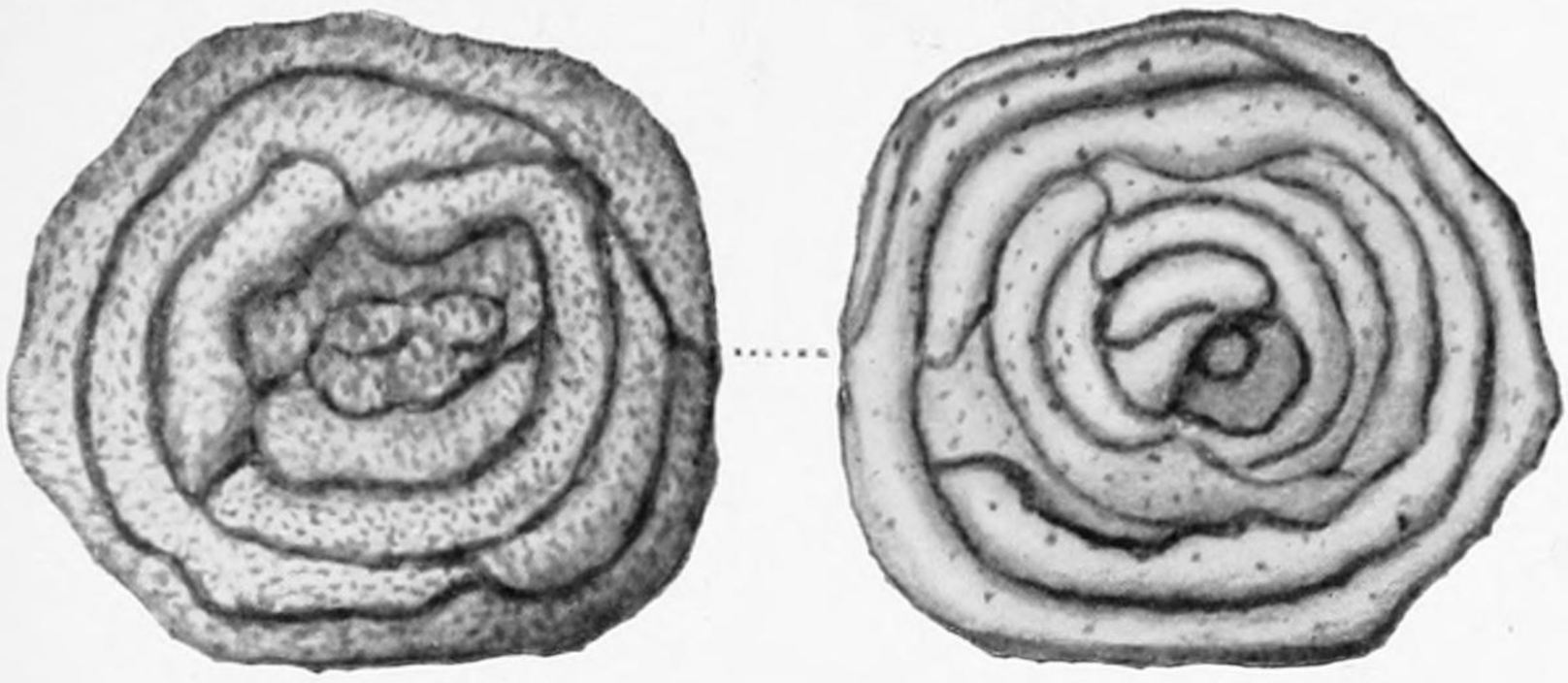
H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.

PLATE IV.

FIGS.				PAGE.
1.	*Pulvinulina vermiculata*, d'Orbigny	× 25	...	8
2.	,, *nitidula*, Chaster	× 75	...	9
3.	,, *globosa*, n. sp.	× 75	..	9
4, 5.	,, *simplex*, n. sp.	× 75	...	9
6.	*Rotalia beccarii*, Linné, sp. var.	× about 18	...	10
7.	*Polytrema miniaceum* (embryonic stage)	× 50	...	11
8.	*Nonionina depressula*, Walker and Jacob, sp.	× 75	...	12
9.	,, *stelligera*, d'Orbigny	× 50	...	13
10.	*Polystomella striatopunctata*, Fichtel and Moll, sp.	× 75	.	14

1*a* *b*



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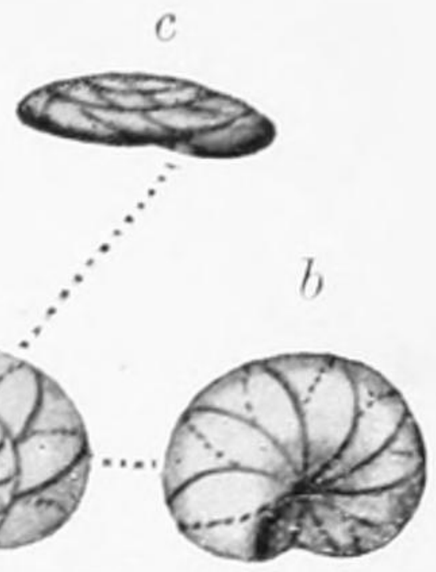

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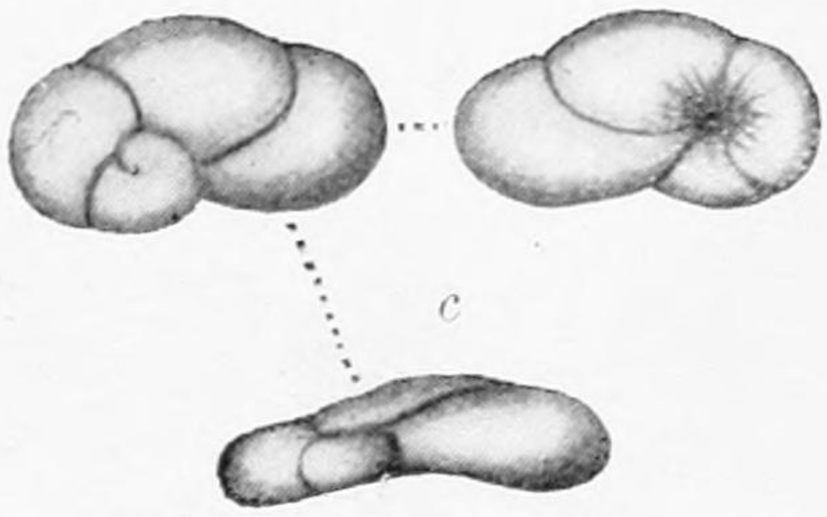
3*a* *b* *c*

4*a* *b* *c*



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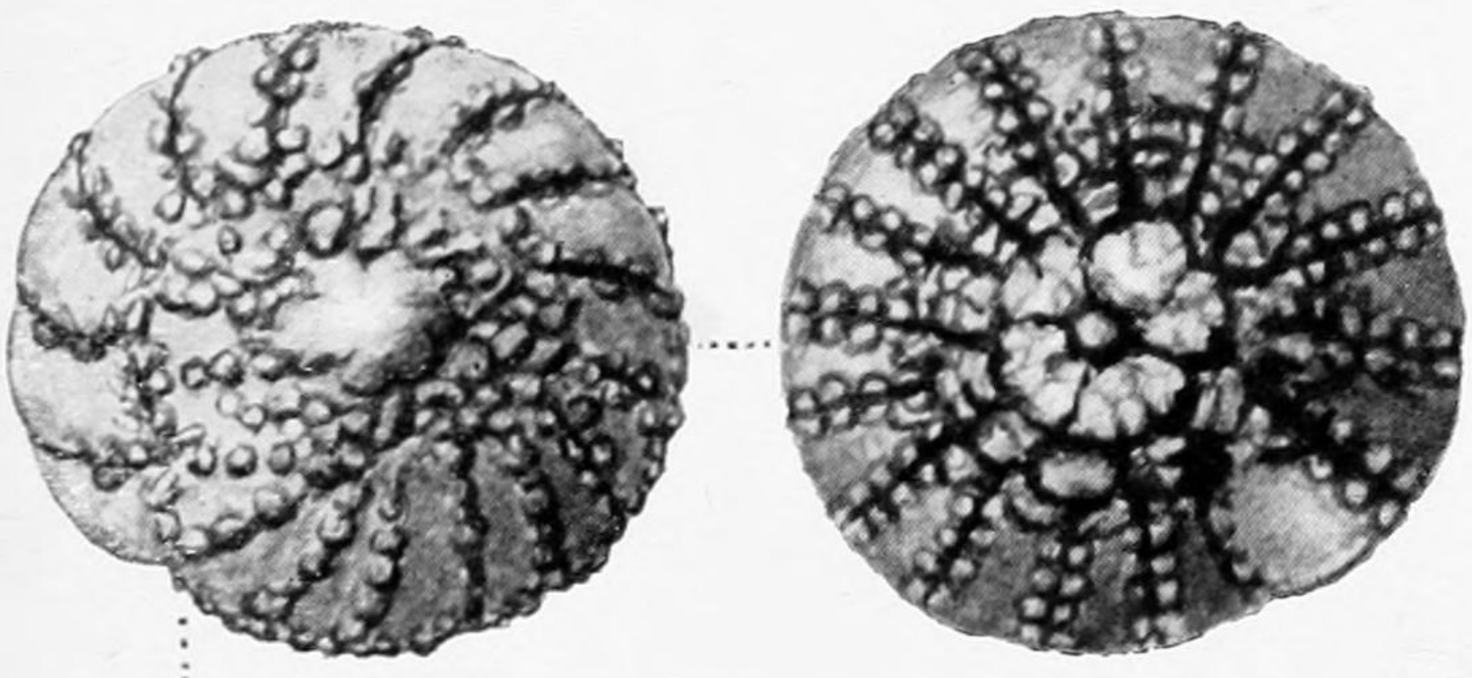

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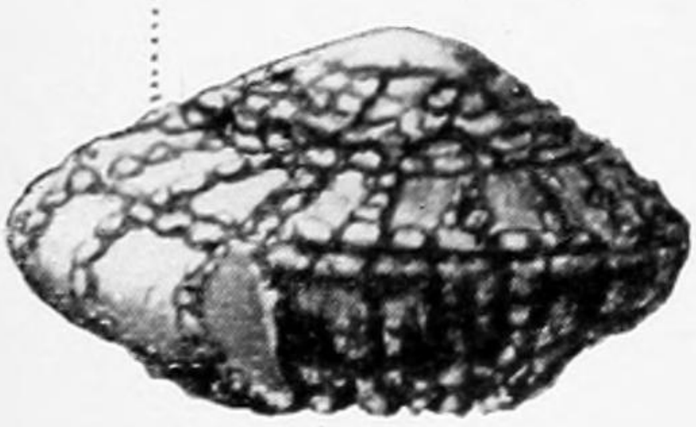
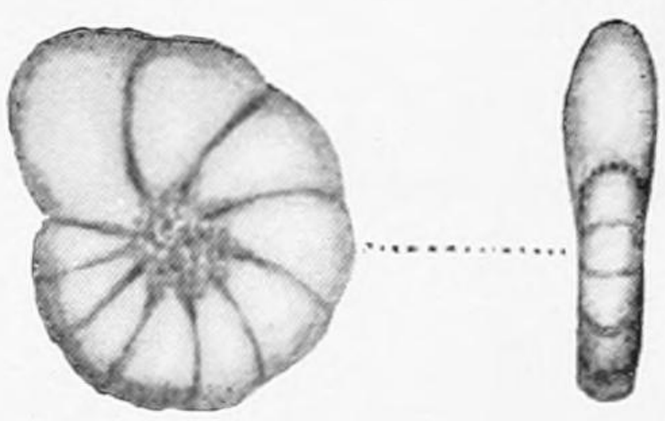
c

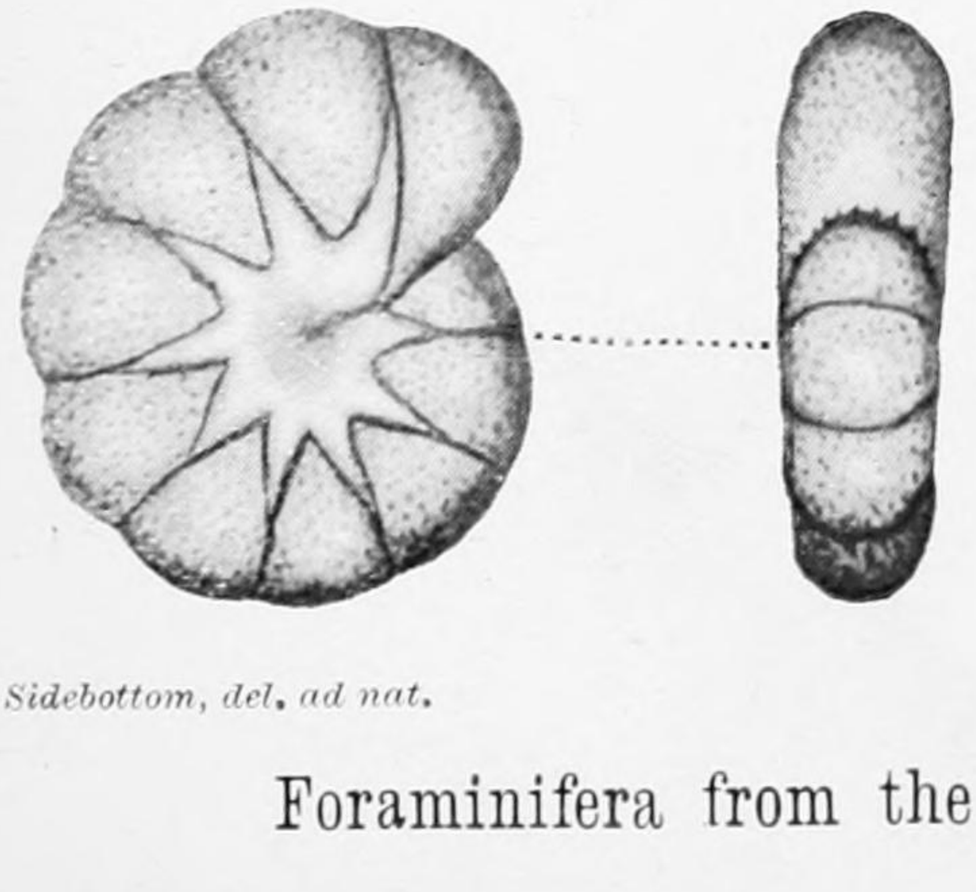


7

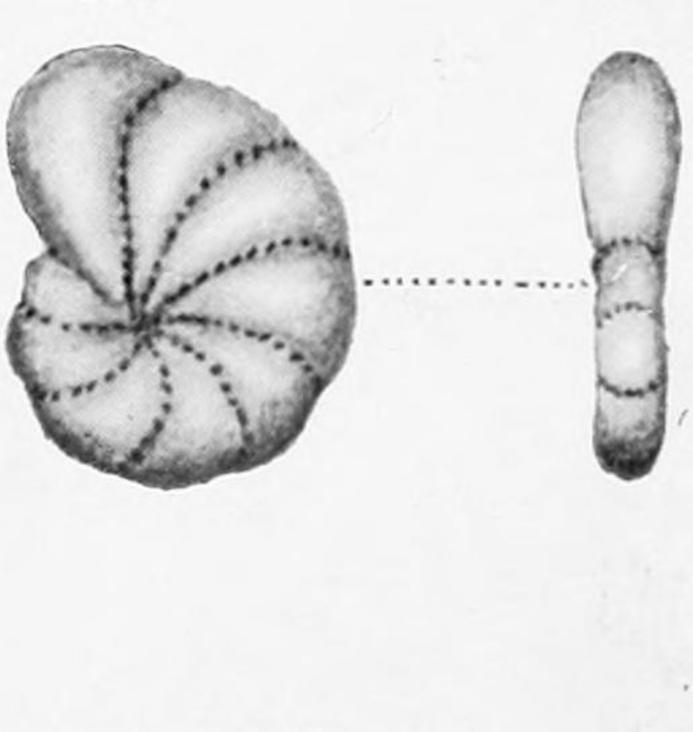
8*a* *b*



9*a* *b*



10*a* *b*



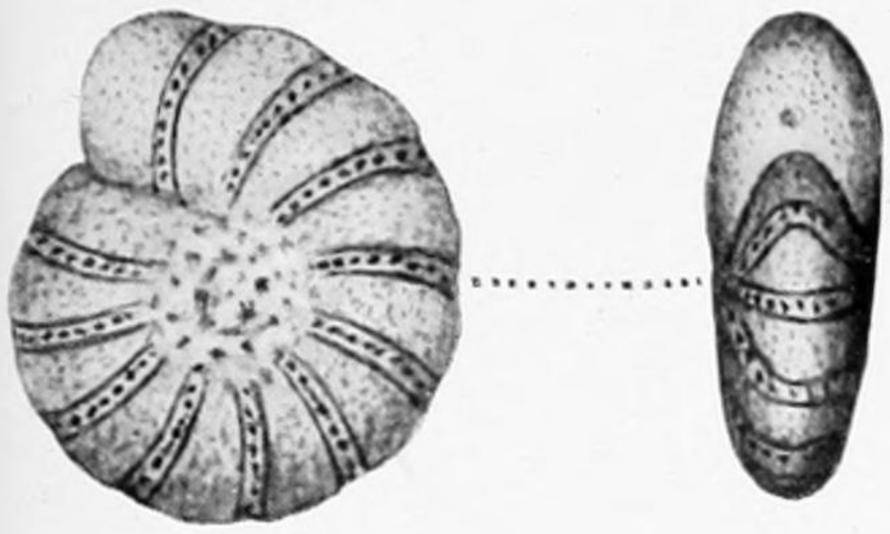
H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.

PLATE V.

FIGS.				PAGE.
1, 2.	*Polystomella striatopunctata*, Fichtel and Moll, sp.		× fig. 1, 50, fig. 2, 75 ...	14
3.	,,	*verriculata*, Brady	× 75 ...	15
4.	,,	*macella*, Fichtel and Moll, sp.	× 50 ...	15
5.	,,	*macella* (F. & M.), var. *granulosa*, nov.	× 50 ...	16
6.	,,	*subnodosa*, Münster, sp.	× 50 ...	16
7.	*Miliolina*	*ferussacii*, d'Orbigny, sp.	× 50 ...	17
8.	,,	*costata*, d'Orbigny, sp.	× 50 ...	17
9.	,,	sp.	× 50 ...	17
10.	*Discorbina*	*parisiensis*, d'Orbigny, sp.	× 75 ...	18
11.	,,	sp.	× 75 ...	18

1*a* *b*



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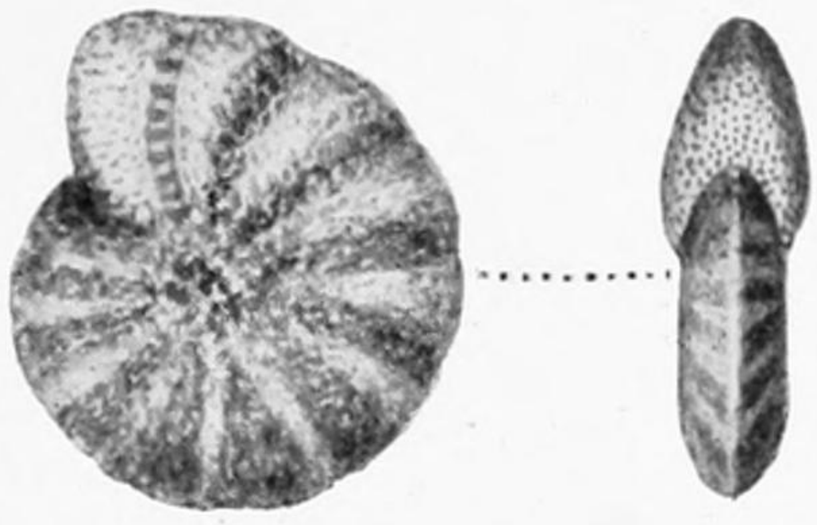

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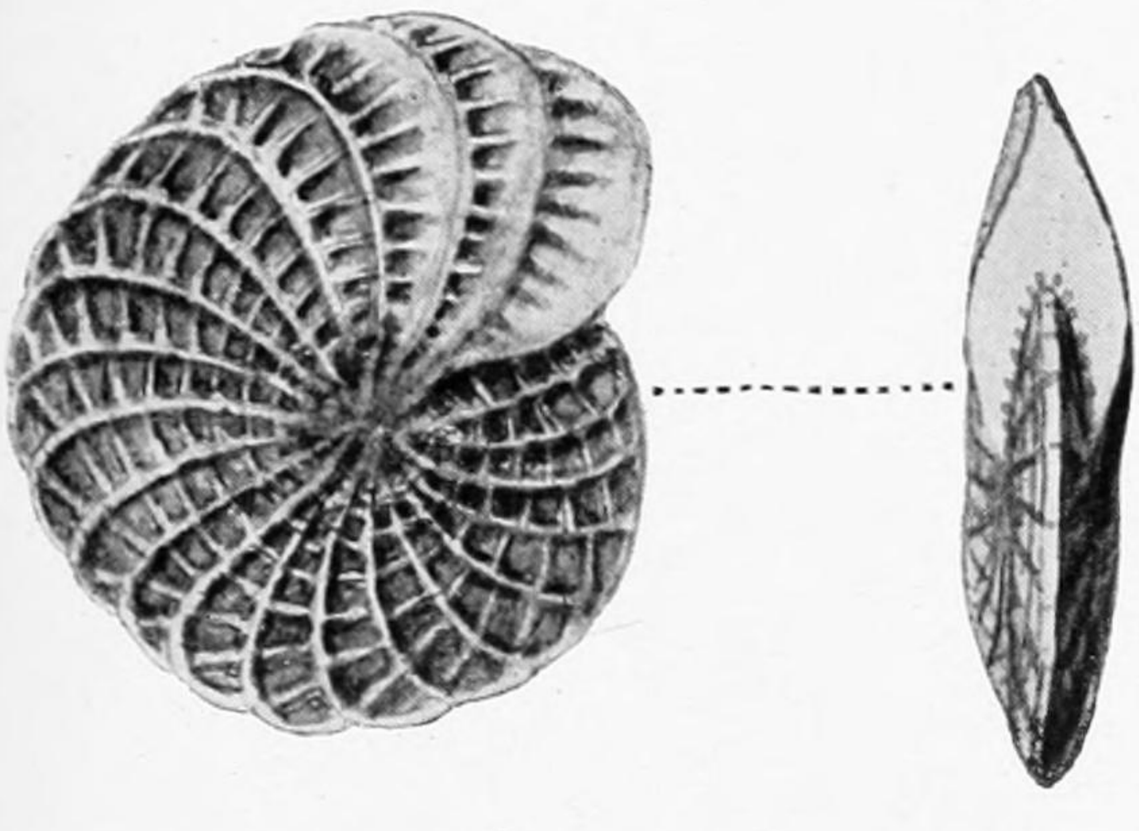

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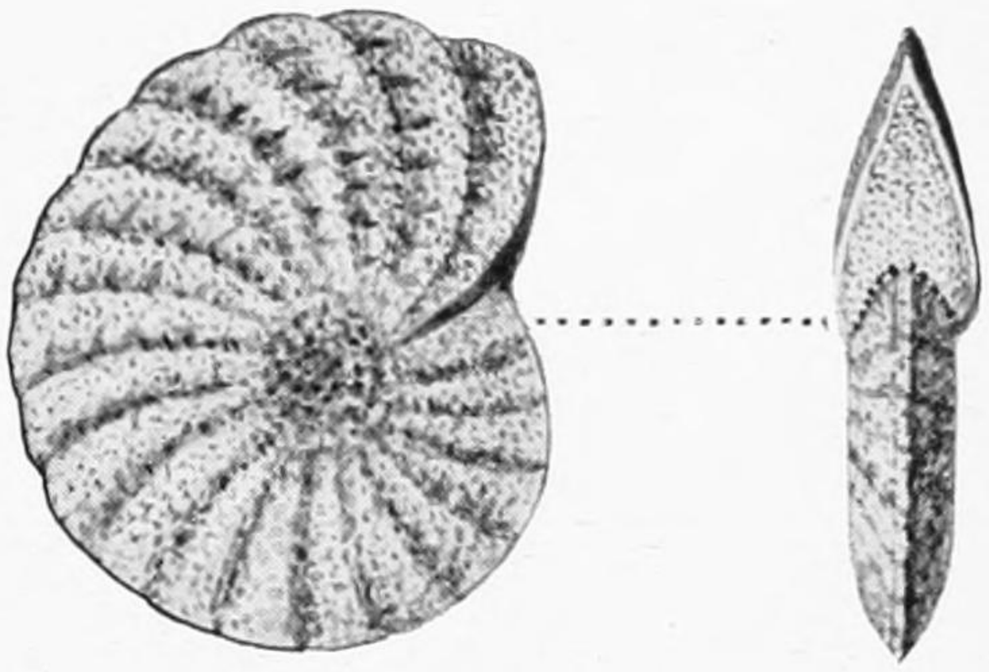

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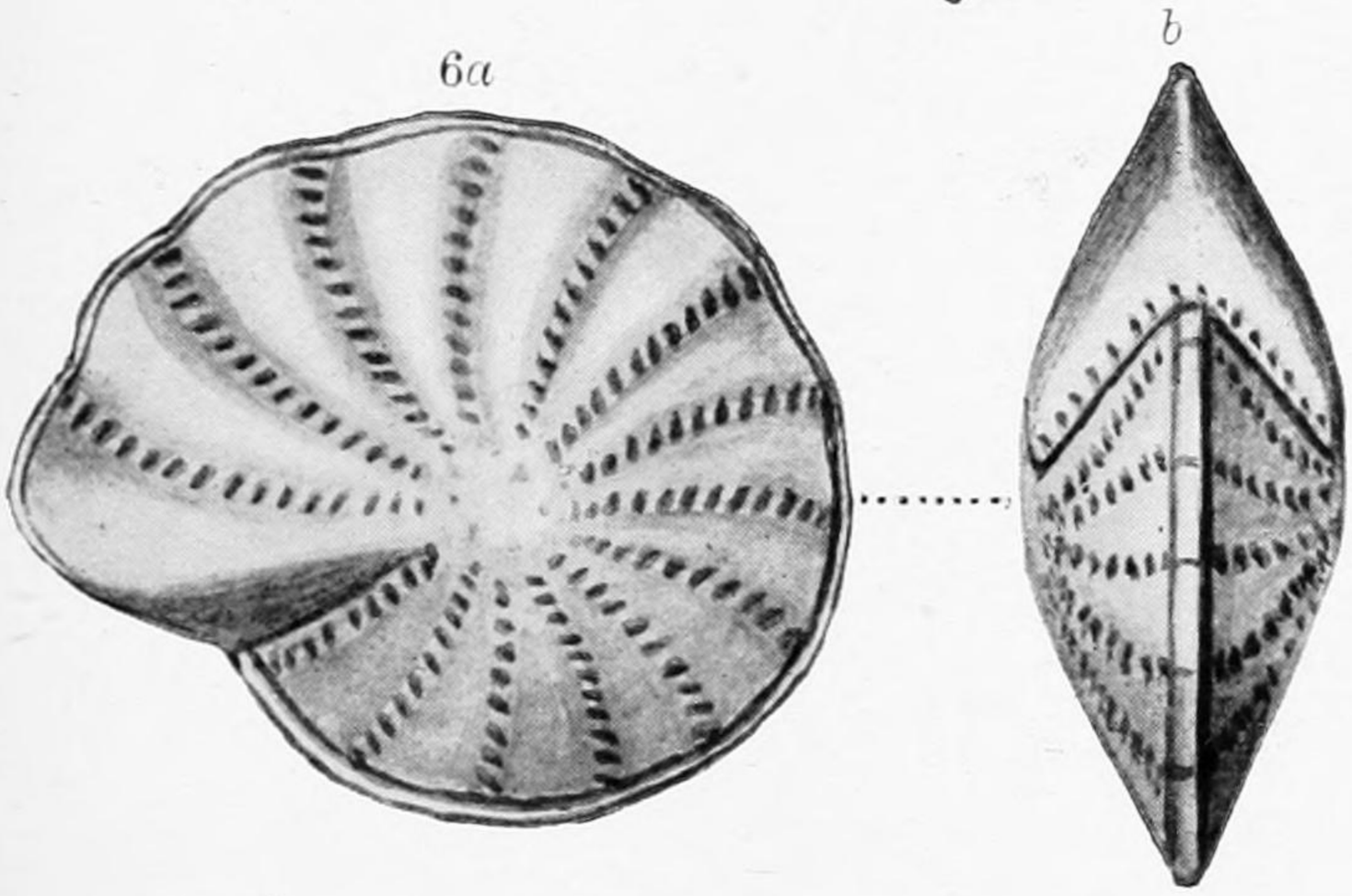

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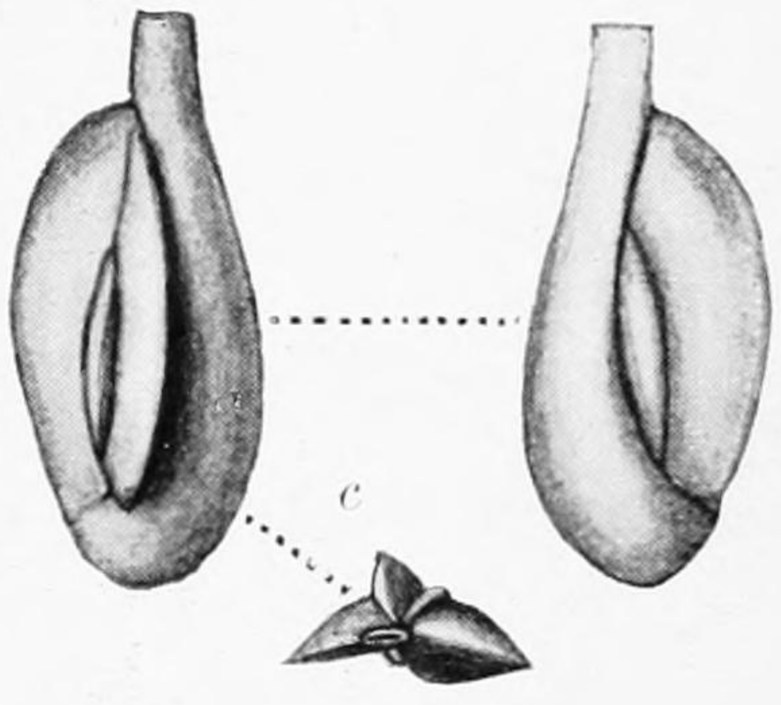

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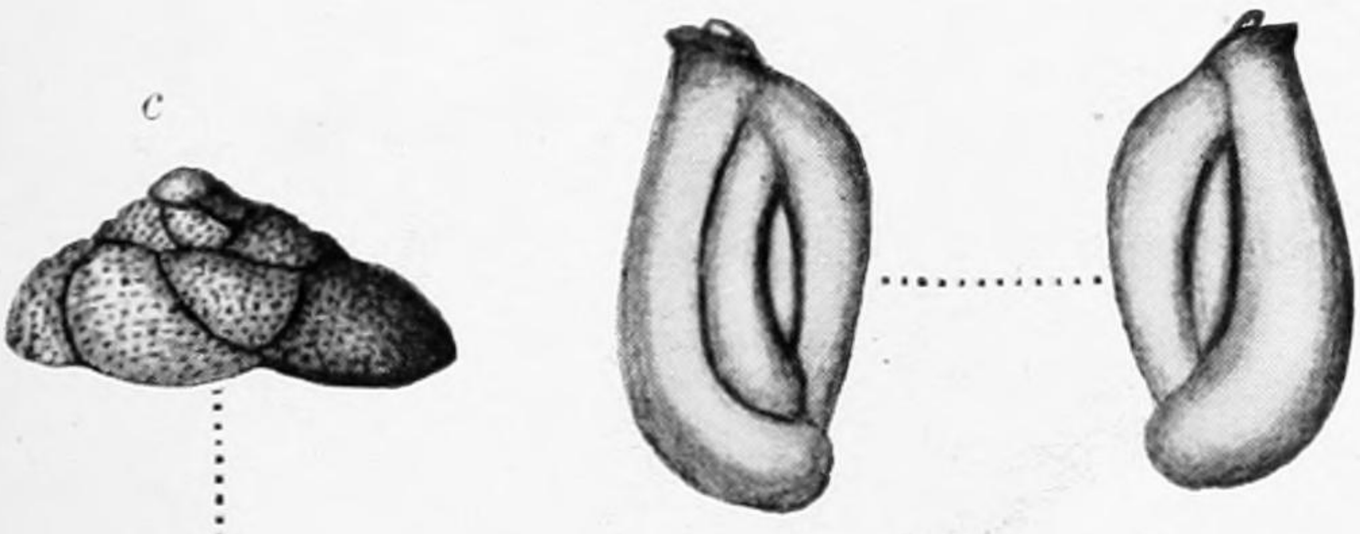

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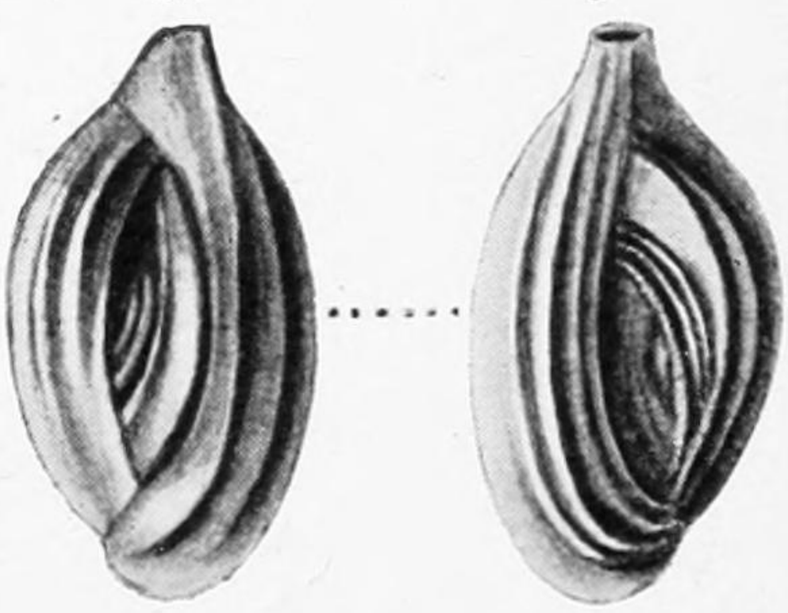

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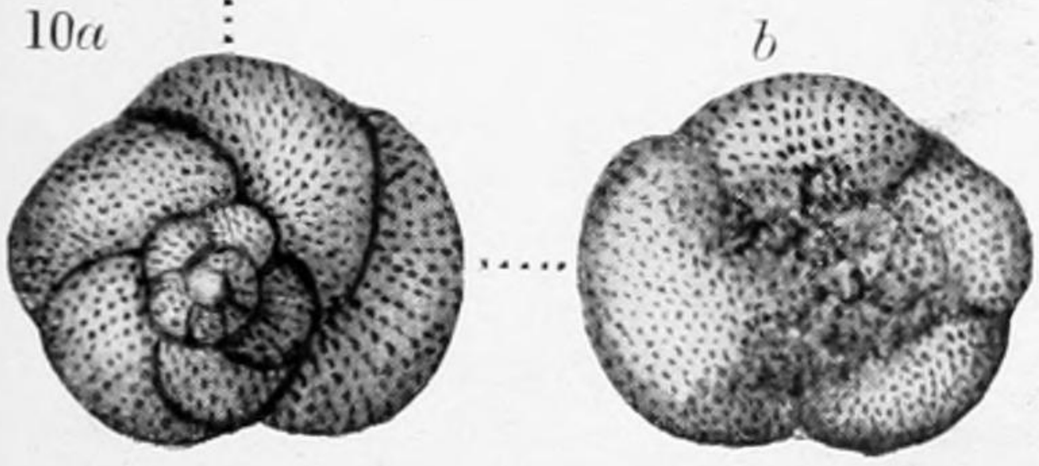

11*a* *b* *c*

H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.

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