

V. Report on the Recent Foraminifera from the
Coast of the Island of Delos (Grecian Archi-
pelago). Part III.

By HENRY SIDEBOTTOM.

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LAGENIDÆ.

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Lagena, Walker and Boys.

**Lagena globosa*, Montagu, sp.

Entosolenia globosa (Montagu), Williamson ('58), p. 8,
pl. 1, figs. 15, 16.

Lagena globosa (Montagu), Reuss ('63), p. 318, pl. 1,
figs. 1—3.

Lagenulina globosa (Montagu), Terquem ('76), p. 67,
pl. 7, figs. 3, 4.

Lagena globosa (Montagu), Brady, ('84), p. 452, pl. 56,
figs. 1—3.

Many of the specimens are nearly globular in shape,
others more or less pyriform and irregular. Frequent.

*There are present a number of tests that are elon-
gate, more or less pyriform, slightly compressed, with
stellate aperture and no entosolenian tube. Mr. Millett,
in his Malay report, suggests that many of these forms are
nothing more nor less than arrested growths of *Nodosaria*
and *Polymorphina*.

* The asterisk denotes that this species occurs at Palermo.

***Lagena botelliformis**, Brady, var. (Pl. 1, fig. 1).

Lagena botelliformis, Brady ('84), p. 454, pl. 56, fig. 6.

The contour of the Delos specimens so closely resembles Brady's figure in the above reference, with the exception that the orifice is situated at the end of a produced neck, that I think it may be considered a variation of that species, in preference to treating it as a variety of *L. laevis*. *L. laevis* does not occur in the material examined. Six specimens were found, only one at Palermo. Very rare.

***Lagena ampulla-distoma**, Rymer Jones (Pl. 1, figs. 2, 3).

Lagena vulgaris, var. *ampulla-distoma*, Ry. Jones ('72), p. 63, pl. 19, fig. 52.

L. ampulla-distoma (Ry. Jones), Brady ('84), p. 458, pl. 57, fig. 5.

L. ampulla-distoma (Ry. Jones), Millett (:01), p. 5, pl. 1, fig. 5.

This occurs in three forms. In the four largest specimens the test is roughened all over, as in fig. 2; in the smaller ones only half of the test is rough, and the shell deposit takes the form of very short blunted spines, which have a tendency to coalesce and run into lines as they approach the clear part of the shell, as in fig. 3. Whilst in the smallest examples (and they are very minute) the shell is covered with protuberances which show a still greater tendency to run into lines—in fact, in one case they have nearly done so. All the forms are very rare. More frequent at Palermo.

***Lagena striata**, d'Orbigny, sp.

Oolina striata, d'Orbigny ('39), p. 21, pl. 5, fig. 12.

L. striata (d'Orb.), Brady ('84), p. 460, pl. 57, figs. 19, 22, 24, 28—30.

Lagena striata (d'Orb.), Brady, Parker and Jones ('88), p. 222, pl. 44, fig. 28.

The examples are small, and the striæ become very faint between the body of the test and the neck. More typical examples are found at Palermo, where this species is also more plentiful.

***Lagena sulcata**, Walker and Jacob, sp.

Lagena striata, Williamson ('48), p. 13, pl. 1, figs. 6, 8.

L. vulgaris, var. *perlucida*, Williamson ('58), p. 5, pl. 1, fig. 8.

L. vulgaris, var. *striata*, Williamson ('58), p. 6, pl. 1, fig. 10.

L. sulcata (W. & J.) Brady ('84), p. 462, pl. 57, figs. 23, 26. Very frequent.

***Lagena sulcata**, var. *interrupta*, Williamson.

Lagena striata, var. *interrupta*, Williamson ('48), p. 14, pl. 1, fig. 7.

L. vulgaris, var. *interrupta*, Williamson ('58), p. 7, pl. 1, fig. 11.

L. sulcata, var. *interrupta* (Williamson), Brady ('84), p. 463, pl. 57, figs. 25, 27. Frequent.

***Lagena semistriata**, Williamson. (Pl. 1, figs. 4, 5.)

Lagena striata, var. β , *semistriata*, Williamson ('48), p. 14, pl. 1, figs. 9, 10.

L. vulgaris, var. *semistriata*, Williamson ('58), p. 6, pl. 1, fig. 9. Very frequent.

The Delos examples of these three forms run into each other. Fig. 5 shows how closely some specimens of *L. semistriata* approach *L. laevis*, the striæ being represented solely by very minute tubercles on the bottom of the test. *L. laevis* not being represented in the Delos

gatherings, it appears that this example (fig. 5) is rightly placed under *L. semistriata*; it also has a likeness to Mr. Millett's *L. clavata*, var. *setigera* (:01, pl. 8, fig. 9), but the shape of the test is not that of the type, and the end is not cup-shaped, but round.

The number of costæ or striæ in *L. semistriata* varies very much, some of the examples having as few as six.

***Lagena variata**, Brady.

Lagena variata, Brady ('84), p. 461, pl. 61, fig. 1.

L. variata (Brady), Millett (:01), p. 7, pl. 1, fig. 7.

Six very fair examples of this rare species occur; all are irregular in shape. Very rare.

***Lagena lineata**, Williamson, sp.

Entosolenia lineata, Williamson ('48), p. 18, pl. 2, fig. 18.

E. globosa, var. *lineata*, Williamson ('58), p. 9, pl. 1, fig. 17.

Lagena lineata (Williamson), Reuss ('62), p. 328, pl. 4, fig. 48.

The examples are typical. Rather rare.

***Lagena striatopunctata**, Parker and Jones.

Lagena suicata, var. *striatopunctata*, Parker and Jones, ('65), p. 350, pl. 13, figs. 25—27.

L. striatopunctata (P. & J.), Brady ('84), p. 468, pl. 58, figs. 37, 40.

L. striatopunctata (P. & J.), Millett (:01), p. 489, pl. 8, fig. 6.

In all cases the neck is bent to one side, the number of costæ being generally seven. The test is cylindrical with rounded bottom. About forty were found. Rather frequent. Frequent at Palermo.

***Lagena hexagona**, Williamson, sp.

Entosolenia squamosa, var. *hexagona*, Williamson ('48), p. 20, pl. 2, fig. 23.

Entosolenia squamosa, var. *hexagona*, Williamson, ('58), p. 13, pl. 1, fig. 32.

Entosolenia squamosa, var. *scalariformis*, Williamson ('58), p. 13, pl. 1, fig. 30.

Lagena favosa, Reuss ('62), p. 334, pl. 5, figs. 72, 73.

L. geometrica, Reuss ('62), p. 334, pl. 5, fig. 74.

L. hexagona (Williamson), Brady ('84), p. 472, pl. 58, figs. 32, 33.

The Delos examples of this elegant foraminifer vary considerably, both as to the size of the hexagonal markings and the shape of the test. Frequent.

*A variety is present which has an elongate and tapering test, terminating in a short neck. This form is the smallest of the variations. Very rare.

***Lagena laevigata**, Reuss, sp. (Pl. 1, fig. 6.)

Fissurina laevigata, Reuss ('50), p. 366, pl. 46, fig. 1.

Lagena laevigata (Reuss), Balkwill and Millett ('84), p. 80, pl. 2, fig. 6.

L. laevigata (Reuss), Brady ('84), p. 473, pl. 114, fig. 8.

Several varieties of this common species are present, and the orifices vary. In some cases the orifice is merely a short slit on the median line, in others the apertural end is slightly produced, and the mouth shows itself at one side of the median line.

*The form figured has a short neck and the usual entosolenian tube. In all the varieties there is a very small ring at the aboral end, and where this projects a little, as it does in most cases, they approach *L. acuta*, Reuss. Frequent.

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Three specimens of the ordinary kind occur in trigonal form.

***Lagena laevigata**, Reuss, sp. var. **acuta**, Reuss, sp.
(Pl. 1, figs. 7, 8).

Fissurina acuta, Reuss ('62), p. 340, pl. 7, fig. 90.

F. apiculata, Reuss ('62), p. 339, pl. 6, fig. 85.

Lagena laevigata (Reuss), var. *acuta*, (Reuss), Millett (:01), p. 494, pl. 8, fig. 16.

This apiculate form of *L. laevigata* is frequent.

*One of these chosen for illustration, fig. 8, is interesting from the fact that the outline is inequilateral. This latter variety is rare.

***Lagena lucida**, Williamson, sp. (Pl. 1, figs. 9—12).

Entosolenia marginata, var. *lucida*, Williamson, sp. ('58), p. 10, pl. 1, figs. 22, 23.

Lagena lucida (Williamson) Balkwill and Millett ('84), p. 80, pl. 2, fig. 7.

In the Delos examples of this species the form of the test is very variable, as will be seen by reference to the figures. In one form only is the apiculate variety present, fig. 12, and this has the entosolenian tube attached, in the other varieties it is short, straight, and free. Frequent. All the varieties occur at Palermo.

* **Lagena fasciata**, Egger, sp. (Pl. 1, figs. 13—16.)

Lagena fasciata (Egger), Reuss ('62), p. 323, pl. 2, fig. 24.

L. quadricostulata, Reuss ('70), p. 469.

L. quadricostulata (Reuss), Brady ('84), p. 486, pl. 59, fig. 15.

Mr. Millett, in his Malay report (:01, p. 495), says: "Taking *L. annectens*, Burrows and Holland ('95, p. 203,

pl. 7, fig. 11), two curved bands appear on each side of the shell. In *L. faba*, Balkwill and Millett ('84, p. 81, pl. 2, fig. 10), these bands are slightly raised, whilst they become costæ in *L. quadricostulata*, Reuss, *L. fasciata*, Egger, and *L. meyeriana*, Chapman ('94, p. 706, pl. 34, fig. 7). These bands may or may not unite at the base of the shell; Dr. Egger's examples show both conditions, whilst in the only known specimen of *L. meyeriana*, the costæ, although continuous, are recurved, and form a sinus at the aboral extremity."

The peculiarity of the Delos examples is that the grooves, or shallow sulci, have their edges raised above the body of the shell.

In the varieties figs. 14, 15, 16, 17, this feature is well marked, whilst in fig. 13 there is a doubt as to its being present, owing to the fineness of the markings, and I have been unable to satisfy myself on this point. In only two or three cases are the grooves continuous at the base of the shell. This range, with few exceptions, has a short entosolenian tube which is straight, and therefore not attached to either face of the test. This tube is often split at the end, instead of having the well-known trumpet orifice.

The Delos forms are evidently closely allied to *L. annectens*, Burrows and Holland, and future research may connect them with *L. alveolata*, Brady. Rare to very rare. Only the forms represented by figs. 14, 15, 16, occur at Palermo.

Lagena fasciata, Egger, var. **carinata**, nov. (Pl. 1., fig. 17).

This variation has a central keel; the test is very finely pitted all over, and so has not the same transparency as we find in the other varieties. A short, stout, straight

entosolenian tube is present in all cases. Frequent. Examples occur frequently of a more compressed and clear form which has the keel almost confined to the aboral end, the sides of the tests feebly carinate, the mouth slightly produced and carinate at its sides. The costæ in these cases are exceedingly delicate.

***Lagena staphyllearia**, Schwager, sp. (Pl. 1, figs. 18, 19, 20).

Lagena staphyllearia (Schwager, sp.) Millett (:01), p. 619, pl. 14, fig. 2.

L. staphyllearia (Schwager, sp.), Flint ('99), p. 307, pl. 54, fig. 1.

All the specimens are compressed. Fig. 18 shews this form with the basal spines separated from each other, test carinate as in *L. marginata*. Fig. 19 shews it with what may be considered as four spines joined together, test non-carinate. Intermediate forms occur, connecting these two varieties. Respectively frequent and rare. A single specimen with two spines, one on either side of the test, was found (fig. 20).

***Lagena quadrata**, Williamson, sp. (Pl. 1, figs. 21, 22, and Pl. 2, figs. 1, 2, 3.)

Entosolenia marginata, var. *quadrata*, Williamson ('58), p. 11, pl. 1, fig. 27.

Lagena laevigata, var. *quadrata* (Williamson), Wright ('86), p. 324, pl. 26, fig. 9.

L. quadrata (Williamson), Egger ('93), p. 331, pl. 10, figs. 78, 79.

L. quadrata (Williamson), Brady ('84), p. 475, pl. 59, figs. 3, 16, and pl. 60, fig. 5.

Charming variations of this species are present in fair numbers. *Fig. 21 has the mouth placed in an immature

hood, and is rare. *Fig. 22 has faintly frosted-looking bands as in *L. lucida* and is very rare. Pl. 2, fig. 1, has the fine lines running round the edges of the test as in some varieties of *L. fasciata*, also very rare. *Fig. 2 has a short neck, sides not quite parallel, and perhaps might be treated as a variety of *L. laevigata*. *Fig. 3 is partially carinate, and agrees very closely with Brady's "Challenger" drawing ('84, pl. 59, fig. 16). This form in the Delos gatherings is the most numerous of the quadrate varieties, but I hardly think it worthy of a varietal name. Frequent.

****Lagena marginata*, Walker and Boys.**

Oolina compressa, d'Orbigny ('39), p. 18, pl. 5, figs. 1, 2.

Fissurina carinata, Reuss ('62), p. 338, pl. 6, fig. 83, pl. 7, fig. 86.

Lagena marginata (W. & B.), Silvestri ('96), p. 119, pl. 3, figs. 7—9.

L. marginata (W. & B.), Flint ('99), p. 307, pl. 54, fig. 2.

Most of the examples are small, nearly circular in outline, and have the keel fairly well developed. Frequent. *There is a variety present, which comes very near to fig. 27 on pl. 44, Brady, Parker, and Jones ('88) It is placed by them under *L. marginata*, but it appears to me to be intermediate between *L. marginata* (W. & B.) and *L. marginata*, var. *semimarginata*, Reuss.

***Lagena squamoso-marginata*, Parker and Jones (Pl. 2, fig. 4).**

Lagena squamoso-marginata, Parker and Jones ('65), p. 356, pl. 18, fig. 2.

L. squamoso-marginata (P. & J.), Brady ('84), p. 481, pl. 60, fig. 24.

L. squamoso-marginata (P. & J.), Millett (:01), p. 622, pl. 14, fig. 7.

All the specimens have a single keel. The entosolenian tube is attached. The mouth opens out at the lower edge of the keel, and the hexagonal markings are raised. About thirty found. Rather rare.

***Lagena marginato-perforata**, Seguenza (Pl. 2, fig. 5).

Lagena marginato-perforata (Seg.), Millett (:01), p. 621, Pl. 14, fig. 4.

This elegant foraminifer is frequent in these gatherings. The keel varies in its development, in some cases it scarcely shows, in others it springs from the edge of the mouth and is continuous right round the test, being widest at the aboral end. The internal tube is straight and free. In all the examples the centre of the test is unornamented. One specimen of trigonal form occurs.

***Lagena marginata** (W. & B.), var. **inaequilateralis**

Wright (Pl. 2, fig. 6).

Lagena marginata (W. & B.), var. *inaequilateralis*, Wright, ('86) p. 321, pl. 26, fig. 10.

The specimens are quite typical, beautifully clear, and in all cases the internal tube is attached to the test; the mouth is peculiar and agrees with the Irish examples. Frequent.

Lagena inaequilateralis (Wright), var. **semi-marginata**, nov. (Pl. 2, fig. 7).

This is an interesting variation of *L. marginata* var. *inaequilateralis*, Wright. The mouth is the same as in

Mr. Wright's form, and the test is also inequilateral. The keel however is confined to the aboral end of the test and is well developed. Six specimens found. Very rare.

Lagena irregularis, n. sp. (Pl. 2, fig. 8).

One face of the test is bent back in the centre at about an angle of forty five, the opposite side being highly convex; periphery bi-carinate. Aperture, a small slit situated between the two edges of the keels. Entosolenian.

This curious form is difficult both to describe and to draw quite satisfactorily. It is very minute, and reference to the figures will best explain its peculiarities. The keels are well developed at the oral end, whilst at the aboral they are not so wide, but the bicarinate condition is more pronounced. The space between the keels, small as it is, is partially filled with débris, or shell-growth, and this increases the difficulty of examination. The internal tube in all cases runs along the centre of the back until it nearly reaches the other end, where it turns to one side. The orifice is a small slit, apparently situated between the edges of the keels as shown in the drawings, but it is very difficult to make out.

It has been thought that this form might be a distorted or wild-growing example of *L. marginata*, var. *inaequilateralis*, Wright, but the twelve specimens found are all alike. The mouth of the test is not protruded as in Mr. Wright's figures of his species, and as in the Delos specimens of the same form, in addition to which the keel is double. Rare.

***Lagena lagenoides**, Williamson, sp.

Entosolenia marginata, var. *lagenoides*, Williamson ('58), p. 11, pl. 1, figs. 25, 26.

Lagena lagenoides (Williamson), Reuss ('62), p. 324, pl. 2, figs. 27, 28.

L. lagenoides (Williamson), Balkwill and Millett ('84), p. 82, pl. 2, fig. 11.

The specimens agree best with Williamson's fig. 26. Frequent. *A smaller form is also present, in which the mouth only slightly protrudes, extending nearly the whole width of the test. Mr. Wright, of Belfast, Ireland, considers this to be *L. ornata*, Williamson, which is a form of *L. lagenoides*. Rare.

* ***Lagena lagenoides*, var. *tenuistriata***, Brady.

(Pl. 2, figs. 9, 10.)

Lagena lagenoides, var. *tenuistriata*, Brady ('84), p. 479, pl. 60, figs. 11, 15, 16.

L. lagenoides, var. *tenuistriata* (Brady), Balkwill and Millett ('84), p. 82, pl. 2, fig. 12.

In the Delos specimens, the centres of the tests are sometimes free from striæ. The entosolenian tube is short and straight. Frequent.

* ***Lagena orbignyana***, Seguenza, sp. var. (Pl. 2, fig. 11.)

Entosolenia marginata (pars.), Williamson ('58), p. 9, pl. 1, figs. 19, 20.

Lagena orbignyana (Seguenza), Brady ('84), p. 484, pl. 59, figs. 1, 18, 24-26.

L. orbignyana (Seguenza), Brady, Parker and Jones ('88), p. 222, pl. 44, fig. 20.

L. orbignyana (Seguenza), Flint ('99), p. 308, pl. 54, fig. 4.

The test in this variety is slightly twisted; and in the middle, on either face, is an oval ridge of clear shell-substance. The internal tube is very much curled. In one or two cases the central keel is split and filled up

with débris. Most of the specimens are badly fractured at the edge of the test. Rather rare.

Lagena orbignyana ? var. falcata, nov. (Pl. 2, fig. 12.)

The test is compressed, and has two recurved spines, springing respectively from either side of the shell, near the orifice. The fine line running on each side of the delicate keel (or very angular margin) is continuous except at the oral end of the shell. The mouth is oval and slightly produced. The internal tube is short and free. Mr. Millett kindly drew my attention to Dr. Chaster's *Lingulana herdmani* ('92, pl. 1, fig. 9), a detached chamber of which would have a strong resemblance to the Delos specimens, but these latter bear no evidence of fracture. They could hardly be the initial chambers of Dr. Chaster's species, as his examples bear no spines on the initial chamber. The lines above referred to are also absent in *Lingulina herdmani*. The two specimens found are exactly alike. Very rare.

Lagena bicarinata, Terquem, sp. (Pl. 2, figs. 13, 14, 15.)

Fissurina bicarinata, Terquem ('82), p. 31, pl. 9, fig. 24.

Lagena bicarinata (Terquem), Balkwill and Millett ('84), p. 82, pl. 2, fig. 4.

L. bicarinata (Terquem), Balkwill and Wright ('85), p. 342, pl. 12, fig. 30.

L. bicarinata (Terquem), Wright ('86), p. 320, pl. 26, fig. 8.

L. bicarinata (Terquem), Halkyard ('89), p. 66, pl. 2, fig. 1.

L. bicarinata (Terquem), Millett (:01), p. 624, pl. 14, fig. 13.

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Three varieties occur which have the two keels, and although very different in other respects, I have brought them together under the above heading. Fig. 13 has the two keels well developed, but has no neck, and is of frequent occurrence. Fig. 14 has a well developed neck with phialine lip surrounding the orifice, also a ridge on either side encircling the body of the test, and is rare. Fig. 15 has the keels very poorly developed and is frequent. All the varieties have the internal tube attached to one face of the test.

Lagena orbignyana, var. **clathrata**, Brady (Pl. 2, fig. 16).

Lagena clathrata, Brady ('84), p. 485, pl. 60, fig. 4.

L. clathrata (Brady), Balkwill and Millett ('84), p. 82, pl. 2, fig. 14.

L. orbignyana, var. *clathrata* (Brady), Millett (:01), p. 628, pl. 14, fig. 23.

The examples agree with the form figured by Messrs. Balkwill and Millett in the above reference. Frequent.

***Lagena fimbriata**, Brady.

Lagena fimbriata, Brady ('84), p. 486, pl. 60, figs. 26—28.

L. fimbriata (Brady), Balkwill and Millett ('84), p. 82, pl. 2, fig. 5.

Brady, in the "Challenger" Report, speaks of this as being a deep-water form, but it has been found both by Mr. Millett and Mr. Wright in shallow-water off the coast of Ireland. The two or three specimens found at Delos agree well with the Irish forms, although in the former the oval wing surrounding the base is not well developed and is more compressed. Very rare. Better examples occur at Palermo.

***Lagena alveolata**, Brady (Pl. 2, fig. 17).

Lagena alveolata, Brady ('84), p. 487, pl. 60, figs. 30, 32.

In the above reference, Brady states that *L. alveolata* is only found in deep water, and reports its occurrence in the North Atlantic, 2,750 fms.; in the South Atlantic, 2,200 fms.; in the Southern Ocean, 2,600 fms.; in the South Pacific; and in the North Pacific, 2,300 fms.

The depth at which the Delos examples were found varied from 8 to 14 fms. The tests are very transparent, and all have a long entosolenian tube attached to one face of the shell. About 15 were found. Rare.

***Lagena protea**, Chaster (Pl. 2, fig. 18).

Lagena protea, Chaster ('92), p. 62, pl. 1, fig. 14.

There are about fifteen specimens of this protean form, no two of which are alike. I have one specimen attached to a piece of shell, and probably the one figured has likewise been adherent. Rare. Still finer examples were found in the Palermo material.

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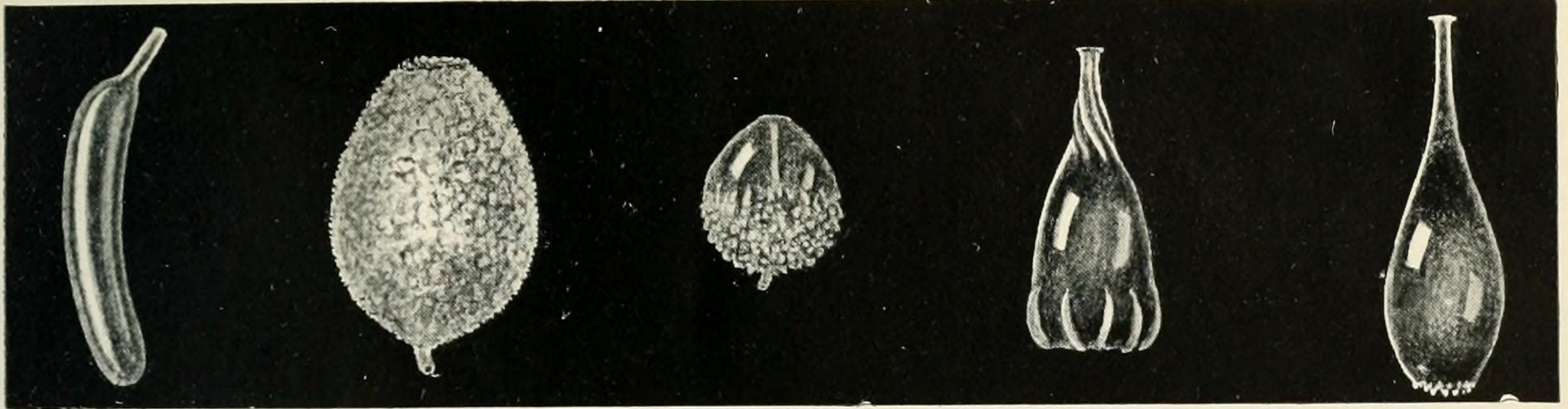
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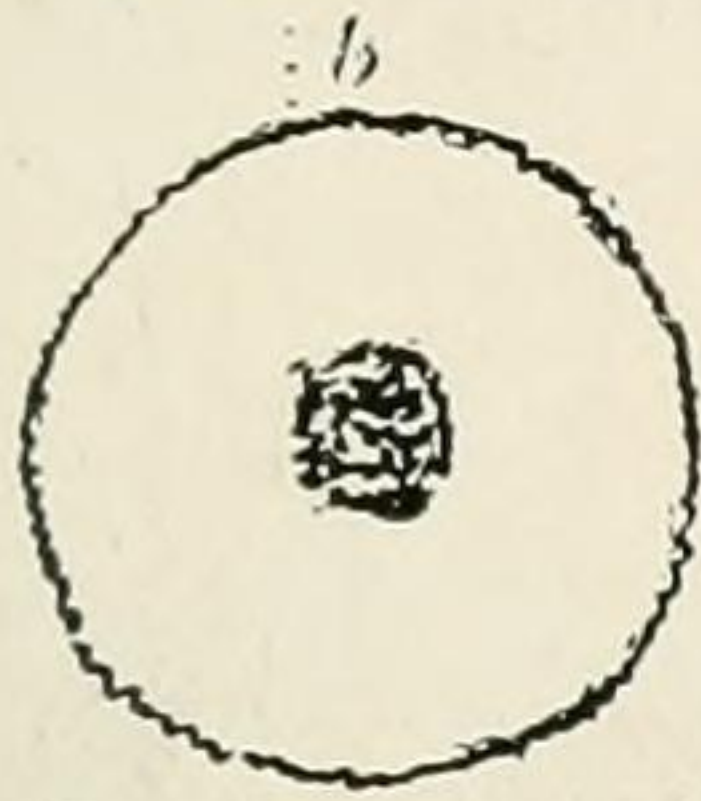
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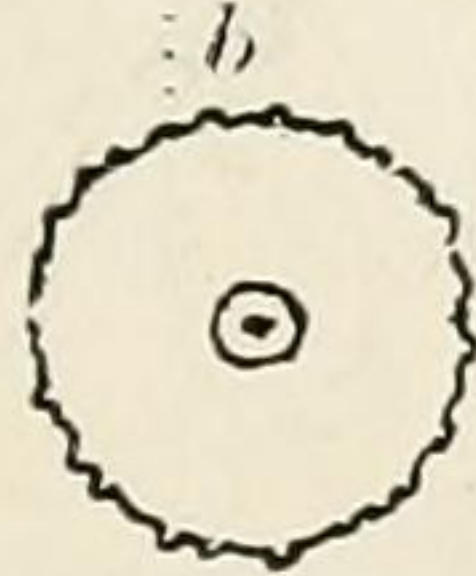
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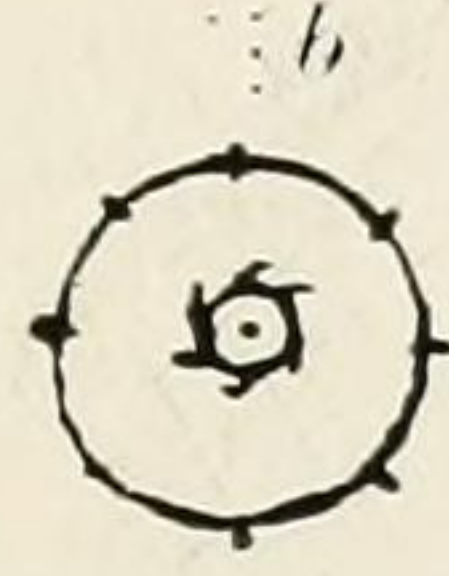
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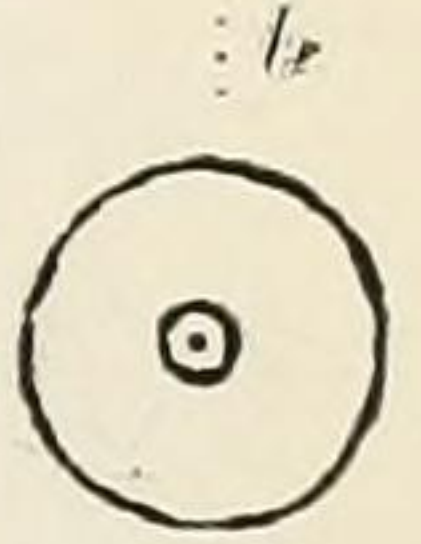
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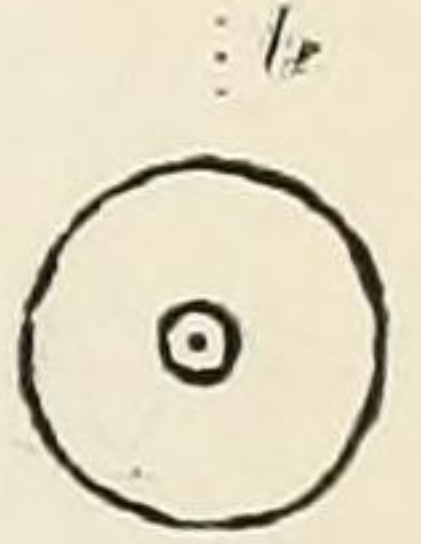
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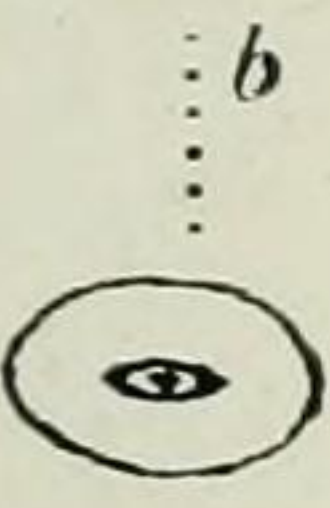
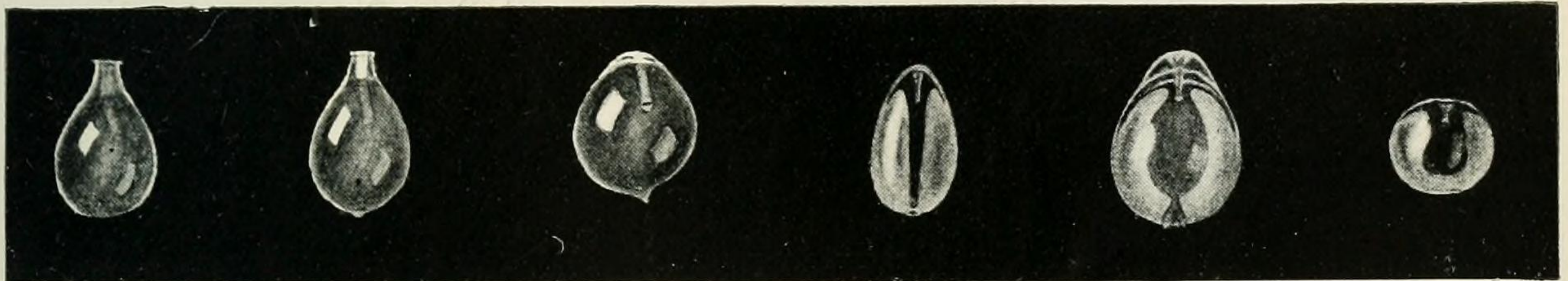
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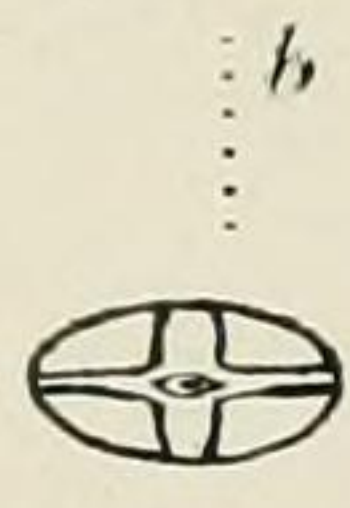
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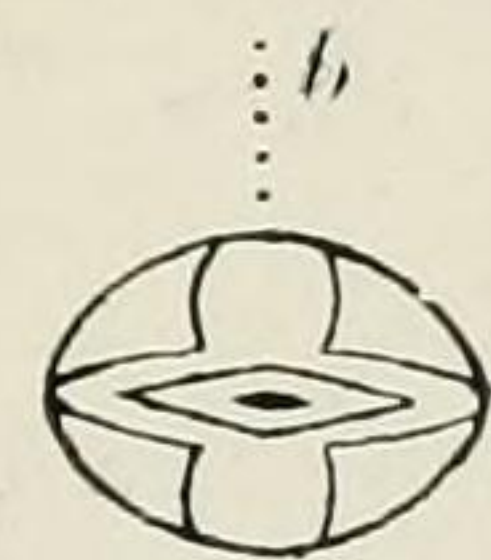
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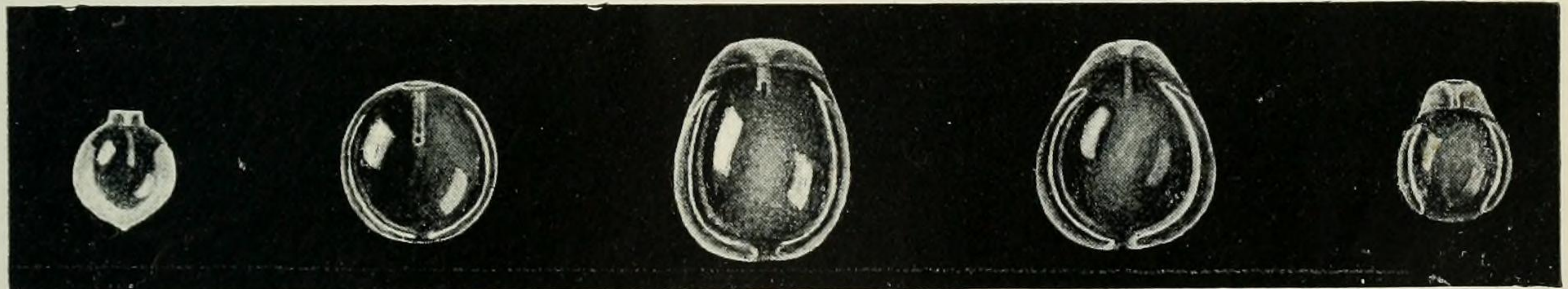
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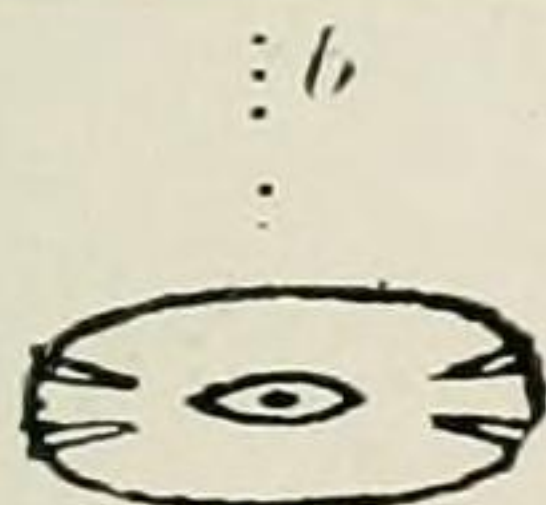
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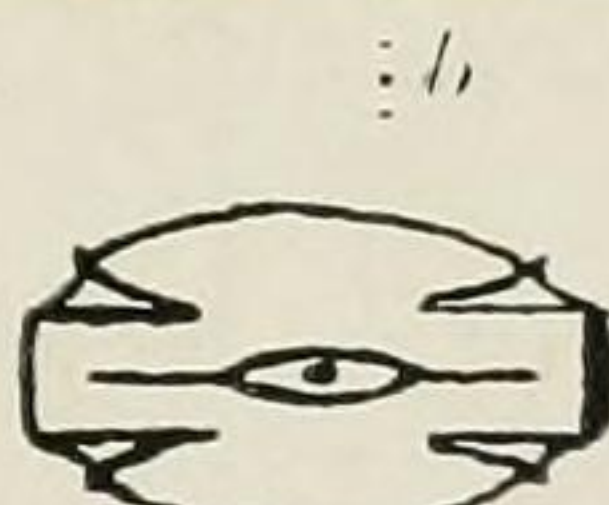
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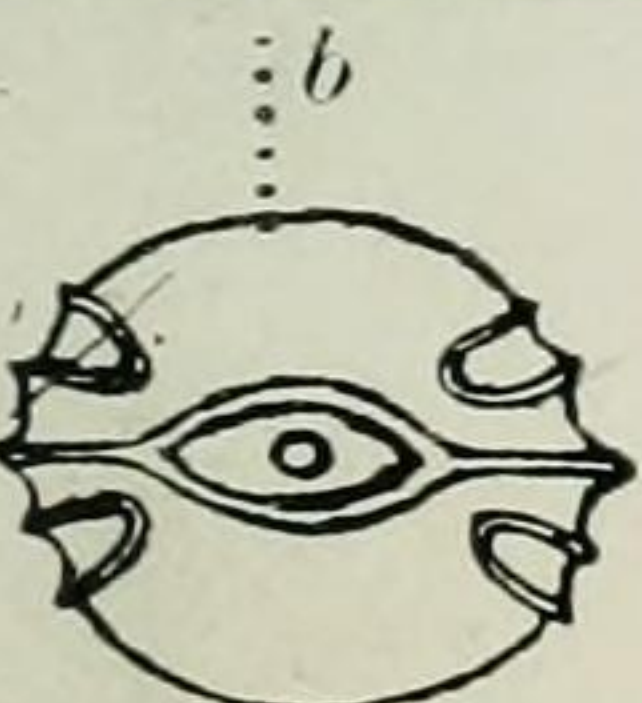
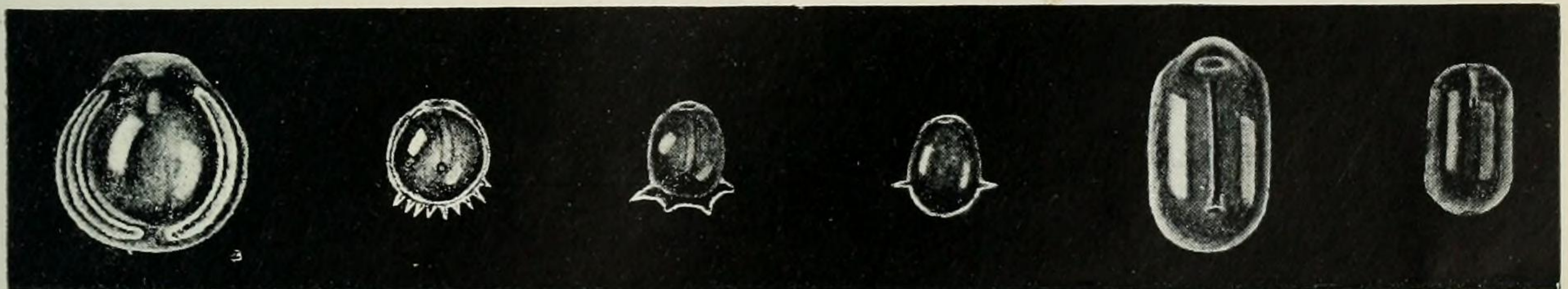
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H. Sidebottom, del. ad nat.

Foraminifera from the coast of the island of Delos.

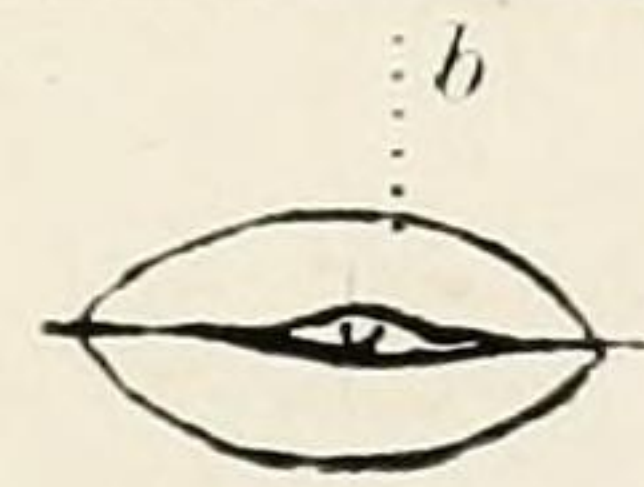
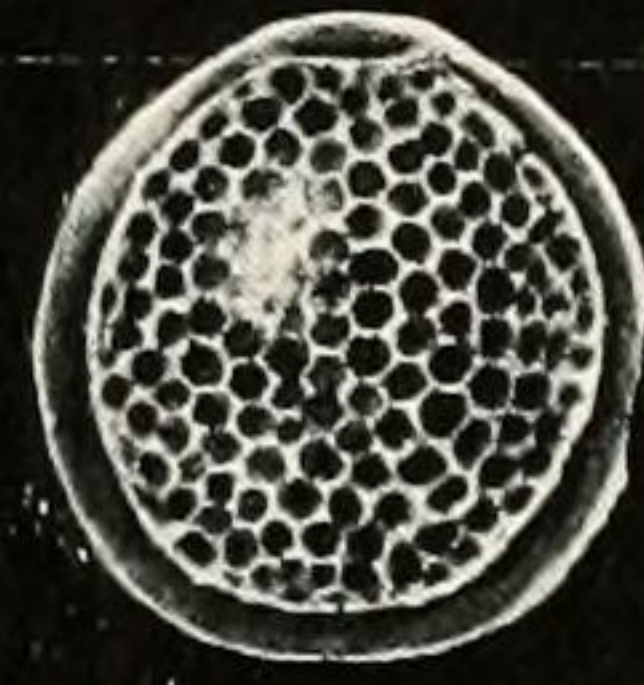
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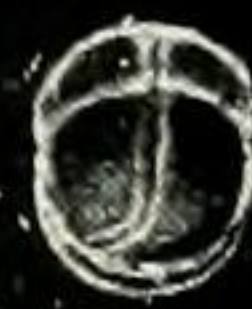
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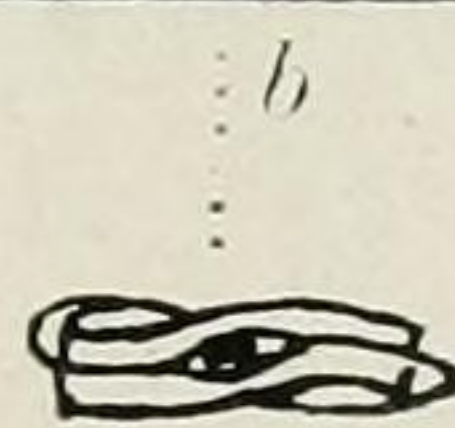
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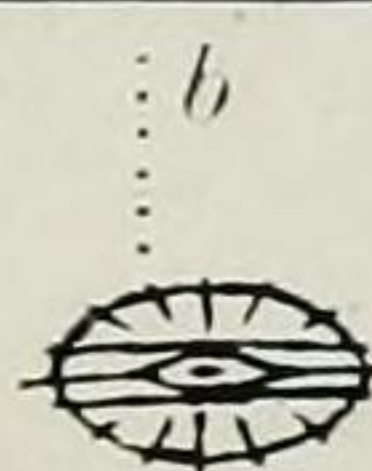
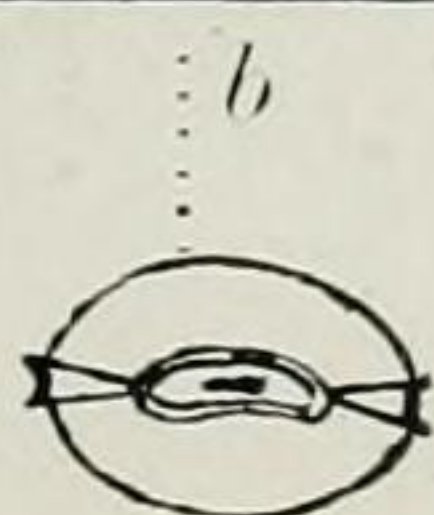
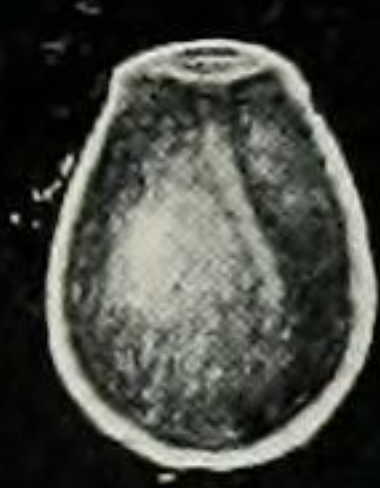
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