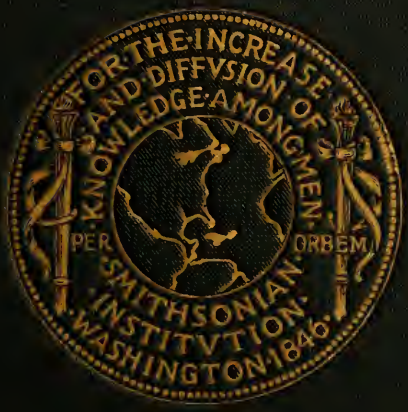
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THE FORAMINIFERA OF THE ATLANTIC OCEAN

PART 4. LAGENIDAE

BY

JOSEPH AUGUSTINE CUSHMAN
Of the Boston Society of Natural History

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INTRODUCTION.

This paper is the fourth part of a work the intent of which is to describe and illustrate the Foraminifera of the Atlantic Ocean, especially those species which have occurred in the waters adjacent to the shores of the United States, including the whole of the Gulf of Mexico and the Caribbean Sea, that being the area in which most of the work of the vessels of the United States engaged in dredging work has been done. This part includes only the family Lagenidae. The first part, issued in 1918, included the family Astrorhizidae. The second part, issued in 1920, included the family Lituolidae. The third part, issued in 1922, included the family Textulariidae. The fifth part will be devoted to the families Chilostomellidae and Globigerinidae, and further volumes will take up the remaining families of the Foraminifera as they are represented in the Atlantic Ocean.

JOSEPH AUGUSTINE CUSHMAN.

TABLE OF CONTENTS.

THE FORAMINIFERA OF THE ATLANTIC OCEAN.

LAGENIDAE.

By Joseph Augustine Cushman,

Of the Boston Society of Natural History.

INTRODUCTION.

This fourth part of the work on the Atlantic Foraminifera deals entirely with the Lagenidae, a family following in natural sequence those families already considered in the three earlier parts. The same general arrangement of data is here adopted.

A study of the distribution, especially of the western Atlantic Lagenidae, and the plotting of their occurrence, has shown that there are very definite faunal occurrences, as has already been noted in the preceding parts, but it is perhaps even more marked in the Lagenidae. There is very little similarity between the species occurring on opposite sides of the Atlantic, even in the temperate regions. The fauna developed off the coast of New England in cold water seems to be most closly allied with that of Baffin Bay and Spitzbergen, while of those species found in the warmer waters off the southern coast of New England, practically none are found in typical form on the coast of Europe. Those species which are characteristic of the Gulf of Mexico and the Caribbean range northward to the coast of Georgia or South Carolina, and in deeper water to Bermuda, but as a rule do not occur along our Atlantic coast north of Cape Hatteras. As indicated with the preceding families, the relationship of the Caribbean and Gulf of Mexico fauna is with that of the Indo-Pacific.

I have tried to give a reference to the various species found on the eastern side of the Atlantic, but have made the reference brief as a forthcoming work of Heron-Allen and Earland on the British Foraminifera will no doubt give greater detailed data in regard to such species.

SYSTEMATIC PART.

A systematic presentation of the various groups of the family follows:

Family 5. LAGENIDAE.

Test calcareous, vitreous, finely perforate, either monothalamous or made up of a series of chambers arranged in a straight or curved axis, or close-coiled or spirally, or even in an alternating manner; aperture either radiate or simple or with a neck and phialine lip.

The Lagenidae form one of the most distinctive groups of the Foraminifera and its members are readily recognized. Usually the genus *Lagena*, making up the subfamily Lageninae, has been taken as the radicle from which the other genera have been derived. Species like *L. globosa* probably come as near a primitive radicle for this family as it is possible to determine.

From *Lagena* there is a question as to which should be considered the more primitive, *Nodosaria* or *Cristellaria*. As numerous species assigned to *Nodosaria* have in the microspheric form definite indications of being derived from coiled ancestry, it would seem as though the coiled form, such as *Cristellaria*, may be the more primitive. The genera *Marginulina*, *Vaginulina*, and *Frondicularia* are all evidently derived from coiled forms such as *Cristellaria*. *Lingulina* also may have in its microspheric form a coiled series in its young. This would therefore leave *Nodosaria* practically alone as the only genus without definite coiling, but as we have already noted that certain Nodosarias in their microspheric form show an arcuate test and oblique sutures, it would seem to indicate that the entire group is derived through originally coiled forms.

A study of the apertures throughout the families shows an interesting result. A few genera, such as *Trifarina*, *Uvigerina*, and *Siphogenerina*, have typically a test with an elongate neck and phialine lip. Such a type of aperture occurs in some of the species of *Nodosaria*, and occasionally elsewhere. On the other hand, most of the species of *Cristellaria*, *Vaginulina*, *Marginulina*, *Frondicularia*, and *Polymorphina*, with some of the species of *Nodosaria*, have an aperture without an elongate neck and a radiate form as the characteristic apertural distinction. Certain species of *Polymorphina* in their senescent characters show the aperture with a neck and lip, and this distinction of the apertural characters may not be of great significance. In the subfamily, Polymorphininae, instead of either a straight or linear series, a spiral arrangement is characteristic. In the subfamily Uvigerininae a spiral arrangement is again a typical character.

The Lagenidae, as a whole, are richly ornamented, and although the ornamentation may be definitely grouped into costae, spines, and winglike plates, there are nevertheless combinations of these in which the costae become broken into knobs, bosses, and spines, and the plates variously broken into tooth-like projections, and various combinations of the different types of ornamentation may occur in the same species.

In addition, the delicacy of forms and curves that appear throughout the group, together with their glassy tests, makes this family by far the most attractive of the various groups of Foraminifera.

Taking the oceans as a whole, the Lagenidae are best developed in tropical regions at depths of 100–500 fathoms (183–914 meters), where they often reach extraordinary numbers, both in species and individuals. In colder waters the number of species is usually not so large, but *Cristellaria*, *Nodosaria*, etc., reach a large size at similar depths, and often in deeper water. In certain temperate regions, such as that of the British Isles, *Lagena* especially reaches great development in shallow water. In other regions *Lagena* seems to be found in greatest numbers from 1,000–2,000 fathoms (1829–3658 meters), indicating that temperature is probably a large factor in their distribution.

Subfamily 1. Lageninae.

Test consisting of a single chamber, the aperture either ecto- or entosolenian.

This subfamily includes the single genus *Lagena*.

Genus LAGENA Walker and Boys, 1784.

Lagena Walker and Boys (type, *L. globosa* (Montagu)), Test. Min., 1784, p. 3.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 440.—Chapman, The Foraminifera, 1902, p. 187.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 3.

Description.—Test monothalamous, smooth or ornamented, generally flask-shaped; aperture ecto- or entosolenian.

The genus *Lagena* may be taken as the radicle from which the various genera of the Lagenidae have been derived. It is single-chambered, except for certain specimens which are united accidentally, either by mechanical means or by unusual divisions of the test in growth. The genus contains a great many species and varieties, the relationships of which, as any examination of the literature will show, are in a very chaotic condition. The opinion as to the limits of variation of the various species varies greatly with different authors. I have been struck with the comparative lack of variability in the species observed in the examination of the *Albatross*

collections from the western Atlantic. Apparently the *Lagenae* are not nearly as abundant in the western Atlantic as they are off the coast of the British Isles, and in various parts of the Pacific, but where they do occur they are often in considerable numbers. In such cases the variability has been found to be slight. I have had considerable amounts of European material, especially from off the southwest coast of Ireland, and while there is a certain amount of variation shown, the majority of specimens in most cases seem to be fairly constant in their characters. Most of the species, which from the literature are very widely distributed, are either smooth species where there are very few characters available, or where the costate or striate character has been taken as a distinctive mark without reference to the general shape of the test or other characters which might have been used as distinctions. I believe with a study of sufficient specimens it will be possible to limit the shallow-water species as definitely as any other groups. As elsewhere, the deep-water species seem to be widely distributed.

The apertural characters have been used to distinguish different groups in *Lagena*. Such names as *Entosolenia*, *Fissurina*, *Phialina*, etc., have been used in a subgeneric sense, but until more is known of the amount of true variation it does not seem best to use them. Such species as *L. elongata* have been spoken of as "open at both ends." I have been able to examine a large number of specimens of the elongate forms, and while many of them have both ends open it has seemed in every case to be due to imperfect preservation of the specimens. In every such lot there are, when sufficiently well preserved, a few specimens which show the delicate phialine lip, and the opposite end, while extended out into a very attenuate test, is closed. Therefore I think that except for abnormal specimens the completely preserved specimens will show that one end of the test is always closed.

In order to facilitate the use of this work as a reference guide, the various species of *Lagena* are arranged alphabetically. The figures as nearly as possible are arranged in the same order.

As Heron-Allen and Earland are now working on a very complete description of the foraminifera of the general region of the British Isles, I have simply indicated the occurrence of certain British species, as their work will undoubtedly make the data very complete for this part of the Atlantic from which I have comparatively little material.

In its geological history the genus *Lagena* has been recorded as far back as the Cambrian, but whether the specimens are true *Lagena* may be somewhat of a question.

LAGENA ACUTA (Reuss).

Fissurina acuta Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 340, pl. 7, figs. 90, 91.

Lagena acuta Fornasini, Boll. Soc. Geol. Ital., vol. 7, 1888, p. 47, pl. 3, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 6, pl. 38, fig. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 82; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 249; Journ. Roy. Micr. Soc., 1916, p. 45.

Heron-Allen and Earland in the above references have recorded this species from about the British Isles, in the Clare Island region "widely distributed and often very common," and from the west coast of Scotland and off South Cornwall.

I have found no specimens referable to this species from the western Atlantic.

LAGENA ACUTICOSTA Reuss.

Plate 1, figs. 1–3.

Lagena acuticosta Reuss, Sitz. Akad. Wiss. Wien, vol. 44, pt. 1, 1861 (1862), p. 305, pl. 1, fig. 4; vol. 46, pt. 1, 1862 (1863), p. 331, pl. 5, fig. 63.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 464, pl. 57, figs. 31, 32; pl. 58, figs. 20 (?), 21.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 329, pl. 10, figs. 47, 48, 82, 83.—Wright, Irish Nat., vol. 9, no. 3, 1900, p. 53.—Millett, Journ. Roy. Micr. Soc., 1901, p. 8.—Chapman, The Foraminifera, 1902, p. 402.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 423.—Chapman, Subantarctic Ids. N. Zealand, 1909, p. 334; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, no. 16, 1910, p. 16; Journ. Quekett Micr. Club, vol. 11, 1912, p. 388, pl. 15, fig. 22.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 45, pl. 14, fig. 28.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 23, pl. 8, figs. 9, 10; pl. 23, fig. 2.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 610; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 180.

Lagena sulcata (Walker and Jacob), var. *acuticosta* H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, figs. 26, 31.

Description.—Test subglobular to pyriform, broadest near the base, which is broadly rounded, thence gradually tapering to the apertural end, the body of the test with a number of thin, much elevated costae, running from the base to near the apertural end, where they become coalesced into a platelike area below the aperture.

Length up to 0.35 mm.

Distribution.—This is one of the common species of the genus and seems to be widely distributed, as the above list of references will

show. There are certain forms which seem to occur with a definite geographical distribution, and it may be that closer work with large collections from various parts of the world will show more than one species included under this name. Specimens from the western Atlantic were well developed in the warmer waters of the Gulf of Mexico and the Caribbean. Specimens were numerous in a collection which I had sent me by Mr. Sidebottom from off the coast of Iceland, but they are different in certain characters from those of the Gulf of Mexico. They seem to show that there is a difference in the characters from widely separated regions. There seem to be very few records for this species from about the British Isles.

Lagena acuticosta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19047	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
19048	U.S.N.M.	1	D2318....	24 25 45 N.; 81 46 00 W..	45	75.0	co.....	Rare.
19049	U.S.N.M.	2	D2358....	20 19 00 N.; 87 03 30 W..	222	.....	fne. wh. co..	Rare.
19050	U.S.N.M.	3	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Few.
19051	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
19052	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Few.
19053	U.S.N.M.	5	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s, bk. sp.	Few.
19054	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Rare.
19055	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s.....	Rare.
19056	U.S.N.M.	1	.....	Off Sand Key, Fla.....	92	.....	.....	Rare.
.....	J.A.C....	1	.....	Off Cape Porpoise, Me....	8	.....	.....	Rare.
.....	J.A.C....	10+	.....	Coast of Iceland.....	.....	.....	.....	Abundant.

LAGENA ADVENA, new species.

Plate 1, fig. 4.

Lagena striata H. B. Brady (part) (not D'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 57, fig. 30.—Sidebottom (part), Journ. Quekett Micr. Club, vol. 11, 1912, p. 389, pl. 15, fig. 9.

Lagena striata (D'Orbigny), var. *haidingeri* Cushman (not Czjzek), Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 19, pl. 7, fig. 6; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 178.

Description.—Test composed of two distinct parts, a globular body and a polygonal tapering neck, the basal end of the test broadly rounded with a few short, somewhat divergent spines, the main body of the test superficially with numerous very closely set longitudinal costae, which are underlain by a layer with transverse lines, as is shown by moistening the wall; aperture at the end of a many-sided pyramidal neck, the sides somewhat concave, the angles plate-like.

Length, up to 0.55 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19042) from *Albatross* station D2150, in 382 fathoms (697 meters) in the Caribbean. Brady figures this species, but I am unable to say where his

material was from. I have had specimens from the Pacific from off the Galapagos Islands and the Philippines. Sidebottom's material was from the Southwest Pacific.

Lagena advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19042	U.S.N.M.	1	D2150....	° ′ ″ ° ′ ″ 13 34 45 N.; 81 21 10 W..	382	°F. 45.8	wh. crs. s....	Rare.

LAGENA ANNECTENS Burrows and Holland.

Heron-Allen and Earland record this species as scantily represented west of Scotland[1] and rare off South Cornwall.[2]

LAGENA APICULATA (Reuss).

Plate 1, fig. 5.

Oolina apiculata Reuss, In Haidinger's Nat. Abhandl., vol. 4, 1850, p. 22, pl. 1, fig. 1.

Lagena apiculata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 319, pl. 1, figs. 4–8, 10, 11.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 453, pl. 56, figs. 4, 15–18.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 80, pl. 13, fig. 747.—Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 381, pl. 14, fig. 16 (not figs. 17, 18).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 13.

Description.—Test subglobose, smooth, entosolenian, but slightly if at all compressed, apical end with a pointed spine, variable in length.

Length 0.50 mm.

Distribution.—There is a single specimen from the western Atlantic *Albatross* material which can be referred to this species of Reuss. It is like that figured by Sidebottom in the above reference, but not at all like his figures 17 and 18 which are here referred to *Lagena felsinea* Fornasini.

Lagena apiculata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19125	U.S.N.M.	1	D2205....	° ′ ″ ° ′ ″ 39 35 00 N.; 71 18 45 W..	1,073	°F. 38.1	gy. oz.....	Rare.

[1] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 250.
[2] Journ. Roy. Micr. Soc., 1916, p. 46.

LAGENA ASPERA Reuss.

Plate 1, figs. 6–8.

Lagena aspera Reuss, Sitz. Akad. Wiss. Wien, vol. 44, 1861, p. 305, pl. 1, fig. 5; vol. 46, pt. 1, 1862 (1863), p. 335, pl. 6, fig. 81.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 457, pl. 57, figs. 7–10.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 337, pl. 14, figs. 10–12.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 902.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 325, pl. 10, fig. 11.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 53.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 16, pl. 16, fig. 1.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol 11, 1916, p. 243; Journ. Roy. Micr. Soc., 1916, p. 44.

Description.—Test flask-shaped, usually globular with a short stout neck; surface ornamented with an irregularly placed series of beadlike blunt spines.

Length up to 0.60 mm.

Distribution.—All the Atlantic records for this species seem to be from off the British Isles. I have no specimens which I could refer to it from the western Atlantic.

LAGENA BICARINATA (Terquem).

Plate 1, fig. 9.

Fissurina bicarinata Terquem, Mem. Soc. Géol. France, ser. 3, vol. 2, 1882, p. 31, pl. 1, figs. 24*a*, *b*.

Lagena bicarinata Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 905.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 89; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254; Journ. Roy. Micr. Soc., 1916, p. 46.

Nearly all the Atlantic records for this species are from about the British Isles, where it seems to be fairly common. I have had no specimens from the western Atlantic.

LAGENA BOTELLIFORMIS H. B. Brady.

Plate 1, fig. 10.

Lagena botelliformis H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 60; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 454, pl. 56, fig. 6.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 477.—Millett, Journ. Roy. Micr. Soc., 1901, p. 492, pl. 8, fig. 15.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 2, pl. 1, fig. 1.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407, pl. 54, fig. 5.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 242.

The above references include two Atlantic records, one from off the southwest of Ireland, and one from the west of Scotland. I have found no material in the western Atlantic *Albatross* collections referable to this species.

LAGENA CASTANEA Flint.

Plate 1, figs. 12, 13.

Lagena castanea Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 54, fig. 3.

Description.—Test small, somewhat compressed, about as long as broad, margin rounded and smooth, except at the lower side which has a double keel, the two parts well separated from one another, joining each other at the sides of the test, the upper half of the test with no trace of a keel, apertural end slightly extended; wall smooth, thin, transparent; aperture with an entosolenian tube which in some cases at least is spirally twisted.

Length about 0.50 mm.

Distribution.—The type station for this species is in 896 fathoms (1,639 meters), off Panama, in the Caribbean. I have had numerous specimens from this same station, but have not seen it elsewhere in the *Albatross* dredgings.

Lagena castanea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19061	U.S.N.M.	5	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Few.

LAGENA CATENULATA (Williamson).

Plate 1, fig. 11.

Entosolenia squamosa Montagu, var. *catenulata* Williamson, Rec. Foram. Great Britain, 1858, p. 13, pl. 1, fig. 31.

Lagena catenulata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 325, pl. 3, fig. 29.—Parker and Jones, Philos. Trans., vol. 155, 1865, p. 352, pl. 16, fig. 7.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 78, pl. 1, fig. 9.

Description.—Test subglobular, slightly longer than broad, the basal end broadly rounded, the apertural end slightly drawn out; surface ornamented by a generally polygonal ornamentation, in more or less regular vertical rows, the test translucent.

Length up to 0.25 mm.

Distribution.—Specimens which seem to fit this species occur commonly off the coast of the British Isles, so far as the material I have had shows, but no specimens were found in the western Atlantic material referable to it.

Lagena catenulata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
						°F.		
.....	J.A.C....	4	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Few.
.....	J.A.C....	1	*Lord Bandon* Log 58.	Off Bantry Bay, southwest Ireland.	110	.....	.....	Rare.
.....	J.A.C....	10	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	.....	m., s.....	Common.
.....	J.A.C....	2	.....	Dog's Bay, Ireland.....	.....	.....	.....	Rare.

LAGENA CHRYSALIS Heron-Allen and Earland.

Plate 1, fig. 14.

Lagena chrysalis Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 74, pl. 6, fig. 4.

Description.—"Test chrysalidiform, tapering at both extremities, the aboral end much more acute than the oral, which is neatly rounded off. Aboral extremity either pointed or slightly tumescent at the apex; surface smooth, somewhat dull, but girdled at intervals by four to six clear lines in the shell-substance which enhance the general resemblance of the shell to the chrysalis of a moth. Length, 0.21 mm.; breadth, 0.08 mm. Aperture simple. There is a slight constriction in the shell wall on either side of the clear lines.

"The general appearance of this little test is glanduline, resembling a minute specimen of *Nodosaria radicula*, but there is no trace whatever of internal septa.

"Three specimens found at station 13 (Inishgowla harbour, 4 fathoms)."

This is the only record for this species.

LAGENA CLAVATA (D'Orbigny).

Plate 1, fig. 15.

Oolina clavata D'Orbigny, Foram. Foss. Vienne, 1846, p. 24, pl. 1, fig. 2.

Lagena clavata Mackie, Recreative Science, vol. 1, 1859, p. 148, fig. 13.—Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 320, pl. 1, figs. 13, 14.—Terquem, Mém. Soc. Géol. France, ser. 3, vol. 2, 1882, p. 25, pl. 1 (9), fig. 2.—H. B. Brady, Rep. Voy. *Challenger*, Zoology,

vol. 9, 1884, p. 456; Journ. Roy. Micr. Soc., 1887, p. 902.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 324, pl. 10, fig. 68.—Haeusler, Abh. schweiz. Pal. Ges., vol. 20, 1893 p. 14, pl. 1, figs. 17–22.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 75, pl. 13, figs. 725–727.—Morton, Proc. Portland Soc. Nat. Hist., vol. 2, pt. 4, 1897, p. 116, pl. 1, fig. 2.—Fornasini, Mem. Accad. Sci. Ist. Bologna, ser. 5, vol. 7, 1897 (1898), p. 14 (206), pl., fig. 18.—Wright, in Meade, Geol. Mag., dec. 4, vol. 7, 1900, p. 100, pl. 5, fig. 13.—Millett, Journ. Roy. Micr. Soc., 1901, p. 490.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 16.—Cushman, Bull. 71, pt. 3, 1913, p. 9, pl. 2, fig. 3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 80; Trans. Zool. Soc. London, vol. 20, 1915, p. 660, pl. 50, fig. 23; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.

Lagena laevis (Walker and Jacob), var. *amphora* Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 12, pl. 1, figs. 3, 4.

Lagena laevis Haeusler, Neues Jahrb., 1887, pt. 1, p. 181, pl. 4, figs. 39–48; Abh. schweiz. Pal. Ges., vol. 17, 1890, p. 86, pl. 13, figs. 17, 18.

Lagena vulgaris Williamson, var. *clavata* Williamson, Rec. Foram. Great Britain, 1858, p. 5, pl. 1, fig. 6.

Lagena laevis (Montagu), var. *clavata* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.

Description.—Test elongate, clavate or fusiform, with a long neck at the oral end and an elongation of the test somewhat variable in length at the aboral end; surface smooth, cross section nearly circular; wall thin and transparent; aperture nearly circular, at the end of the neck, often with a phialine lip.

Length up to 1 mm.

Distribution.—This species is common about the British Isles, as the above references show, and material which I have had from stations mainly from off the coast of Ireland. It has occurred rarely in the *Albatross* western Atlantic collections, single specimens from two stations being all that I have found.

Lagena clavata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19123	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19124	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
.....	J.A.C....	5	.....	*Lord Bandon* Log 28, off Baltimore, southwest Ireland.	26	.....	.....	Few.
.....	J.A.C....	8	.....	*Flying Falcon* Log 8, 10 miles off Glencoe, southwest Ireland.	53	.....	m., s.....	Common.
.....	J.A.C....	1	.....	Dog's Bay, Ireland.....	.....	.....	.....	Rare.

LAGENA COSTATA (Williamson).

Plate 1, fig. 16; pl. 2, figs. 1, 2; pl. 3, fig. 8.

Entosolenia costata Williamson, Rec. Foram. Great Britain, 1858, p. 9, pl. 1, fig. 18.

Lagena costata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 329, pl. 4, fig. 54.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547; Trans. Roy. Irish Acad., vol. 28, 1885, p. 338, pl. 14, figs. 3–5.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 903.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479; Irish Nat., vol. 9, No. 3, 1900, p. 53.—Millett, Journ. Roy. Micr. Soc., 1901, p. 7, pl. 1, fig. 8.—Wright, Irish Nat., vol. 11, 1902, p. 213.—Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 388, pl. 15, figs. 16–20.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 21, pl. 9, fig. 6; pl. 10, fig. 1; pl. 12, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 75; Trans. Zool. Soc. London, vol. 20, 1915, p. 656; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 243; Journ. Roy. Micr. Soc., 1916, p. 45.

Description.—Test subglobular, ornamented with a few rather remote ribs or costae running nearly the length of the test, frequently not reaching the apex, but ending in a ring of spinose projections; aperture small and rounded; costae most often rounded.

Length 0.25–0.50 mm.

Distribution.—Most of the references for this species are from the region of the British Isles, where it is one of the most typical species, especially off the Irish and Scottish coasts, where it is recorded at numerous stations, especially by Heron-Allen and Earland. I have failed to find typical specimens in the western Atlantic material I have examined.

LAGENA CRENATA Parker and Jones.

Plate 2, figs. 3, 4.

Lagena crenata Parker and Jones, Philos. Trans., vol. 155, 1865, p. 420, pl. 18, figs. 4*a*, *b*.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 339, pl. 14, figs. 17, 18.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Chapman, Journ. Linn. Soc. London, vol. 28, 1900, p. 246.—Millett, Journ. Roy. Micr. Soc., 1901, p. 485, pl. 8, fig. 1.—Sidebottom, Journ. Quekett Micr. Club, vol. 12, 1913, p. 174, pl. 15, fig. 28.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 658.

Description.—Test flask-shaped, with the base truncate, the base at the edge crenulate, each of the crenulations marking a fold of the base; the neck elongate, usually with a spiral ornamentation, the remainder of the test smooth.

Length 0.30–0.50 mm.

Distribution.—This species was originally described by Parker and Jones, off the coast of Australia. There are, however, several records for it off the coast of the British Isles. It has not occurred in the western Atlantic material.

LAGENA CURVILINEATA Balkwill and Wright.

Plate 2, figs. 5–9.

Lagena curvilineata Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548; Trans. Roy. Irish Acad., vol. 28, 1885, p. 338, pl. 14, figs. 21–24.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 902.—Millett, Journ. Roy. Micr. Soc., 1901, p. 488, pl. 8, fig. 5.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78, pl. 6, fig. 7.

Description.—"Flask-shaped, surface ornamented with fine curvilinear striae. In typical examples the striae commence from centres situated at opposite sides of the shell, round which they are twisted in the most beautifully regular manner. In some specimens the striae cross, giving the shell a decussated appearance."

Distribution.—This beautifully ornamented species, except for the one reference of Millett, seems to be limited to the region of the British Isles. I have found no material from the *Albatross* western Atlantic collections.

LAGENA CYMBULA Heron-Allen and Earland.

Plate 3, fig. 1.

Lagena cymbula Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 90, pl. 7, figs. 16–18.

Description.—"Test oval, depressed, shaped like a punt with rounded ends, the superior face concave, the inferior convex. Aperture situated in the centre of the depression and furnished with an entosolenian tube, which is attached to the interior of the shell, and follows the outline of the shell up the sloping side of the central depression, passing across to the edge and so down the side of the 'punt' to the middle of the base. In transverse section *L. cymbula* would resemble an inverted triangle of which the basal angles have been rounded off and the inferior or apical portion truncated.

"Length, 0.13–0.16 mm.; breadth, 0.05–0.08 mm.; depth, 0.03–0.04 mm.; oval central depression averages 0.02 by 0.04 mm.; tube about 0.01 diameter.

"The affinities of this curious little species lie about midway between *L. cymbaeformis* Millett, which has a test of somewhat similar outline, but is more regularly naviculoid, being sub-acute at both extremities and sloping to a broad keel beneath, and *L. depressa* Chaster, which is more circular than our species, and is of the same breadth on both the oral and the aboral sides. The three species form a very interesting and unique little group, characterized by the presence of the aperture in what would in a normal *Lagena* represent the middle of one lateral surface of the test.

"Mr. Millett's species is described as 'rare' from the Pliocene of St. Erth, and Dr. Chaster found three specimens of *L. depressa* at Southport. We have one specimen of *L. cymbula* from Station 13, but have met with others in 'Goldseeker' dredgings from Noss Head in the Moray Firth (72 meters) which are larger than the Clare Island specimen. It also occurs in a dredging made by the Fisheries Cruiser 'Huxley' in the English North Sea (Haul 869), to which we are referring elsewhere, and in company with *L. depressa* Chaster, in Scapa Flow, Orkney."

The above is the original description, with notes by Heron-Allen and Earland. They also record a single specimen from the west of Scotland.

LAGENA DISTOMA Parker and Jones.

Plate 3, figs. 2, 3.

Lagena laevis (Montagu), var. *striata* Parker and Jones (not *L. striata* (Walker and Boys)), Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 278, pl. 11, fig. 24.

Lagena distoma Parker and Jones in H. B. Brady, Trans. Linn. Soc. London, vol. 24, 1864, p. 467, pl. 48, fig. 6.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 461, pl. 58, figs. 11–15; Journ. Roy. Micr. Soc., 1887, p. 902.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Pearcey, Trans. Glasgow Nat. His. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—Woodward, The Observer, vol. 4, 1893, p. 142.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Kiaer, in Duc d'Orleans Croisière Ocean, Mer du Gronland, 1905 (1907), p. 560.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 248.

Description.—Test elongate, the main body of the test fusiform, the sides nearly parallel in the central portion, apertural end tapering into a very long slender neck with a phialine lip, the other end tapering into a long acicular spine which is hollow part way to the end; surface of the test smooth except for slightly raised fine costae, 6–10 in number; wall thin and transparent.

Length up to 2.50 mm.

Distribution.—In the western Atlantic this species is fairly common at some of the *Albatross* stations off the eastern coast of the United States, with a few stations in the Caribbean.

There are numerous records for this species off the coast of the British Isles. In the Summary of Results of the *Challenger* Expedition the species is recorded from the Atlantic at two stations, off the eastern coast of the United States, in the same general region where the *Albatross* material occurs in considerable abundance. It is also known from the Gulf of St. Lawrence, off the Island of

Anticosti, and off Newfoundland. There are a few scattered records for it outside the Atlantic.

The specimens reach a large size and where complete show a very distinct apertural end which is very slender and therefore very easily broken. The opposite end is drawn out into a long spinose projection which in perfect specimens is closed, but it easily becomes broken. The majority of specimens therefore are similar to those figured by Parker and Jones, showing the two ends open. I have already noted under this genus that I do not think any of the typical *Lagenae* have the two ends of the test open in perfect specimens.

Lagena distoma—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19004	U.S.N.M.	4	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Few.
19005	U.S.N.M.	1	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Rare.
19006	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
19007	U.S.N.M.	10+	D2112....	35 20 50 N.; 75 13 00 W..	16	73.5	s., blk. sp...	Abundant.
19008	U.S.N.M.	1	D2116....	35 45 23 N.; 74 31 25 W..	883	39.0	bu. m., fne. s.	Rare.
19009	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19010	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
19011	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.....	Rare.
3146	U.S.N.M.	4	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Abundant.
19012	U.S.N.M.	10+						
19013	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Rare.
19014	U.S.N.M.	2	D2252....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
19015	U.S.N.M.	1	D2552....	39 47 97 N.; 70 35 00 W..	721	39.6	gy. oz.....	Rare.
19016	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Rare.
19017	U.S.N.M.	3	D2577....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Few.
19018	U.S.N.M.	1	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Rare.
19019	U.S.N.M.	1	H82.....	13 29 00 N.; 62 42 40 W..	1,051	.....	for., m.....	Rare.

LAGENA ELONGATA (Ehrenberg).

Plate 3, fig. 4.

Miliola elongata Ehrenberg, Bericht. preuss. Akad. Wiss. Berlin, 1844, p. 274, 1845, p. 371; Mikrogeologie, 1854, pl. 25, fig. 1.

Lagena elongata Tate and Blake, Yorkshire Lias, 1876, p. 454, pl. 18, figs. 9, 9*a*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 457, pl. 56, fig. 29.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 75, pl. 13, fig. 731.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 1.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890. p. 177.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 12, pl. 1, fig. 5.

Lagena gracillima H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 56, figs. 27, 28.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, pl. 13, figs. 728, 730 (not 729).

Description.—Test elongate, slender, the central portion subcylindrical, the ends rather tapering, apertural end with a slightly thickened lip, opposite end closed; wall translucent, smooth.

Length up to 1.50 mm.

Distribution.—The only station from which I have had material that can be referred to this species is off the northern coast of South America, east of Trinidad. There are a few records for it off the British Isles, and Goës records it from off Greenland and Spitzbergen. There are a few scattered records for it elsewhere than in the Atlantic.

This has probably been confused with *L. gracillima* (Seguenza). This differs from *L. gracillima* in the more cylindrical body, and much shorter projections at the ends. The test is also thicker and less transparent.

Lagena elongata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19032	U.S.N.M.	1	D2754....	11 40 00 N.; 58 33 00 W..	880	38.0	glob. oz.....	Rare.

LAGENA FABA Balkwill and Millett.

Lagena faba Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 81, pl. 2, fig. 10; pl. 3, fig. 7.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 905.
Lagena fasciata Egger, var. *faba* Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 84; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 250.

The only specimens of this species known seem to be those recorded by Balkwill and Millett from off Galway, and those recorded by Heron-Allen and Earland from the Clare Island region and from off the west coast of Scotland.

LAGENA FALCATA Chaster.

Plate 3, figs. 5–7.

Lagena falcata Chaster, First Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 61, pl. 1, fig. 7.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 82, pl. 6, figs. 12, 13; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 249, pl. 41, fig. 25.

The only records for this species are from off the coast of the British Isles, Chaster's figure being from off Southport, and those of Heron-Allen and Earland from *Goldseeker* dredgings off Noss Head, Moray Firth, 70 meters (38 fathoms), and other stations off the coasts of Scotland and Ireland.

LAGENA FASCIATA Egger.

Heron-Allen and Earland[3] record this species as abundant at most of the stations in the Clare Island region, and also report it as

[3] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 83.

widely distributed off the west of Scotland.[4] There seem to be no other Atlantic references.

LAGENA FELSINEA Fornasini.

Lagena vulgaris (Parker and Jones), var. (*Entosolenia*) *globosa* Rymer-Jones, Trans. Linn. London, vol. 30, 1872, pl. 19, fig. 2 (not *Lagena globosa* (Montagu)).

Lagena apiculata H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 56, fig. 4.—Sidebottom (part), Journ. Quekett Micr. Soc., vol. 11, 1912, p. 381, pl. 14, figs. 17, 18 (not fig. 16).

Lagena emaciata Reuss, var. *felsinea* Fornasini, Mem. Accad. Ist. Bologna, ser. 5, vol. 9, 1901, p. 47, fig. 1.

Lagena felsinea Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 10, pl. 4, fig. 1.

Description.—Test elongate, subcylindrical, arcuate in side view, especially toward the apertural end, aboral end broader, rounded, or slightly acute; wall thin, smooth; aperture eccentric, rounded, with a long entosolenian neck somewhat inflated at its inner end.

Length about 0.70 mm.; diameter about 0.25 mm.

Distribution.—Specimens which can be referred to the above species occur at several stations off the northeastern coast of the United States, with a single specimen from *Albatross* D2160, in the Caribbean. These specimens are very similar to that which I have figured from the North Pacific, and which Sidebottom has figured as *Lagena apiculata* from the Southwest Pacific.

Lagena felsinea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19136	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Rare.
19137	U.S.N.M.	4	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Few.
19138	U.S.N.M.	2	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
19139	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	.....	co.....	Rare.

LAGENA FIMBRIATA H. B. Brady.

Plate 3, fig. 9.

Lagena fimbriata H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 61; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 486, pl. 60, figs. 26–28; Journ. Roy. Micr. Soc., 1887, p. 907.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 333, pl. 10, figs. 15, 16.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 28.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No.

[4] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 25.

5, 1906, p. 14.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 411.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 19.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 30, pl. 14, fig. 8.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 89, pl. 7, fig. 14.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255.

Lagena orbignyana (?) Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 418, pl. 21, fig. 15.

Description.—"Test pyriform or flask-shaped, broad at the base, compressed; ento- or ectosolenian; furnished with a deep vertical wing, encircling the oval base; the wing traversed by parallel tubuli, and sometimes fringed at the free margin."

Length, 0.42 mm.

Distribution.—There are numerous records for this species from about the British Isles and elsewhere, but I have seen no specimens referable to it from the western Atlantic *Albatross* collections.

LAGENA FLINTIANA, new species.

Plate 3, figs. 11–13.

Lagena orbignyana Flint (not Seguenza), Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 54, fig. 4.

Description.—Test somewhat compressed, longer than broad, the basal end broadly rounded, the apertural end much drawn out, body of the test rounded, completely encircled with a thin single keel, inside of which is a slight thickening of the test, but which does not stand up into a prominent ridge of any extent; wall translucent except for the peculiar thickenings which occur about the border of the body of the test, and especially across the base where the entire wall becomes clouded, as a result apparently of numerous small thickenings which are abundant in that particular portion; aperture tubular, entosolenian, but with an elongate tube in the body cavity.

Length up to 0.75 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19064) from *Albatross* station D2144, in 896 fathoms (1,639 meters), in the Caribbean. Flint records this species as *Lagena orbignyana* Seguenza, but a study of the material from his station shows that he had a very different species. His stations are in the northern part of the Gulf of Mexico, in the Caribbean, between Cuba and Yucatan, off Panama, and west of the Windward Islands. I have had numerous specimens from these same regions. While it is impossible to say without consulting Brady's original material, it seems probable that the specimens he records as *Lagena orbignyana* from off the Virgin Islands and off the coast of Brazil are the same species.

Lagena flintiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19084	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
19064	U.S.N.M.	3	D2144....	9 49 00 N.; 79 31 20 W..	896	.....	gn. m.....	Frequent.
19065	U.S.N.M.	3						
19066	U.S.N.M.	1	D2381....	28 05 00 N.; 87 56 15 W..	1,330	.....	lt. br. m....	Rare.
19067	U.S.N.M.	1	D2383....	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Rare.
19068	U.S.N.M.	3	D2392....	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Few.
19069	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
19070	U.S.N.M.	3	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Few.
19071	U.S.N.M.	2	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.
19085	U.S.N.M.	1	D2763....	24 17 00 S.; 42 48 30 W..	671	37.9	br. glob .oz..	Rare.

LAGENA FORFICULA Heron-Allen and Earland.

Plate 3, fig. 10.

Lagena forficula Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 87, pl. 6, fig. 11.

Description.—"Test free, consisting of a compressed oval chamber, furnished with a long neck, at the extremity of which is a phialine rim produced sideways into two short recurved hooks. The base of the chamber is furnished with two solid spines curving inward like the pincers of an earwig, from which we have named the species.

"Total length, including neck and basal spines, 0.24 mm.; basal spines, 0.05 mm. in length; chamber, 0.12 mm. long, 0.08 mm. broad; neck, 0.07 mm. long; breadth across apical hooks, 0.08 mm.; maximum breadth of shell across basal spines, 0.09 mm.

"A single specimen of this extraordinary little form from Station 13. Broken individuals have been observed at one or two *Goldseeker* stations in the Moray Firth.

"Our species may be compared with that figured by Mr. Millett in 1901 (Journ. Roy. Micr. Soc., pl. 8, fig. 21) described as '*L. marginata* (Walker and Boys) var., very rare.' It agrees with Mr. Millett's specimens in the long neck with recurved spines at the oral extremity, but differs in the shape of the chamber, which is a compressed oval, whereas Mr. Millett's specimen was a marginate form, and also in the presence of the strongly curved aboral spines. These are entirely wanting in the Malay form, the aboral extremity of which terminated in a short, blunt process, outgrowing from the carina.

"The relationships of our species are evidently much closer to *L. lævigata* than to *L. marginata*, to which Mr. Millett referred his specimens. The presence of the long neck with recurved oral spines, common to both forms, is, however, very noticeable."

The above seems to be the only reference for this peculiar species.

LAGENA GLOBOSA (Montagu).

Plate 4, figs. 1, 2.

"Serpula (Lagena) laevis globosa" Walker and Boys, Test. Min., 1784, p. 3, pl. 1, fig. 8.

Vermiculum globosum Montagu, Test. Brit., 1803, p. 523.

Lagena globosa Brown, Illus. Rec. Conch. Great Britain and Ireland, ed. 1, 1827, pl. 1, fig. 37; ed. 2, 1884, p. 126, pl. 56, fig. 37.—Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 318, pl. 1, figs. 1–3; Bull. Acad. Roy. Belg., ser. 2, vol. 15, 1853, p. 143, pl. 1, figs. 13, 14.—Jones, Parker, and H. B. Brady, Pal. Soc. Mon., vol. 19, 1866, p. 32, pl. 1, fig. 32.—Bütschli, in Bronn, Klassen und Ordnungen Thier-Reichs, vol. 1, 1880, p. 197, pl. 7, fig. 2.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—Terquem, Mém. Soc. Géol. France, ser. 3, vol. 2, 1882, p. 26, pl. 1, fig. 7.—Terrigi, Atti Accad. Pont. Nuovi Lincei, vol. 35, 1883, p. 170, pl. 2, fig. 3.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 452, pl. 56, figs. 1–3.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 336.—Sherborn and Chapman, Journ. Roy. Micr. Soc., 1886, p. 744, pl. 14, fig. 11.—Haeusler, Neues Jahrb. für Min., pt. 1, 1887, p. 181, pl. 4, figs. 1–4 (not 5–18).—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 901.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 221.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 477.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 323, pl. 10, fig. 69.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 77, pl. 13, fig. 741.—Chapman, Proc. Zool. Soc. London, 1895, p. 27.—Morton, Proc. Portland Soc. Nat. Hist., vol. 2, pt. 4, 1897, p. 116, pl. 1, fig. 1.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 21, 1899, p. 102, pl. 5, fig. 3.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 4.—Kiaer, Rep. Norwegian Fish. Mar. Invest., vol. 1, No. 7, 1900, p. 39, pl., fig. 17.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 53.—Millett, Journ. Roy. Micr. Soc., 1901, p. 3.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 210.—Dakin, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 234.—Rhumbler, Zool. Jahrb. Abth. Syst., vol. 24, 1906, p. 63.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 1.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 141.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 333.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 422.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 14.—Chapman, Journ. Soc. Zool., vol. 30, 1910, p. 407.—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, 1911, p. 19.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 46, pl. 13, figs. 9 *a–c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 3, pl. 4, fig. 2.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 72.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1016.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 654; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 242;

Journ. Roy. Micr. Soc., 1916, p. 44.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Chapman, Brit. Ant. Exped., Geology, vol. 2, 1916–1917, p. 66, pl. 4, fig. 25.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 607; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 173.

Entosolenia globosa Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 16, pl. 2, figs. 13, 14; Rec. Foram. Great Britain, 1858, p. 8, pl. 1, figs. 15, 16.—Dawson, Can. Nat., vol. 4, 1859, p. 28, figs. 4, 5; vol. 6, 1872, p. 254, pl. 3, fig. 2.

Lagena sulcata (Walker and Jacob), var. (*Entosolenia*) *globosa* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 348, pl. 13, figs. 37 *a*, *b*; pl. 16, figs. 10 *a*, *b*.

Description.—Test subspherical, smooth; aperture either stellate or a fissure with an entosolenian neck; wall thin, usually transparent, but sometimes thicker and nearly opaque, white.

Length up to 0.50 mm.

Distribution.—Specimens of typical *Lagena globosa* seem to be rare in the western Atlantic. I have had but a few specimens, and the stations are widely scattered from off the northeastern coast of the United States to the Caribbean. There are numerous records for the species, as the above synonymy shows. Specimens seem to be most common in fairly deep water, although about the British Isles the species seems to occur at moderate depths. It is a question whether or not a single species is really represented by all these specimens recorded. According to the descriptions, the apertural characters are very variable, a thing which does not usually occur, even in *Lagena*. It is also to be suspected that some of the forms referred to this species are really the initial chamber or proloculum of *Polymorphina* or other multilocular genera of the Lagenidae.

A varietal form with a much larger test and thicker walls occurs at a few stations.

Lagena globosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19126	U.S.N.M.	2	D2036....	38 52 40 N.; 69 24 40 W..	1,735	38	glob. oz.....	Rare.
19127	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38	glob. oz.....	Rare.
19128[1]	U.S.N.M.	2	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38	glob. oz.....	Rare.
19129[1]	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
19130	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19131	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
19132	U.S.N.M.	1	D2204....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.....	Rare.
19133	U.S.N.M.	1	D2228....	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.....	Rare.
19134	U.S.N.M.	1	D2748....	39 31 00 N.; 71 14 30 W..	1,163	37.8	gy. m., for..	Rare.
19135[1]	U.S.N.M.	1	D2754....	11 40 00 N.; 58 33 00 W..	880	38	glob. oz.....	Rare.

[1]=var.

LAGENA GRACILIS Williamson.

Plate 4, figs. 3, 4.

Lagena gracilis Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 13, pl. 1, figs. 3, 4.—Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 331, pl. 4, figs. 58–61; pl. 5, fig. 62.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 464, pl. 58, figs. 2, 3, 7–9, 10 [?], 19, 22, 23, 24 [?].—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 338.—H. B. Brady, Jour. Roy. Micr. Soc., 1887, p. 903.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 328, pl. 10, figs. 25, 49.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 77, pl. 13, fig. 738.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 27.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 117.—Millett, Journ. Roy. Micr. Soc., 1901, p. 482, pl. 8, figs. 12–14.—Kiaer, in Duc d'Orleans, Croisière Ocean, Mer du Gronland, 1905 (1907), p. 560.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 333; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 409.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 16.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 47, pl. 14, figs. 7, 8.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 24, pl. 8, figs. 5, 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 81.—Pearcey, Trans. Roy. Soc. Edinb., vol. 39, 1914, p. 1017.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 21.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 181.

Lagena vulgaris Williamson, var. *gracilis* Williamson, Rec. Foram. Great Britain, 1858, p. 7, pl. 1, figs. 12, 13.

Description.—Test elongate, fusiform, broadest in the middle, apertural end tapering into a long cylindrical neck with a slightly expanded lip, opposite end pointed; surface ornamented by a few distinct longitudinal costae, 6–12 in number.

Length up to 0.60 mm.

Distribution.—This species, originally described by Williamson, occurs in its typical form at many stations about the British Isles. It is recorded at very many localities elsewhere, but an examination of what few figures are given shows many different forms. I have seen British material from off the southwest of Ireland, and have one specimen from *Albatross* station D2534, in 1,234 fathoms (2,257 meters), off the northeastern coast of the United States, which seems typical.

Lagena gracilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19059	U.S.N.M.	1	D2534	° ′ ″ ° ′ ″ 40 01 00 N.; 67 29 15 W.	1,234	°F. 37.8	gy. oz.	Rare.
.....	J.A.C.	1	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	.....	m., s.	Rare.

LAGENA GRACILLIMA (Seguenza).

Plate 4, fig. 5.

Amphorina gracillima Seguenza, Foram. mon. Mioc. Messina, 1862. p. 51, pl. 1, fig. 37.

Lagena gracillima Jones, Parker, and H. B. Brady, Pal. Soc. Mon., vol. 19, 1866, p. 45, pl. 1, figs. 36, 37.—H. B. Brady, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 292, pl. 11, figs. 6 *a–c*.—Bütschli, in Bronn, Klassen und Ordnungen Thier-Reichs, vol. 1, 1880, p. 197, pl. 7, fig. 20.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—Fornasini, Boll. Soc. Geol. Ital., vol. 2, 1883, p. 185, pl. 2, fig. 5.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 456, pl. 56, figs. 21, 22, 24–26, 19?, 20?, 23?, 27?. 28?; Journ. Roy. Micr. Soc., 1887, p. 902.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892. p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 330, pl. 10, fig. 12.—Woodward, The Observer, vol. 4, 1893. p. 142.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 75, pl. 13, fig. 729 (not 728, 730); Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 52.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 3.—Silvestri, Mem. Pont. Accad. Nuovi Lincei, vol. 17, 1900, p. 245, pl. 6, fig. 42.—Millett, Journ. Roy. Micr. Soc., 1901, p. 491.—Chapman, Trans. N. Zealand Inst., vol. 38, 1905, p. 91.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, 1910, p. 16.—Cushman, Bull. 71. U. S. Nat. Mus., pt. 3, 1913, p. 11, pl. 1, fig. 4.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 660; ser. 2, vol. 11, 1916, p. 248; Journ. Roy. Micr. Soc., 1916, p. 45.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 175.

Lagena sulcata (Walker and Jacob), var. *distoma-polita* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 357, pl. 18, fig. 8.

Lagena laevis (Montagu), var. *gracillima* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.

Description.—Test elongate, fusiform, the apertural end tapering into a long cylindrical neck with a phialine lip, the opposite end much elongate, ending in a point, closed; surface smooth, wall translucent.

Length up to 2 mm.

Distribution.—I have had a number of specimens in the *Albatross* collection which seem to be referable to this species. They are mostly from the northeastern coast of the United States, with two stations off southern Florida. In the Summary of Results of the *Challenger* Expedition specimens are recorded from several *Challenger* stations in the Atlantic; one of these is off the eastern coast of the United States in the same general region from which the *Albatross* material came. Another is off the West Indies. Two others are in the South Pacific, westward from the mouth of the Rio la Plata. There are numerous records for it off the British Isles. Goës records it from Spitzbergen and also from the Caribbean. There are records for it from the Mediterranean, the Antarctic, the Kerimba Archipelago, off New Zealand, and elsewhere. There seems to be a question as to whether this is really a very widely distributed species or whether, being of a smooth type with very few distinguishing characters, there may be several forms included under this name. In the Gulf of Mexico there is a varietal form which has very numerous very fine costae, which are so fine and close together that it is difficult to make them out except with a considerable magnification. In their general shape they are similar to the smooth forms from the Atlantic coast of the United States.

Lagena gracillima—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19020	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Rare.
19021	U.S.N.M.	4	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Few.
19022	U.S.N.M.	4	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Few.
19023	U.S.N.M.	2	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.....	Rare.
3147	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Rare.
19024	U.S.N.M.	1	D2242....	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.....	Rare.
19025	U.S.N.M.	2	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn.m., bk.sp.	Rare.
19026	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	1,081	38.5	br. m.....	Rare.
19033	U.S.N.M.	1	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.
19027	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.
19028	U.S.N.M.	1	.....	Off Key West, Fla.....	78	.....	.....	Rare.
19029[1]	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Rare.
19030[1]	U.S.N.M.	2	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
19031[1]	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.

[1] Variety.

LAGENA HEXAGONA (Williamson).

Plate 4, fig. 6.

Entosolenia squamosa Montagu, var. *hexagona* Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 20, pl. 2, fig. 23; Rec. Foram. Great Britain, 1858, p. 13, pl. 1, fig. 31.

Lagena hexagona Siddall, Cat. Brit. Rec. Foram., 1879, p. 6.—Green, Amer. Journ. Micr., vol. 6, 1881, p. 46, pl., fig. 4.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 472, pl. 58, figs. 32, 33.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 326, pl. 10, fig. 60.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 80, pl. 13, fig. 746.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 28.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 8.—Chapman, Trans. New Zealand Inst., vol. 38, 1905, p. 92.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 213.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 425.—Chapman, Subantarctic Ids. N. Zealand, 1909, p. 334; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 408.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 17, pl. 2, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 17, pl. 6, figs. 2, 3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76; Trans. Zool. Soc. London, vol. 20, 1915, p. 656; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 244; Journ. Roy. Micr. Soc., 1916, p. 44.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 608.

Description.—Test pyriform, base semicircular, apertural end somewhat drawn out, with a short neck; surface ornamented by rather regular hexagonal reticulations, the sides of the hexagons verticals, the angles pointing toward the ends of the test.

Length up to 0.25 mm.

Distribution.—Williamson originally described this species from off the Shetland Islands. As the above references show, it is recorded from many stations about the British Isles and comparatively few elsewhere. The European material that I have seen, especially from off the southwest of Ireland, is very typical and abundant. There are a few specimens from the western Atlantic which I have referred rather questionably to this species. They differ from the typical British form in either their slightly different shape, or in the relative size of the reticulations.

The typical British material, so far as I have seen, is of the type given by Williamson, that is, the pyriform test with a broadly rounded initial end, the short neck, and the deep reticulations with the peculiar arrangement already noted in the description above.

Lagena hexagona—material examined.

Cat. No.	Coll. of—	No. of speci-mens.	Station.	Locality.	Depth in fath-oms.	Bot-tom tem-pera-ture.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19034	U.S.N.M.	9	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
19035	U.S.N.M.	1	D2055....	42 32 00 N.; 68 17 00 W..	100	.....	bu. m., s....	Rare.
19036	U.S.N.M.	6	D2639....	25 04 50 N.; 80 15 10 W...	56	.....	co. s.....	Frequent.
19037	U.S.N.M.	4	D2756....	3 22 00 S.; 37 49 00 W...	417	40.5	gy. spk.....	Few.
.....	J.A.C....	6	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Frequent.
.....	J.A.C....	1	*Lord Bandon* Log 58.	Off Bantry Bay, southwest Ireland.	110	.....	.....	Rare.
.....	J.A.C....	7	*Flying Falcon* Log. 8.	10 miles off Glencoe, southwest Ireland.	53	.....	.....	Frequent.

LAGENA HISPIDA Reuss.

Plate 4, figs. 7, 8.

"Sphaerulae hispidae" Soldani, Testaceographia, vol. 2, 1798, p. 53, pl. 17, figs. V, X.

Lagena hispida Reuss, Zeitschr. deutsch. geol. Ges., vol. 10, 1858, p. 43; Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 335, pl. 6, figs. 77–79.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 459, pl. 57, figs. 1–4; pl. 59, figs. 2, 5.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 337.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 902.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 324, pl. 10, fig. 26.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 74, pl. 13, figs. 723.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 27.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 53, fig. 8.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 53.—Millett, Journ. Roy. Micr. Soc., 1901, p. 6.—Chapman, Trans. New Zealand Inst., vol. 38, 1905, p. 91.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 385, pl. 14, fig. 31; pl. 15, figs. 1, 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 13, pl. 4, figs. 4, 5; pl. 5, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 74.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 243, pl. 41, fig. 16.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 608.

Description.—Test globular or pyriform, usually not compressed, neck elongate, thin, slender; wall thin, clothed with delicate spines uniformly distributed over the test.

Length 0.40–0.80 mm.

Distribution.—Spinose specimens of *Lagena* seem to be rare in the western Atlantic. I have had specimens from but two stations,

D2144 in the Caribbean, off Panama, and D2150, in the Caribbean, off Yucatan. Flint records specimens from the northern part of the Gulf of Mexico and in the Caribbean, west of the Leeward Islands. Brady's Atlantic *Challenger* records, except for one off the western coast of Africa, are all within this same faunal region, off the coast of Brazil, off the West Indies, and off Bermuda. There are numerous records for the species about the coast of the British Isles. From the large number of records and the different forms figured it is quite probable that a closer study of the hispid forms of *Lagena* will show definite species or varieties with definite geographical limits.

Lagena hispida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19062	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19063	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.

LAGENA IOTA, new species.

Plate 4, figs. 9–11.

Description.—Test somewhat pyriform, about one and one-half times as long as broad, somewhat compressed, base bluntly pointed, apertural end somewhat drawn out, basal portion with an elongate curved thickening at each side of the periphery, not connecting with one another at the base; wall of the test smooth, but the central portion usually clouded with numerous minute thickenings; aperture with a slight entosolenian tube.

Length 0.50 mm.

Distribution.—Type-specimens (U.S.N.M. Cat. No. 19083) from *Albatross* station D2041, in 1,608 fathoms (2,940 meters), off the northeastern coast of the United States. I have failed to find this species elsewhere in the *Albatross* dredgings.

Lagena iota—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19086	U.S.N.M.	2	D2029....	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.....	Rare.
19087	U.S.N.M.	3	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Few.
19088	U.S.N.M.	1	D2036....	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz.....	Rare.
19089	U.S.N.M.	2	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
19083	U.S.N.M.	10+	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Abundant.
19090	U.S.N.M.	2	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
19091	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	.....	glob. oz.....	Rare.
19092	U.S.N.M.	2	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
19093	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	.....	co.....	Rare.
19094	U.S.N.M.	1	D2530....	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.....	Rare.
19095	U.S.N.M.	1	D2684....	39 35 00 N.; 70 54 00 W..	1,106	.....	br. c., bk. sp.	Rare.
19096	U.S.N.M.	1	D2706....	41 28 30 N.; 65 35 30 W..	1,188	.....	gy. oz., for..	Rare.
19097	U.S.N.M.	3	D2713....	38 20 00 N.; 70 08 30 W..	1,859	.....	br. c.....	Few.

LAGENA LACUNATA Burrows and Holland.

Plate 4, figs. 12, 13.

Heron-Allen and Earland[5] record a few specimens of this species from the west of Scotland.

LAGENA LAEVIGATA (Reuss).

Plate 5, figs. 1, 2.

Fissurina laevigata Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 366, pl. 46, fig. 1; Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 338, pl. 6, fig. 84.—Terquem, Mém. Soc. Géol. France, ser. 3, vol. 2, 1882, p. 30, pl. 1 (9), figs. 17*a*, *b*.

Lagena laevigata Terrigi, Atti Accad. Pont. Nuovi Lincei, vol. 33, 1880, p. 177, pl. 1, fig. 6.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 473, pl. 114, figs. 8*a*, *b*.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 81, pl. 2, fig. 6.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 905.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 330, pl. 10, figs. 64, 65.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 29.—Madsen, Medd. fra Dansk. Geol. Forening, No. 2, 1895, pp. 74, 195, pl., fig. 3.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 493.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 5, pl. 1, fig. 6 [?].—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 425.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 409.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 17.—Chapman, Zool. Res. *Endeavour*, pt. 3, 1912, p. 311.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 7, pl. 2, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 81.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 21.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.—Heron-Allen and Earland, Trans. Zool. London, vol. 20, 1915, p. 661; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 249, pl. 41, figs. 23, 24; Journ. Roy. Micr. Soc., 1916, p. 45.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 607; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 174.

Fissurina globosa Bornemann, Zeitschr. deutsch. geol. Ges., vol. 7, 1855, p. 317, pl. 12, fig. 4.

Lagena marginata Haeusler, Neues Jahrb. für. Min., 1887, pt. 1, p. 186, pl. 4, figs. 51, 52 (not *Vermiculum marginatum* Montagu).

Description.—Test subglobose, compressed, somewhat pyriform in front view, in cross section elliptical; wall smooth, transparent in

[5] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254, pl. 51, figs. 28, 29.

thin specimens or opaque in more thickened ones, along the lateral margins usually clear even in thickened specimens; aperture elongate, fairly narrow, connecting with the interior by a fairly long entosolenian neck.

Length up to 1 mm.; breadth slightly less.

Distribution.—It is strange that this species which is apparently so common in many parts of the world has not occurred in its typical form in the western Atlantic collections. It seems to be abundant about the British Isles.

LAGENA LAEVIS (Montagu).

Plate 5, fig. 3.

There are very numerous records for this species, covering most of the areas from which foraminifera have been recorded, but a reference to the various forms figured will show that many different smooth forms have been included under this name. Such specimens are not recorded in the *Albatross* collections, although there are numerous smooth forms which might well fit some of the figures given for this species.

LAGENA LAEVIS (Montagu), var. NEBULOSA, new variety.

Plate 5, figs. 4, 5.

Lagena laevis H. B. Brady (part) (not Montagu), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 455, pl. 56, figs. 10–12, 13 [?], 14 [?].

Description.—Variety differing from the typical in the form of the test which is globular or somewhat cylindrical, the neck slender, test with the sides parallel, the surface of the test with numerous thickenings giving a clouded appearance, almost subspinose.

Length up to 0.80 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19076) from *Albatross* station D2144, in 896 fathoms (1,639 meters), in the Caribbean. Specimens which may be referred to this variety occur at two different localities in the *Albatross* dredgings. There are three stations in the Caribbean, the remainder off the northeastern coast of the United States. Brady records *Lagena laevis* in this same general area from off the coast of Brazil, off the Virgin Islands, off Bermuda, and off the eastern coast of the United States. An examination of some of the originals of these records may show that they belong to this variety.

Lagena laevis, var. nebulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19072	U.S.N.M.	2	D2041....	39 22 50 N.; 68 25 60 W..	1,608	38.0	glob. oz.....	Rare.
19073	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
19074	U.S.N.M.	1	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., crs. g.....	Rare.
19075	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
19076	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19077	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
19078	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.....	Rare.
19079	U.S.N.M.	1	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. s.	Rare.
19080	U.S.N.M.	1	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.....	Rare.
19081	U.S.N.M.	1	D2684....	39 35 00 N.; 70 54 00 W..	1,106	.....	br.c., bk.sp..	Rare.
19082	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W..	1,859	.....	br. oz.....	Rare.

LAGENA LAGENOIDES (Williamson).

Plate 5, figs. 6–8.

Entosolenia marginata Walker and Boys, var. *lagenoides* Williamson, Rec. Foram. Great Britain, 1858, p. 11, pl. 1, figs. 25, 26.

Lagena lagenoides Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 324, pl. 2, figs. 27, 28.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 479, pl. 60, figs. 6, 8, 9, 12.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 341, pl. 12, figs. 22.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 906.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, fig. 23.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 39, pl. 16, fig. 2.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 88; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 183.

Description.—Test flask-shaped, usually compressed, body oval or ovate, surrounded by a simple peripheral keel which has numerous radiating tubulations, neck usually comparatively short, in complete specimens usually joined with the peripheral keel.

Length 0.4–1 mm.

Distribution.—Williamson originally described this as a variety of *Lagena marginata.* It has been recorded by numerous authors from about the British Isles, as the above list of references will show. The only station from which I have had specimens in the *Albatross* collections which might be referred to this species is D2150, in the Caribbean Sea. Specimens were few, but radiating tubulations were much fewer than in *Lagena sublagenoides* Cushman. There are numerous other records for this species in different parts of the oceans, but they are not always figured and described in detail, and it is probable that there are more than one species or variety involved.

Lagena lagenoides—*material examined.*

Cat. No.	Coll. of—	Number of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19112	U.S.N.M.	2	D2150....	° ′ ″ ° ′ ″ 13 34 45 N.; 81 21 10 W..	382	°F. 45.8	wh. crs., s...	Rare.

LAGENA LAGENOIDES (Williamson), var. TENUISTRIATA H. B. Brady.

Plate 5, fig. 9.

Lagena tubulifera H. B. Brady, var. *tenuistriata* H. B. Brady, Quart. Journ. Micr. Sci., vol, 21, 1881, p. 61.

Lagena lagenoides Williamson, var. *tenuistriata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 479, pl. 60, fig. 11 (not 15, 16); Journ. Roy. Micr. Soc., 1887, p. 907.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 336, pl. 10, figs. 94, 95.—Millett, Journ. Roy. Micr. Soc., 1901, p. 264.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 12, pl. 2, figs. 9, 10.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 19; Journ. Quekett Micr. Club, vol. 11, 1912, p. 413, pl. 19, figs. 4, 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 39, pl. 16, fig. 3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 88, pl. 7, fig. 7.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1019.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test flask-shaped, pyriform, keel with comparatively few, large, remote tubulations, body of test not greatly compressed; surface ornamented with coarse longitudinal costae running the length of the body of the test.

Length 0.35–0.50 mm.

Distribution.—Most of the records for this variety are from the region of the British Isles and the Mediterranean. Although specimens referred to the typical form of the species have occurred in the *Albatross* dredgings, none of them showed the striations characteristic of this variety.

LAGENA LINEATA (Williamson).

Plate 5, fig. 10; pl. 6, figs. 5–8.

Entosolenia lineata Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 18, pl. 2, fig. 18.

Entosolenia globosa (Montagu), var. *lineata* Williamson, Rec. Foram. Great Britain, 1858, p. 9, pl. 1, fig. 17.

Lagena lineata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 328, pl. 4, fig. 48.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 461, pl. 57, fig. 13.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 336, pl. 14, figs. 13–16.—H. B. Brady, Journ. Roy.

Micr. Soc., 1887, p. 902.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, fig. 33.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 326, pl. 10, figs. 29, 30.—Morton, Proc. Portland Soc., 1897, p. 118.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 7.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 210.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 4.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 334, pl. 15, fig. 3.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 15.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 75.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 656; Journ. Linn. Soc., Zool., ser. 2, vol. 11, 1916, p. 243; Journ. Roy. Micr. Soc., 1916, p. 44.

Description.—Test subglobular, or slightly pyriform, broadest toward the base, apertural end truncate, with an entosolenian neck, base often with a short projection; surface with very fine longitudinal markings, often indistinct; surface dull.

Length up to 0.25 mm.

Distribution.—This species, originally described by Williamson, occurs at a large number of stations off the British Isles. The figures of specimens from other regions seem to show that they are not identical with the British specimens. I have failed to find any typical specimens except in the British material that I have had. This is from off Baltimore, southwest of Ireland, in 26 fathoms (48 meters).

LAGENA LONGISPINA (H. B. Brady).

Plate 5, figs. 11, 12.

Lagena longispina H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 61; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 454, pl. 56, figs. 33–36; pl. 59, figs. 13, 14.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 2.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1016.

Description.—Test subglobular, or somewhat compressed; wall fairly thick; surface smooth, basal portion furnished with two or more long spines.

Length without the spines up to nearly 1 mm.; spines often longer than the length of the test.

Distribution.—Brady figures several forms under this specific name, all of which are marked by elongate spines from the basal portion of the test. Flint's figures from the *Albatross* collections show specimens very much like those I have figured here. So far as I have seen in the *Albatross* material from the western Atlantic, the specimens typically have two very long divergent spines, their centers hollow. Egger gives figures of this species but they are not at all

characteristic if they can be considered specifically identical with this species. It has not been recorded in all the work from about the British Isles and is evidently a species of comparatively deep water. It was found at a number of stations south of the latitude of New York, off the northeastern coast of the United States, one station in the northern part of the Gulf of Mexico, and one east of Trinidad. Flint's specimens were from the Gulf of Mexico and the Caribbean. Brady's stations are well scattered in the deeper water of various parts of the Atlantic and elsewhere.

Lagena longispina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18995	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
18996	U.S.N.M.	1	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Rare.
18997	U.S.N.M.	1	D2039....	39 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Rare.
18998	U.S.N.M.	1	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Rare.
18999	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	.....	glob. oz.....	Rare.
19000	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Rare.
19001	U.S.N.M.	2	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Rare.
19002	U.S.N.M.	1	D2754....	11 40 00 N.; 58 33 00 W..	880	38.0	glob. oz.....	Rare.

LAGENA LUCIDA (Williamson).

Plate 6. figs. 1, 2.

Entosolenia marginata Montagu, var. *lucida* Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 17, pl. 2, fig. 17.

Lagena lucida Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 324, pl. 2, figs. 25, 26.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 80, pl. 2, figs 25, 26.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 905.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 213.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 6, pl. 1, figs. 9–12.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 425.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 17, pl. 2, fig. 7; Journ. Quekett Micr. Club, vol. 11, 1912, p. 401, pl. 17, fig. 13 (12? 14?).—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 87; Trans. Linn. Soc. London, ser 2, vol. 11, 1916, p. 249; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test somewhat compressed, marginal portion and central area clear and translucent, with a rather broad more or less opaque band between; wall smooth; aperture usually fissurine or rounded.

Length 0.30–0.50 mm.

Distribution.—Williamson's original figure of this species shows a typical British specimen. In this same form the species is common

about the British Isles but seems to be lacking on the western side of the Atlantic. There are a few references for it from other regions, but for the most part the figures are not typical. I have had it from several European stations.

Lagena lucida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
						°F.		
.....	J.A.C....	1	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	.....	m., s.....	Rare.
.....	J.A.C....	1	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Rare.
.....	J.A.C....	1	*Lord Bandon* Log 58.	Off Bantry Bay, southwest Ireland.	110	.....	.....	Rare.
.....	J.A.C....	1	.....	Dog's Bay, Ireland.....	.....	.....	.....	Rare.

LAGENA LYELLII (Seguenza).

Plate 6, fig. 3.

Amphorina lyellii SEGUENZA, Foram. mon. mioc. Messina, 1862, p. 52, pl. 1, fig. 40.

Lagena lyellii H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 292, pl. 11, fig. 7.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—BALKWILL and MILLETT, Journ. Micr., vol. 3, 1884, p. 27, pl. 2, fig. 2; Rec. Foram. Galway, 1908, p. 5.—SIDEBOTTOM, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 15, pl. 1, figs. 13–15, 17, 18?.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 79, pl. 6, fig. 8; Trans. Zool. Soc. London, vol. 20, 1915, p. 659; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247; Journ. Roy. Micr. Soc., 1916, p. 45.

Nearly all the records for this species are from the coasts of the British Isles and the Mediterranean, although Heron-Allen and Earland record it from the Kerimba Archipelago. It has not occurred on the western side of the Atlantic.

LAGENA MALCOMSONII Wright.

Plate 6, fig. 4.

Lagena laevigata (REUSS), var. *malcomsonii* WRIGHT, Proc. Belfast Nat. Field Club, ser. 2, vol. 3, 1910–1911, App., p. 4, pl. 1, figs. 1, 2.

Lagena malcomsonii HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 84, pl. 6, fig. 9; Trans. Zool. Soc. London, vol. 20, 1915, p. 662; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251; Journ. Roy. Micr. Soc., 1916, p. 46.

Heron-Allen and Earland give the following notes on this species from the Clare Island Survey Report:

A few specimens sparingly distributed over 11 stations. Wright's species is merely *L. quadrata* (Williamson) in which the marginal edges are rounded

instead of acute, and the aperture is surrounded by a produced lip. Specimens vary accordingly within all the limits usually found in *L. quadrata*. Wright's figures represent a somewhat long shell with practically parallel sides. The range in shape among the Clare Island specimens extends from almost square tests to the outline of Wright's figure, but we have met with specimens in *Goldseeker* dredgings in which the shell is very much longer and narrower, resembling, in fact, a piece of compressed tubing.

They also record it from the west of Scotland and off South Cornwall. It seems to be rare. I have had no specimens from the western Atlantic.

LAGENA MARGINATA (Walker and Boys).

Plate 6, fig. 9.

There are many references to this species in the literature, but if they are examined it will be found that they vary greatly in their characters. The main characteristic seems to be the development of a keel of greater or less extent about a usually subspherical central chamber. If, however, the original figures of Walker and Boys are consulted, it will be found that their figures show a more or less compressed pyriform test, gradually tapering from the somewhat curved apertural end, with a very broad rounded basal portion, and instead of having a thin broad keel, have a rounded narrow marginal carina. Such specimens as this are common about the British Isles and should be taken as the typical form of this widely recorded species. I have not found typical material on the western side of the Atlantic. As there are so many forms quoted under this species, an examination of much of the material which has passed under this name should be made and the various forms discriminated.

LAGENA MARGINATA (Walker and Boys), var. INAEQUILATERALIS J. Wright.

Lagena marginata (Walker and Boys), var. *inaequilateralis* Wright, Rep. Belfast Nat. Field Club, 1885–1886, App., p. 321, pl. 26, fig. 10; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 10, pl. 2, fig. 6; vol. 54, No. 16, 1910, p. 18.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 85; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251; Journ. Roy. Micr. Soc., 1916, p. 46.

Heron-Allen and Earland make the following notes on this variety:

"An occasional specimen found at 6 different stations. Only a few present the characteristics of Wright's variety in a strongly marked manner. When typical this is one of the most distinctive and interesting varieties we know. The highly convex surface on one side of the shell, strongly contrasted with the flat surface on the other, and the curious aperture situated under a little hood on one side—

always the flat side of the test—are features not to be overlooked. The shape of the hood varies considerably and in some cases almost attains the trumpet-like character of the aperture of *L. Millettii*, but, of course, on a very much smaller scale."

They also record it from the west of Scotland and off South Cornwall, rare in both cases. Wright recorded it from off the southwestern coast of Ireland.

LAGENA MARGINATA (Walker and Boys), var. SEMICARINATA Sidebottom.

Plate 6, fig. 13.

Lagena marginata (Walker and Boys), var. *semicarinata* Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 10, pl. 2, fig. 7.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 85, pl. 7, fig. 4.

The only Atlantic record seems to be that of Heron-Allen and Earland, from whom the figure is copied as well as the following notes:

"We have one specimen from Station 13 which we are inclined to attribute to Mr. Sidebottom's variety in spite of certain essential differences. In the text of his paper he described the variety under the name of *L. inaequilateralis* Wright var. *semi-marginata* (nov.), no doubt overlooking the fact that his varietal name had already been appropriated by Reuss. In the plate, however, this specimen is described as var. *semi-carinata*. Mr. Sidebottom's specimen is described as '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.'

"Our specimen differs, inasmuch as the aperture is fissurine, and the shell is of the normal equally biconvex type, with an attached entosolenian tube. The marginal keel, however, exactly resembles Mr. Sidebottom's figure in position and extent."

LAGENA MARGINATA (Walker and Boys), var. SEMIMARGINATA Reuss.

Plate 6, figs. 14, 15.

The only Atlantic records for this species are given by Brady,[6] off Prince Edwards Island, 50–150 fathoms (91–274 meters), off Heard Island, 75 fathoms (137 meters), and three stations in the middle of the South Atlantic, 1,900, 2,200 and 2,350 fathoms (3,475, 4,024, and 4,298 meters). Heron-Allen and Earland[7] record a single specimen from the west of Scotland.

[6] Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 477, pl. 59. figs. 17, 19.
[7] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251.

LAGENA MARGINATA (Walker and Boys), variety.

Plate 8, fig. 1.

Description.—Variety differing from the typical in the very slight thin keel extending entirely about the test, the aperture very elongate, elliptical.

Diameter up to 1 mm. or slightly more.

Distribution.—In the Gulf of Mexico and the Caribbean there is a large form with a very broad thin transparent keel which may possibly be a variety of *Lagena marginata*, but further study may show it to be a distinct species.

Lagena marginata, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19116	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
19117	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19118	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
19119	U.S.N.M.	1	D2383 ...	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Rare.
19120	U.S.N.M.	1	D2385 ...	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Rare.
19121	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
19122	U.S.N.M.	3	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Few.

LAGENA MARGINATO-PERFORATA Seguenza.

Plate 7, fig. 4.

Lagena marginato-perforata Seguenza, Atti Accad. Lincei, ser. 3, vol. 6, 1880, p. 332, pl. 17, fig. 34.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 10, pl. 2, fig. 5; vol. 54, No. 16, 1910, p. 18.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 86, pl. 7, figs. 5, 6; Trans. Zool. Soc. London, vol. 20, 1915, p. 663; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.

"This species occurs at 9 stations among the dredgings and is quite common in the fine mud of Station 13. There is considerable variety in the specimens, some having a single keel, the true *L. marginato-perforata*, others a double keel (= *Fissurina punctata* (Seguenza)); while many of the specimens are ornamented with a varying number of minute radiating costae at the two extremities of the shell, which, however, are not produced over the central area of the test. There is usually an attached entosolenian tube, and the coarse perforations from which the species takes its name are generally suppressed in the area of the shell where the tube is attached. This agrees with Mr. Sidebottom's specimen and drawing; but in his specimens the internal tube is described as being straight and free. The species is of fairly common occurrence in shallow-water tropical gatherings. Mr. Wright has recently described and figured

it under the name *L. laevigata* var. *marginato-perforata*, as a fossil from the Estuarine Clays of Magheramorne, 'very common,' recent Irish specimens 'very few.'"

The above notes are from Heron-Allen and Earland on their specimens from the Clare Island region. They also record it from the west of Scotland and off South Cornwall, but rare. I have found no specimens that I could refer to it in the western Atlantic material.

LAGENA MELO (D'Orbigny).

Oolina melo d'Orbigny, Voy. Amér. Mérid., vol. 5, pt. 5, "Foraminifères," 1839, p. 20, pl. 5, fig. 9.

Lagena melo Jones, Parker, and H. B. Brady, Pal. Soc., vol. 19, 1866, p. 38, pl. 1, fig. 35.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, figs. 21, 24, 25?.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Woodward, The Observer, vol. 4, 1893, p. 143.—Millett, Journ. Roy. Micr. Soc., 1901, p. 8.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, no. 16, 1910, p. 17.

Description.—Test subglobular or slightly pyriform, the basal end broadly rounded, the apertural end slightly tapering, the ornamentation consisting of numerous raised costae, the concave surfaces between with numerous transverse ridges dividing the area into rectangular divisions.

Length up to 0.25 mm.

Distribution.—Specimens which can be referred to this species were obtained at a few *Albatross* stations. There are a few records for it from the western Atlantic, those of Brady, Parker, and Jones from off the Abrohlos Bank, and it has been recorded from the Gulf of St. Lawrence, Gaspé Bay, and off Labrador, and off the banks of Newfoundland. There are a few records for it about the British Isles, but it seems to be less common there than are the other reticulately ornamented forms. The *Albatross* specimens are from the northeastern coast of the United States, with one station off Cape Hatteras and one off the southern part of Florida.

Lagena melo—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19038	U.S.N.M.	2	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
19039	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m. s.....	Rare.
19040	U.S.N.M.	3	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s.....	Few.
19041	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.
	J.A.C.....	1	*Lord Brandon* Log 28.	Off Baltimore, southwest Ireland.....	26	.....	.....	Rare.

LAGENA MONTAGUI (Alcock).

Plate 7, figs. 1–3; pl. 8, fig. 7.

Entosolenia montagui Alcock, Proc. Lit. Philos. Soc. Manchester, vol. 4, 1865, p. 206.

Lagena squamosa Montagu, var. *montagui* Wright, Irish Nat., vol. 9, 1900, p. 54, pl. 2, fig. 2.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1911, p. 321, pl. 10, figs. 14–16; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76, pl. 7, figs. 11, 12.

This variety or species is known from about the region of the British Isles. The following notes are from Heron-Allen and Earland on their Clare Island specimens, which are here figured.

"An occasional specimen at six stations, varying as usual considerably in size and contour.

"The exact nature of this curious variety is extremely doubtful. In the ordinary course such distorted specimens would be regarded as 'sports' and set aside; but the general uniformity of their nature, and their wide distribution, coupled with the fact that no other species of *Lagena* presents similar characteristics, make it certain that some zoological significance is attachable to their occurrence. Possibly they represent some stage in the life-history of the species with which we are at present unfamiliar.

"We have no data to add to the information already furnished by Mr. Wright. The most characteristic Clare Island specimens correspond exactly with Alcock's original description of the compressed form 'resembling a dried fig.'"

LAGENA MILLETTII Chaster.

Plate 7, fig. 5.

Lagena millettii Chaster, First Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 61, pl. 1, fig. 10.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 83, pl. 6, fig. 10.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 45.

Specimens of this species seem to be rare about the British Isles. They are recorded by Pearcey from the South Atlantic in deep water. It apparently does not occur in the western Atlantic.

LAGENA ORBIGNYANA (Seguenza).

Entosolenia marginata Williamson (part) (not *Lagena marginata* (Walker and Boys)), Rec. Foram. Great Britain, 1858, p. 9, pl. 1, figs. 19, 20.

Fissurina orbignyana Seguenza, Foram. mon. mioc. Messina, 1862, p. 66, pl. 2, figs. 24, 26.

Lagena orbignyana Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 341.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 906.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Ann. Mag. Nat. Hist., vol. 6, ser. 5, 1890, p. 124; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 214.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 426.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 90; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 253; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test compressed, inflated in the middle, the central body portion of the test nearly circular, apertural end slightly extended, periphery with a thin keel running entirely about the test, at either side of which is a secondary lateral keel, slightly raised above the general surface; wall smooth, finely punctate, test with an entosolenian neck.

Length not exceeding 0.40 mm.

Distribution.—I have had numerous specimens from off the British Isles which are of this typical form figured by Williamson and in that region it is one of the common species. Although there are numerous records for the species elsewhere, the figures given show that the typical form was not that figured by the authors from other regions. I have failed to find any typical material in the western Atlantic, but the species is represented there by numerous varieties.

This short, nearly circular form figured by Williamson may be taken as the typical form of the species. It is most simply characterized by the peripheral keel and the secondary keel on either side, dividing the test into two distinct portions on either side, that of the central part of the test inside the ring formed by the secondary keel and the concave area extended around the test between the peripheral and the secondary keels. These two areas become variously ornamented and changed in their relation to one another, but these changes seem to be rather constant and show definite geographical limits in their distribution.

LAGENA ORBIGNYANA (Seguenza), var. ANTILLEA, new variety.

Plate 7, figs. 10, 11.

Description.—Variety differing from the typical in the very large size, in the ornamentation, which consists of tubular radiate markings in the peripheral keel, the secondary keel marked by a series of pits which extend in on to the body of the test itself, and extend up both sides of the apertural neck, nearly to the aperture itself; wall very thick, opaque.

Length slightly exceeding 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19107) from *Albatross* station D2355, in 399 fathoms (730 meters), in the Caribbean, off Yucatan. This variety is somewhat similar to var. *lacunata* (Burrows and Holland), but differs in the distribution of the pits and in the more elaborate ornamentation. Its very thick walls, large size, together with the peculiar ornamentation, will distinguish it from other varieties of the species. It seems to be limited to the western tropical Atlantic.

Lagena orbignyana, var. antillea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19106	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19107	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	.....	yl. oz.....	Rare.
19108	U.S.N.M.	1	H179.....	14 20 30 N.; 63 10 00 W..	821	.....	co. s., sh., for	Rare.

LAGENA ORBIGNYANA (Seguenza), var. CARIBAEA, new variety.

Plate 7, figs. 6–9.

Lagena orbignyana H. B. Brady (part) (not Seguenza), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 59, fig. 24.

Description.—Variety differing from the typical in the much larger size, thicker-walled test, and the surface which is granular.

Length up to 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19098) from *Albatross* station D2144, in 896 fathoms (1,639 meters), in the Caribbean. It has also occurred at a few other stations in this general region. This is evidently the same as the specimen figured by Brady, and it would be very interesting to know from what locality his figured specimen came. It is much larger than the typical form, and is evidently a tropical variety.

Lagena orbignyana, var. caribaea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19098	U.S.N.M.	1\						
19099	U.S.N.M.	2/	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Few.
19100	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
19101	U.S.N.M.	1	D256S....	39 15 00 N., 68 08 00 W..	1,781	36.9	gy. oz.....	Rare.
19102	U.S.N.M.	1	H133.....	11 33 20 N.; 66 19 00 W..	533	.....	gy. m., for...	Rare.

LAGENA ORBIGNYANA (Seguenza), var. CLATHRATA H. B. Brady?

Plate 8, fig. 5.

There are records for this form from the Atlantic about the British Isles as follows: Balkwill and Millett;[8] H. B. Brady;[9] Wright;[10] Balkwill and Millett;[11] and Heron-Allen and Earland.[12]

The British specimens do not seem to be typical of the form described by Brady, whose typical specimens were from the Indo-Pacific. In the *Challenger* report Brady mentions the fact that the British specimens are not identical in all their characters with his specimens from the Pacific.

LAGENA ORBIGNYANA (Seguenza), var. ELLIPTICA, new variety.

Plate 6, figs. 10–12.

Description.—Variety differing from the typical in the elongate pyriform shape, the central body portion of the test being elliptical, peripheral, and lateral keels sharp, thin, translucent, body of the test transparent, thin, made slightly granular by the punctae, the area between the keels and bordering the inner margin on the secondary keel usually opaque.

Length up to 0.60 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 19105) from *Albatross* station D2150, in 382 fathoms (697 meters), in the Caribbean. This somewhat resembles Brady's figure.[13]

Lagena orbignyana, var. elliptica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19104	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
19105	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. ers. s....	Few.

LAGENA ORBIGNYANA (Seguenza), var. VARIABILIS Wright.

Plate 8, fig. 2.

Lagena orbignyana (Seguenza), var. *variabilis* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482, pl. 20, figs. 9, 9*b*.

Description.—Variety differing from the typical in having the basal portion of the body of the test with numerous longitudinal costae which only occur on the lower third.

Length 0.40–0.60 mm.

[8] Journ. Micr., vol. 3, 1884, p. 82, pl. 2, fig. 14; pl. 4, fig. 3.
[9] Journ. Roy. Micr. Soc., 1887, p. 906.
[10] Irish Nat., vol. 9, no. 3, 1900, p. 54.
[11] Rec. Foram. Galway, 1908, p. 6.
[12] Proc. Roy, Irish Acad., vol. 31, pt. 64, 1913; p. 90, pl. 7, fig. 10; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254.
[13] Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 59, fig. 26.

Distribution.—Wright described this variety from off the southwest of Ireland in 750 fathoms (1,370 meters). I have a specimen from *Albatross* station D2097, off the northeastern coast of the United States, which is similar to that described by Wright, but it is evidently very rare, as it has not occurred at any of the other *Albatross* stations, so far as I have seen.

Lagena orbignyana, var. variabilis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19103	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	.....	glob. oz.....	Rare.

LAGENA ORBIGNYANA (Seguenza), var. WALLERIANA Wright.

Lagena orbignyana (SEGUENZA), var. *walleriana* WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481, pl. 20, figs. 8, 8*b*.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 253.

Description.—Variety differing from the typical in having the center of the convex face ornamented with a rounded boss-like protuberance.

Distribution.—This was described by Wright from specimens from off the southwest of Ireland in 53 and 145 fathoms (97 and 265 meters). Heron-Allen and Earland record a single typical specimen from the west of Scotland, and there are a few records for it outside the Atlantic. I have failed to find any specimens in the western Atlantic referable to this variety.

LAGENA ORBIGNYANA (Seguenza), variety.

Plate 8, fig. 3.

There are a very few specimens, similar to that figured, which seem to belong to *L. orbignyana*, but which need further specimens to give them specific character.

Lagena orbignyana, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19109	U.S.N.M.	1	D2564....	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.....	Rare.
19110	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Rare.

LAGENA ORBIGNYANA (Seguenza), variety.

Plate 8, fig. 4.

The specimen figured has a peculiar central ornamentation consisting of irregular longitudinal lines caused by confluent edges of coarse pits.

The specimen is not well preserved except in the central region, but it may be a variety of this species.

Lagena orbignyana, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19111	U.S.N.M.	1	D2260....	° ′ ″ ° ′ ″ 40 13 15 N.; 69 29 15 W..	46	°F. 50.2	gy. s.....	Rare.

LAGENA ORNATA Williamson.

Plate 8, figs. 6, 8.

Entosolenia marginata Montagu, var. *ornata* Williamson, Rec. Foram. Great Britain, 1858, p. 11, pl. 1, fig. 24.

Lagena ornata Jones, Parker, and H. B. Brady, Pal. Soc., vol. 19, 1866, p. 43, pl. 1, figs. 29–31.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Journ. Roy. Micr. Soc., 1877, p. 907.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 88, pl. 7, fig. 8; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 252; Journ. Roy. Micr. Soc., 1916, p. 46.

Except for the record of Whiteaves this species seems to be recorded only from the British Isles. It has been undoubtedly confused with *Lagena lagenoides* Williamson, but seems to be distinct. Heron-Allen and Earland note that it "appears to be always constant to type, even in such *minutiae* as the curving of the entosolenian tube."

LAGENA OVUM (Ehrenberg).

Plate 8, figs. 9, 10.

Miliola ovum Ehrenberg, Berlin Monatsber., 1843, p. 166; Mikrogeologie, 1854, pl. 23, fig. 2; pl. 29, fig. 45; pl. 31, fig. 4.

Lagena ovum Marsson, Mitth. nat. Ver. Neu-Vorpom. Rügen, Jahrg. 10, 1878, p. 120, pl. 1, fig. 1.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 454, pl. 56, fig. 5.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 323, pl. 10, fig. 9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 5, pl. 2, fig. 2.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 73, pl. 6, fig. 1; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p 242.

Description.—Test elongate, elliptical in front view, nearly circular in cross section, slightly compressed, ends broadly rounded, nearly equal; wall thin, transparent, smooth; aperture broadly elliptical, central, with a comparatively short entosolenian neck.

Length 0.40 mm.

Distribution.—Brady had this species from *Challenger* station 5 in the deep part of the North Atlantic, in 2,740 fathoms (5,011 meters). Egger records it from off West Africa and Heron-Allen and Earland record a single typical specimen from Killary Bay, Ireland, and two specimens from off the west of Scotland.

LAGENA PARADOXA Sidebottom.

Plate 8, fig. 11.

Lagena foveolata Reuss ? var. *paradoxa* Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 395, pl. 16, figs. 22, 23.

Description.—Test flask-shaped, elongate, the basal end broadly rounded and the greatest width near the base, thence tapering gradually to the apical end, which is furnished with a short, cylindrical, slender neck with a slight phialine lip, the base of the neck rather abruptly joined with the test; wall of the test compound, the outer surface longitudinally costate, with fine crossbars between them, the inner layer more or less spinose connecting it with the surface wall, wall opaque.

Length up to 0.20 mm.

Distribution.—Sidebottom originally described this form from the Southwest Pacific. I have specimens from four *Albatross* stations which are very similar to those described and figured by Sidebottom. They are not as long nor quite so tapering as his specimens and the costae not so pronounced. They have a similar compound wall, and the general manner in which the neck is attached to the body of the test is also strikingly similar. It seems worthy of specific rank.

Worn specimens show the two layers, the outer one of which often flakes off from the under one.

Lagena paradoxa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F		
19043	U.S.N.M.	1	D2093....	39 42 50 N.; 71 01 20 W..	1,000	39.0	for., s.....	Rare.
19044	U.S.N.M.	2	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co.....	Rare.
19045	U.S.N.M.	1	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.....	Rare.
19046	U.S.N.M.	1	D2684....	39 35 00 N.; 70 54 00 W..	1,106	.....	br. co.....	Rare.

LAGENA PERLUCIDA (Montagu).

Plate 8, figs. 12, 13.

Vermiculum perlucidum Montagu, Test. Brit., 1803, p. 525, pl. 14, fig. 3.
Lagena perlucida Brown, Illust. Conch. Great Britain, 1827, fly-leaf, pl. 1, fig. 29; edition 2, 1844, p. 3, pl. 56, fig. 29.—Schlumberger, Fueille des Jeunes Naturalistes, ann. 13, 1882, pl. 1, fig. 2.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78; Trans. Zool. Soc. London, vol. 20, 1915, p. 659; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 246; Journ. Roy. Micr. Soc., 1916, p. 45.
Lagena vulgaris Williamson, var. *perlucida* Williamson, Rec. Foram. Great Britain, 1858, p. 5, pl. 1, figs. 7, 8.

Description.—Test somewhat pyriform, elongate, widest near the base, the apertural end continued into an elongate cylindrical slender neck, with a slight lip, the opposite portion of the test with a few fine longitudinal costae, extended part way up the body of the test; surface otherwise smooth.

Length up to 0.25 mm.

Distribution.—All the records for this species seem to be from about the British Isles, except that of Heron-Allen and Earland, who record it as "few and poor" from the Kerimba Archipelago, off the southeastern coast of Africa. The only specimens I have had were from Dog's Bay, Ireland, and from 10 miles off Glencoe, southwest of Ireland, in 53 fathoms (97 meters), both from material received from Mr. Joseph Wright.

LAGENA PROTEA Chaster.

Plate 9, figs. 1, 2.

Lagena protea Chaster, First Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 62, pl. 1, fig. 14.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 15, pl. 2, fig. 18; vol. 54, No. 16, 1910, p. 19, pl. 2, figs. 17, 18; Journ. Quekett Micr. Club, vol. 11, 1912, p. 427.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 74, pl. 7, figs. 19, 20.

"This species occurs at four stations, the specimens being large and well developed. As the name implies, no two are alike. Mr. Sidebottom quotes a letter from the late Dr. Chaster supplementing his original description of the species, and replying to various criticisms to which the species had been subjected. In our opinion, this form remains one of the most unsatisfactory with regard to its affinities. There is little doubt that many of the specimens have originally been sessile, a habit which is otherwise unknown in the genus *Lagena*. Moreover, traces of apparent segmentation are not uncommon, which in itself would remove the species from the genus *Lagena* to *Polymorphina*. But the quantity of available material is not at present sufficient for final settlement of this question, and

for the present we prefer to leave the species in the position to which Dr. Chaster assigned it, and in which Mr. Sidebottom, who has had wider opportunities of judging than ourselves, concurs. It may be observed that Messrs. Jones and Chapman include this species among their type-species of Ramulina."

The above notes are from Heron-Allen and Earland. The only Atlantic records for this species seem to be those of Chaster and Heron-Allen and Earland from about the British Isles.

LAGENA PULCHELLA H. B. Brady.

Plate 9, fig. 3.

Lagena pulchella H. B. Brady, Rep. Brit. Assoc. (Nottingham), 1866, p. 70; Ann. Mag. Nat. Hist., ser. 4, vol. 6, 1870, p. 294, pl. 12, figs. 1*a*, *b*.—Balkwill and Millett Journ. Micr., vol. 3, 1884, p. 82, pl. 2, fig. 13.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342, pl. 12, fig. 19.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 906.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 253.

All the records for this species seem to be from about the British Isles, where it has been recorded by numerous authors.

LAGENA PULCHELLA H. B. Brady, var. HEXAGONA Heron-Allen and Earland.

Plate 9, fig. 4.

Lagena pulchella H. B. Brady, var. *hexagona* Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 254, pl. 41, fig. 27.

Heron-Allen and Earland describe this variety from a single specimen off the west of Scotland. They note that "in this very distinct variety the costae radiating from the oral end of the shell coalesce and form a hexagonal reticulation over the basal half of the faces of the test."

LAGENA QUADRATA (Williamson).

Plate 9, figs. 5, 6.

Entosolenia marginata Montagu, var. *quadrata* Williamson, Rec. Foram. Great Britain, 1858, p. 11, pl. 1, figs. 27, 28.

Lagena lucida Williamson, var. *quadrata* Reuss, Sitz. Akad. Wiss. Wien., vol. 46, pt. 1, 1862 (1863), p. 324, pl. 2, fig. 26.

Lagena quadrata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 475, pl. 59, figs. 3, 16; Journ. Roy. Micr. Soc., 1887, p. 905.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 331, pl. 10, figs. 78, 79.—Millett, Journ. Roy. Micr. Soc., 1901, p. 496, pl. 8, fig. 18.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 214.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 8, pl. 1, figs. 21, 22; pl. 2, figs. 1–3.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 142.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 339; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 409.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54,

No. 16, 1910, p. 18, pl. 2, fig. 8[?]; Journ. Quekett Micr. Club, vol. 11, 1912, p. 405, pl. 17, figs. 26–28[?].—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 50, pl. 14, figs. 19*a*, *b*, 20.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 35, pl. 14, fig. 9.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 84; Trans. Zool. Soc. London, vol. 20, 1915, p. 662; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 251; Journ. Roy. Micr. Soc., 1916, p. 46.

Lagena marginata (Walker and Boys), var. *quadrata* Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.

Lagena laevigata (Reuss), var. *quadrata* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 480.

Description.—Test compressed, somewhat quadrate in outline, usually somewhat keeled; aperture somewhat elongate; wall smooth.

Length up to 0.50 mm.

Distribution.—This species was originally described from off the British Isles by Williamson. It has since been recorded from about the British Isles by several authors. There are numerous records for its distribution elsewhere, but from the specimens I have seen from the western Atlantic and other regions the typical form is best seen in the eastern North Atlantic.

LAGENA QUADRICOSTULATA Reuss.

Lagena quadricostulata Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 469.—Schlicht, Foram. Pietzpuhl, 1870, pl. 4, figs. 25–30.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 486, pl. 59, figs. 7 (?), 15.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177 (?).—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 29.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 214.—Chapman, Zool. Res. *Endeavour*, pt. 3, 1912, p. 311.—Pearcey, Trans. Roy. Soc. Edinb., vol. 39, 1914, p. 1021.—Chapman, Biol. Res. "*Endeavour*," vol. 3, pt. 1, 1915, p. 22.

Description.—"Test pyriform and more or less compressed, the margin obtuse or rounded, the base frequently mucronate, and the aperture entosolenian; the surface bears four arched costae, two on each face of the test, near the lateral margins and parallel to them. The costae are thickest near the middle and taper away toward the ends."

Length 0.25 mm.

Distribution.—The Atlantic records for this species consist of a questionable one of Pearcey as very rare in the Faroe Channel, and from the Summary of Results of the *Challenger* Expedition, it is recorded from station 13, in the North Atlantic, 1,900 fathoms (3,475 meters). Wright records it as common, with trigonal forms rare, from Dog's Bay, Ireland, and Earland records it from shore sands at Bognor, Sussex, rare. Pearcey records it from Burdwood Bank, in the South Atlantic, 56 fathoms (102 meters), and one deeper station, in 1,998 fathoms (3,654 meters).

LAGENA RENIFORMIS Sidebottom.

Plate 9, figs. 7–11.

Lagena reniformis Sidebottom, Journ. Quekett Micr. Club, vol. 12, 1913, p. 204, pl. 18, fig. 15.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255, pl. 41, figs. 30–34.

The figures given here are copied from Heron-Allen and Earland, the specimens coming from off the coast of Scotland. There are no other records for the Atlantic.

LAGENA RETICULATA (Macgillivray).

Lagenula reticulata Macgillivray, Hist. Test. anim. Aberdeen, 1843, p. 38,
Lagena reticulata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 333, pl. 5, figs. 67, 68.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 213.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 424; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 244; Journ. Roy. Micr. Soc., 1916, p. 44.

I have given simply the Atlantic references for this species which occurs about the British Isles. It has not occurred in the western Atlantic.

LAGENA RIZZAE (Seguenza).

Plate 9, fig. 14.

Fissurina rizzae Seguenza, Foram. mon. mioc. Messina, 1862, p. 72, pl. 2, fig. 50.
Lagena rizzae Gough, Dept. Agric. Fish. Ireland, Sci. Invest., 1905 (1906), p. 4, pl. 1, fig. 3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 89, pl. 7, fig. 9; Trans. Zool. Soc. London, vol. 20, 1915, p. 666; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 253; Journ. Roy. Micr. Soc., 1916, p. 46.

Nearly all the records for this species are from the regions of the British Isles, it having been found by Gough, and at several localities by Heron-Allen and Earland. It may have been confused, as the last authors note, with *L. bicarinata* and *L. laevigata*. I have not found specimens from the western Atlantic referable to it.

LAGENA SEMILINEATA J. Wright.

Plate 9, figs. 12, 13.

Lagena semilineata Wright, Rep. Belfast Nat. Field Club, 1885–1886, App., p. 320, pl. 26, fig. 7; Irish Nat., vol. 9, 1900, p. 54.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 246, pl. 41, figs. 21, 22.

The only records for this species seem to be those of Wright from off the coasts of Ireland, and Heron-Allen and Earland from off the coast of Scotland.

LAGENA SEMISTRIATA Williamson.

Plate 9, fig. 15.

Lagena striata (D'Orbigny), var. *semistriata* Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 14, pl. 1, figs. 9, 10.

Lagena vulgaris Williamson, var. *semistriata* Williamson, Rec. Foram. Great Britain, 1858, p. 6, pl. 1, fig. 9.

Lagena sulcata (Walker and Jacob), var. *semistriata* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 350, pl. 13, fig. 23.

Lagena semistriata Jones, Parker, and H. B. Brady, Monogr. Foram. Crag, 1866, p. 34, pl. 4, fig. 6.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 465, pl. 57, figs. 14, 16, 17.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 339.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 903.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Woodward, The Observer, vol. 4, 1893, p. 143.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 327, pl. 10, figs. 34, 39.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 76, pl. 13, fig. 737.—Morton, Proc. Portland Soc., 1897, p. 117.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 486, pl. 8, figs. 2, 3.—Whiteaves, Geol. Survey, Canada, 1901, p. 10.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 3.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 424.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 16, pl. 2, fig. 2.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 50, pl. 14, figs. 1–5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 658; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 245; Journ. Roy. Micr. Soc., 1916, p. 45.—Cushman, Bull. 676, U. S. Geol. Survey, 1918, p. 9, pl. 2, fig. 3; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 610; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 179.

Description.—Test typically consisting of a somewhat pyriform body, the base truncate and rounded, the upper end extending out into a long cylindrical neck with a slightly spreading lip; surface of the test ornamented by a few longitudinal costae, largely confined to the basal portion of the test, variable in length, surface otherwise smooth.

Length up to 0.30 mm.

Distribution.—I have had no specimens from the western Atlantic which seem to be this species, nor is it recorded from the region south of the Gulf of St. Lawrence. There are records for it off Labrador, in Gaspé Bay, in the Gulf of St. Lawrence. It is very numerous about the British Isles, as the long list of references shows, and there are a few other records for it elsewhere.

Lagena semistriata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
						°F.		
.....	JAC.....	9	*Lord Bandon*, Log. 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Common
.....	JAC.....	1	*Lord Bandon* Log. 58.	Off Bantry Bay, southwest Ireland.	110	.....	.....	Rare.
.....	JAC.....	1	*Flying Falcon* Log. 8.	10 miles off Glencoe, southwest Ireland.	53	.....	m., s.....	Rare.

LAGENA SPUMOSA Millett.

Plate 10, figs. 1, 2.

Heron-Allen and Earland[14] record and figure two specimens from the west coast of Scotland. They also had it from 1,280 meters (700 fathoms) in the Faroe Channel, and 260 meters (142 fathoms) in Hilte Fjord, Norway, as well as from the Mediterranean. It was originally described from the Pacific.

LAGENA SQUAMOSA (Montagu).

Plate 10, figs. 3, 4.

Vermiculum squamosum Montagu, Test. Brit., 1803, p. 526, pl. 14, fig. 2.

Entosolenia squamosa Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, pl. 2, fig. 19; Rec. Foram. Great Britain, 1858, p. 12, pl. 1, fig. 29.

Lagena squamosa Brown, Ill. Rec. Conch. Great Britain, 1844, pl. 1, fig. 32.—Jones, Parker, and H. B. Brady, Monogr. Foram. Crag, 1866, p. 39, pl. 4, fig. 7.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 471, pl. 58, figs. 28–31.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 340, pl. 14, fig. 9.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 41.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 326, pl. 10, figs. 58, 59.—Woodward, The Observer, vol. 4, 1893, p. 143.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 79, pl. 13, fig. 745.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 117.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 9.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 212.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 424.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 335, pl. 15, fig. 5.—Bagg, U. S. Geol. Survey Bull. 513, 1912, p. 51, pl. 14, fig. 27.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 16, pl. 6, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 76, pl. 7, fig.

[14] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 245, pl. 41, figs. 19, 20.

13.—Pearcey, Trans. Roy. Soc., Edinb., vol. 49, 1914, p. 1018.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 22.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 244; Journ. Roy. Micr. Soc., 1916, p. 44.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Chapman, Brit. Antarctic Exped., Geology, vol. 2, 1916–17, p. 31, pl. 3, fig. 18.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 608.

Entosolenia globosa Montagu, var. *squamosa* Parker and Jones, Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 278, pl. 11, fig. 25.

Description.—Test subglobular, broadly rounded at the apertural end or somewhat truncate; surface reticulate, apertural end of each areole being arched, giving the appearance of overlapping scales.

Length up to 0.30 mm.

Distribution.—Specimens of this type were originally described from about the British Isles, and have been referred to by many authors as the above synonymy will show. It is very evident from an examination of the various figures given that numerous forms of ornamentation have been included under this name. I have failed to find any specimens from the *Albatross* material from the western Atlantic which can be referred to this, but I have very typical specimens from off the British Isles. Whether the specimens from remote parts of the world which have been referred to this species are identical is very questionable.

Lagena squamosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
.....	J.A.C....	1	.....	Dog's Bay, Ireland.....	.....	.....	.....	Rare.
.....	J.A.C....	1	*Lord Bandon* Log 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Rare.

LAGENA STAPHYLLEARIA (Schwager).

Fissurina staphyllearia Schwager, *Novara*-Exped., Geol. Theil, vol. 2, 1866, p. 209, pl. 5, fig. 24.

Lagena staphyllearia H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 474, pl. 59, figs. 8–11.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 481.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 29.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 54, fig. 1.—Millett, Journ. Roy. Micr. Soc., 1901, p. 619, pl. 14, fig. 2.—Dakin, Rep. Ceylon Pearl-Oyster Fish., vol. 5, 1906, p. 234.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 410.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 31, pl. 17, fig. 3.—Pearcey, Trans. Roy. Soc., Edinb., vol. 49, 1914, p. 1019.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 664.

Description.—Test ovate, compressed, wall smooth, periphery usually keeled, with several spines symmetrically arranged about the border; aperture fissurine.

Length about 0.50 mm.

Distribution.—There are very few Atlantic records for this species. There is a single *Challenger* station from the middle Atlantic which is south of the Equator, one *Gazelle* station recorded by Egger from off West Africa, one *Albatross* station recorded by Flint in the Caribbean, off Panama, and Pearcey records it from the far South Atlantic in deep water. I have a single specimen which can be referred to this species from *Albatross* station D2174, off the eastern coast of the United States in deep water. The species was originally described from the late Tertiary of Kar Nicobar. As the few records show, it has been recorded from many widely separated regions. Except for the records of Wright in deep water off the southwestern coast of Ireland, there seem to be no records from the region of the British Isles.

Lagena staphyllearia—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
19060	U.S.N.M.	1	D2174....	° ′ ″ ° ′ ″ 38 15 00 N.; 72 03 00 W....	1594	°F.	gy. m.....	Rare.

LAGENA STELLIGERA H. B. Brady.

Plate 10, figs. 5, 6.

Lagena stelligera H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 60; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 466, pl. 57, figs. 35, 36.—Pearcey (?), Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Earland, Journ. Quekett Micr. Club. ser. 2, vol. 9, No. 57, 1905, p. 212.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 407.—Sidebottom, Journ. Quekett Micr. Club, vol. 11, 1912, p. 391, pl. 15, figs. 28, 29; pl. 16, figs. 1–4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 26, pl. 12, fig. 3.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1018.

Brady's *Challenger* stations included both the North and South Atlantic, but mostly in deep water. Pearcey records this species with a question from the Faroe Channel, and Earland a single specimen from shore-sand at Bognor, Sussex. I have failed to find any material in the western Atlantic referable to this species.

LAGENA STEWARTII J. Wright.

Plate 10, fig. 7.

Lagena stewartii J. Wright, Rep. Belfast Nat. Field Club, ser. 2, vol. 3, No. 6, App. No. 2, 1910–1911, p. 12, pl. 2, fig. 8.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 81, pl. 6, figs. 2, 3.

Description.—"Test circular, compressed, the two faces convex, surface smooth, peripheral edge rounded, short entosolenian tube; aperture oval."

Distribution.—The only record for the species in the recent state is that of Heron-Allen and Earland, who record a few specimens from one station in the Clare Island region. Wright's specimens were fossil.

The above description is from Wright, and the figures are from Heron-Allen and Earland.

LAGENA STRIATA (D'Orbigny).

Plate 10, fig. 9.

Oolina striata D'Orbigny, Foram. Amér. Mérid., 1839, p. 21, pl. 5, fig. 12.
Lagena striata Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 327, pl. 3, figs. 44, 45; pl. 4, figs. 46, 47.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 460, pl. 57, figs. 22, 24.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 337.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 903.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, fig. 28.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 478.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 327, pl. 10, figs. 21–23.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 116.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1901, p. 487.—Chapman, The Foraminifera, 1902, p. 402; Trans. New Zealand Inst., vol. 38, 1905, p. 91.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—Goddard, Rec. Austr. Mus., vol. 6, 1905–1907, p. 308.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 2.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 423.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 408.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 15, pl. 1, figs. 16, 19, 20; pl. 2, fig. 1.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 51, pl. 14, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 19, pl. 7, figs. 4, 5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 78.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 22.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 246; Journ. Roy. Micr. Soc., 1916, p. 45.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 609; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 177.

Description.—Test flask-shaped, nearly circular in cross section, body of test subglobular, neck variable in length, usually rather abruptly contracted from the body of the test at its base; surface ornamented with numerous rather fine costae running the entire length of the test, apical end typically broadly rounded, occasionally slightly tapering to a point.

Length 0.25–0.75 mm.

Distribution.—From the list of references it would seem that this is a very widely distributed species. There are numerous records for it about the British Isles and a few others from various parts of the Atlantic, as well as in other regions. However, all the striate *Lagenae* I have had from the western Atlantic seem to be better placed under other species.

LAGENA STRIATO-PUNCTATA Parker and Jones.

Plate 10, fig. 10.

Lagena sulcata (Walker and Jacob), var. *striato-punctata* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 350, pl. 13, figs. 25–27.

Entosolenia striato-punctata G. M. Dawson, Can. Nat., vol. 5, 1870, p. 178, woodcut, p. 180, fig. 11.

Lagena striato-punctata H. B. Brady, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 434, pl. 20, fig. 3.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 468, pl. 58, figs. 37, 40.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 339, pl. 14, fig. 20.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 904.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 448; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 327, pl. 10, figs. 35, 36, 44–46.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 83, pl. 13, fig. 753.—Millett, Journ. Roy. Micr. Soc., 1901, p. 489, pl. 8, fig. 6.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 50, No. 5, 1906, p. 4; vol. 54, No. 16, 1910, p. 17, pl. 2, fig. 5; Journ. Quekett Micr. Club, vol. 11, 1912, p. 392, pl. 16, figs. 7–10.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 30, pl. 14, fig. 10.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 80; Trans. Zool. Soc. London, vol. 20, 1915, p. 660; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247.

Description.—"Test oval, pyriform, or flask-shaped, and either ecto- or entosolenian. It is decorated externally with tolerably stout longitudinal costae, from 6 to 20 in number, bearing conspicuous pseudopodial foramina. The perforations are placed either in single rows down the middle of the costae or in double lines, one on each side, in their thickened bases."

Length 0.30–0.50 mm.

Distribution.—There are numerous records for this species off the British Isles and in other parts of the Atlantic, off Spitzbergen,

off the Canary Islands, and from the Gulf of St. Lawrence. I have no specimens from the *Albatross* material which I have felt could be referred to it.

LAGENA SUBLAGENOIDES Cushman.

Plate 10, fig. 8.

Lagena lagenoides H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 479, pl. 60, figs. 13, 14.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, fig. 23.—Millett, Journ. Roy. Micr. Soc., 1901, p. 623, pl. 14, fig. 9 [?].

Lagena sublagenoides Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 40, pl. 16, fig. 4.

Description.—Test flask-shaped, much compressed, central body of the test elongate-ovate, tapering into a long, slender neck, surrounded by a wide peripheral keel with numerous close-set, fine tubulations, central portion smooth, apical end of keel usually but not always emarginate.

Length 0.60–0.85 mm.

Distribution.—I have previously recorded this species from the Pacific, off the Galapagos Islands and near Midway Island in fairly deep water. In the *Albatross* Atlantic collections it occurred at three stations, two in the northern part of the Gulf of Mexico, and one in the western Caribbean. At the last station there is a trihedral specimen, but in its general characters like the typical. It seems to be different from *Lagena lagenoides* (Williamson), as I have previously shown, especially by its very numerous close-set tubulations and usually with a long slender neck. The specimen figured here is somewhat broken.

Lagena sublagenoides—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19113	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W....	382	45.8	wh. crs. s....	Rare.
19114	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W....	210	67.0	gy. m.....	Rare.
19115	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W....	347	44.1	gy. m.....	Rare.

LAGENA SUBSTRIATA Williamson.

Plate 10, fig. 11.

Lagena substriata Williamson, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 15, pl. 1, fig. 12.

Lagena vulgaris Williamson, var. *substriata* Williamson, Rec. Foram. Great Britain, 1858, p. 7, pl. 1, fig. 14.

Description.—Test elongate, the body of the test typically twice as long as broad, the basal end rounded, and the apertural end tapering

into an elongate neck; wall of the test with numerous fine longitudinal costae, as many as 50 or 60 in number, running from the base of the chamber to the base of the neck.

Length up to 0.50 mm.

Distribution.—This was originally described by Williamson as *Lagena substriata*, but later has been placed under *Lagena striata* (D'Orbigny) as a synonym. The original figure of D'Orbigny for *Oolina striata* shows a test with the body about as long as broad, very different in shape from that figured by Williamson. An examination of British bottom samples seems to show that this typical form figured by Williamson is common about the British Isles, and while it may vary to a certain extent, it seems as though it might be recognized as a valid species. I have had a single specimen from *Albatross* station D2035, off the northeastern coast of the United States, which seems identical with British specimens, but it has not occurred elsewhere in the western Atlantic collections of the *Albatross*, so far as I have seen. It is evidently included by many British authors under the name *Lagena striata* (D'Orbigny).

Lagena substriata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19003	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob., oz.....	Rare.
.....	J.A.C....	4	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	.....	m., s.....	Few.
.....	J.A.C....	5	*LordBandon*, Log 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Frequent.

LAGENA SULCATA (Walker and Jacob).

Plate 11, fig. 1.

"Serpula (Lagena) striata sulcata rotundata" Walker and Boys, Test. Min., 1784, p. 2, pl. 1, fig. 6.

Serpula (*Lagena*) *sulcata* Walker and Jacob, Adams' Essays, Kanmacher's ed., 1798, p. 634, pl. 14, fig. 5.

Lagena sulcata Parker and Jones, Philos. Trans., vol. 155, 1865, p. 351.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 462, pl. 57, figs. 23, 26, 33, 34.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 338, pl. 14, figs. 1, 2.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 903.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 222, pl. 44, figs. 18, [22?], [34?].—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 414.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Woodward, The Observer, vol. 4, 1893, p. 143.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 78, pl. 13, figs. 742–744.—Flint, Rep. U. S. Nat. Mus., 1897

(1899), p. 307, pl. 53, fig. 7.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 116.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 53.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 211.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 423.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 22, pl. 9, fig. 2.—Heron-Allen and Earland, Proc. Roy. Irish. Acad., vol. 31, pt. 64, 1913, p. 79; Trans. Linn. Soc. London, 1916, p. 246; Journ. Roy. Micr. Soc., 1916, p. 45.

Description.—Test typically subglobose, very slightly longer than broad, the neck fairly long and cylindrical, ornamentation consisting of numerous, 14–18, distinct elevated costae, running from the basal end of the test to the apertural end, and a few of them often continued in a spiral manner the length of the neck itself.

Length up to 0.35 mm.

Distribution.—About the British Isles this seems to be a very common species, but specimens which can be referred to the typical form seem to be very rare from the western side of the Atlantic. There are numerous records of its occurrence from many parts of the oceans, but specimens are not usually figured and it is difficult to say what the distribution of this typical form may be. Many things have been placed under this name which are very different from the typical western European form of the species.

Lagena sulcata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
					°F.			
.....	J.A.C....	7	*Lord Bandon*, Log 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Frequent.
.....	J.A.C....	1	*Flying Falcon*, Log 8.	10 miles off Glencoe, southwest Ireland.	53	.....	m., s.....	Rare.

LAGENA SULCATA (Walker and Jacob), var. APICULATA Cushman.

Plate 11, fig. 2.

Lagena sulcata, apiculate forms, H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 58, figs. 4, 17 (?).

Lagena sulcata (Walker and Jacob), var. *apiculata* Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 23, pl. 9, figs. 3, 4; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 609; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 180.

Description.—Variety differing from the typical in having the apical end drawn out into a stout spine, the apertural end with a tapering cylindrical neck with a phialine lip, usually without other ornamentation, body of the test with numerous longitudinal costae, as in the typical form.

Distribution.—The only *Albatross* specimens I have had from the Atlantic are from the Caribbean and from off the northeastern coast of Brazil. It occurs at numerous stations in the Pacific in fairly deep water.

Lagena sulcata, var. apiculata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
19057	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
19058	U.S.N.M.	2	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk.....	Rare.

LAGENA TRIGONO-MARGINATA Parker and Jones.

Plate 11, figs. 3, 4.

Lagena trigono-marginata Parker and Jones, Philos. Trans., vol. 155, 1865, p. 348, pl. 18, figs. 1*a*, *b*.—Robertson (in G. S. Brady and Robertson), Rep. Brit. Assoc., 1875, p. 190.—Wright, Proc. Belfast Nat. Field Club, 1876 (1877), App., p. 104, pl. 4, figs. 8*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 482, pl. 61, figs. 12, 13.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 336, pl. 10, figs. 54, 55.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 410.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1019.

Lagena marginata Walker and Boys, var. *trigono-marginata* Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.

Description.—Test triangular in transverse section, the three faces somewhat convex, the angles marked by raised bands with a distinct carina down the center of each; wall otherwise smooth; aperture circular, only slightly produced.

Length up to 0.30 mm.

Distribution.—I have found no specimens of this species from the western Atlantic material, but have it from Nymph Bank, south of Cork, Ireland, in 52 fathoms (95 meters), from material received from Joseph Wright. There are records for the species from off Funafuti, off New Amsterdam, and from Burdwood Bank. Brady's records are from two *Challenger* stations off Raine Island, Torres Strait, 155 fathoms (283 meters), and in the deep water of the North Pacific, 2,300 fathoms (4,200 meters). He also gives it from two *Porcupine* dredgings in the North Atlantic, off the west coast of Ireland, 90 and 1,360 fathoms (165 and 2,487 meters). It is also recorded from Dublin Bay (Balkwill and Wright), in the Estuary of the Dee (Siddall), and off the coast of Yorkshire (Robertson).

LAGENA TRUNCATA H. B. Brady.

Plate 11, figs. 5, 6.

Lagena truncata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 457, pl. 56, figs. 31, 32.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 31, pl. 19, fig. 3.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1017.

Description.—Test elongate, pyriform; greatest breadth below the middle, aboral end broadly rounded; apertural end obtusely rounded; wall smooth; aboral end with two or more short spines; aperture radiate.

Length, 0.40–1 mm.

Distribution.—In the *Challenger* report Brady records this species from two Atlantic stations, one in the North Atlantic, southwest of the Canaries, in 2,740 fathoms (5,017 meters), and one in the South Atlantic, west of Tristan d'Acunha, in 2,200 fathoms (4,024 meters). In the volume on Summary of Results of the *Challenger* Expedition it is also recorded from station 2, in 1,945 fathoms (3,557 meters), and station 13, in 1,900 fathoms (3,475 meters), between Teneriffe and Sombrero Islands. Pearcey records it from the Antarctic at two *Scotia* stations, also in deep water. Brady records it also from the South Pacific, in 1,825 and 2,070 fathoms (3,338 and 3,786 meters), and I have had it from a *Nero* station in the North Pacific, in 1,321 fathoms (2,424 meters). It is therefore a species rather widely distributed in deep, cold waters.

LAGENA TUBULIFERA Egger.

Lagena tubulifera Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 324, pl. 10, figs. 6, 7.

Under this name Egger describes a new species of *Lagena* from *Gazelle* station 156, in 3,950 meters (2,160 fathoms), between Montevideo and Tristan d'Acunha. As Brady has already used the name *tubulifera* in 1881, by the rules of priority this name can not be used again under this genus. Therefore if Egger's species proves to be a valid one, a new name will have to be made for it.

LAGENA UNGUIS Heron-Allen and Earland.

Plate 11, fig. 7.

Lagena unguis Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 86, pl. 7, figs. 1–3; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—"Test inequilateral, compressed, extremely hyaline, resembling *L. marginata*, but with a continuous marginal carina produced considerably at the oral extremity of the shell and curved like a 'filbert-shaped' finger-nail. The aperture is placed in a depressed opening on the outer or convex surface of the 'nail' just

above the upper edge of the chamber, and is furnished with a curved attached entosolenian tube which runs down the wall of the test on the inner side of the shell, i. e. that opposed to the convex side.

"Average breadth across wing, 0.08–0.15 mm.; average length across wing, 0.10–0.20 mm.; average length of chamber, 0.08–0.15 mm.: average breadth of chamber, 0.07–0.14 mm.

" This little form, though very distinctive in appearance, is difficult to describe; but it may be compared to a human finger nail detached from the flesh and with a little cyst growing upon its concave surface. It is, no doubt, closely allied to *L. marginata* and Mr. Wright's var. *inaequilateralis* of that species, but can not be confused with either of these. Its nearest affinity appears to be *L. irregularis* Sidebottom, which closely resembles our species in the relation of the chamber to the surrounding carina, but has a bicarinate periphery and differs also from ours in the position of its aperture, which is situated between the two keels.

" The species occurs in many of the *Goldseeker* dredgings in the North Sea and round the Scottish coast and is quite distinctive in its appearance."

The above is the original description and notes of Heron-Allen and Earland on this species. They also recorded it as very rare off South Cornwall.

LAGENA WILLIAMSONI (Alcock).

Plate 11, figs. 8, 9.

Entosolenia williamsoni Alcock, Proc. Lit. Philos. Soc., vol. 4, 1865, p. 193.
Lagena williamsoni Wright, Proc. Belfast Nat. Field Club, 1876–7, App. 4, p. 104, pl. 4, fig. 14.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 547; Trans. Roy. Irish Acad., vol. 28, 1885, p. 339, pl. 14, figs. 6–8.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 903.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 479.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 79.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 212.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 424; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 80; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 247; Journ. Roy. Micr. Soc., 1916, p. 45.

Description.—Test somewhat pyriform, circular in transverse section, basal end broadly rounded, apertural end somewhat extended; surface ornamented by numerous longitudinal costae, 14–18 in number, the upper portion of these coalescing and forming a collar made up of a reticulate network below the aperture; aperture rounded, sometimes with a slight lip.

Length up to 0.50 mm.

Distribution.—This is a common species about the British Isles, and except for the single record of Heron-Allen and Earland,[15] who record a single specimen from the Kerimba Archipelago, off the southeastern coast of Africa, all the other records are from British or adjacent waters, although one of Goës's records is from off Spitzbergen, but he does not figure specimens. I have specimens in my collection from the localities given in the table. There have been no specimens in the western Atlantic material which could be referred to this species.

Lagena williamsoni—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
						°F.		
.....	J.A.C....	10+	*Flying Falcon* Log 8.	10 miles off Glencoe, southwest Ireland.	53	.....	m., s.....	Abundant.
.....	J.A.C....	8	*Lord Bandon*, Log 28.	Off Baltimore, southwest Ireland.	26	.....	.....	Common.
.....	J.A.C....	10+	.....	Dog's Bay, Ireland.....	.....	.....	.....	Abundant

Subfamily 2. Nodosariinae.

Test polythalamous; chambers arranged in a straight, arcuate, planospiral or uncoiling series; apertures either radiate or with a neck and phialine lip.

Genus NODOSARIA Lamarck, 1812.

Nodosaria Lamarck (type *N. raphanistrum* (Linnaeus)), Extrait Cours Zool., 1812, p. 121; Hist. Anim. Sans. Vert., vol. 7, 1822, p. 596.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 488.—Chapman, The Foraminifera, 1902, p. 188.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 46.

Description.—Test composed of a straight or arcuate series of chambers, either loosely joined together by stolons or close set and overlapping or various forms between; surface smooth or ornamented; aperture either radiate or with a definite neck and phialine lip.

As indicated in the introduction, there are two more or less distinct groups which are placed under this genus. In one the aperture is radiate, in the other it has an elongate neck and phialine lip. Usually those forms which have the radiate aperture have comparatively thick heavy tests; those with the neck and phialine lip more often have the thin hyaline test. In both groups both microspheric and megalospheric forms occur. Where the proloculum is megalo-

[15] Trans. Zool. Soc. London, vol. 20, 1915, p. 659.

spheric, it is often the largest chamber of the test, and the number of chambers is often comparatively few. The microspheric form of the same species may start with a very small proloculum and the number of chambers be several times that of the other form. The ornamentation in the group is usually confined to longitudinal costae, or modifications of them, or of spines. In some species there is a definite senescent character in the loss of ornamentation in the later chambers. Other species may show a very definite shape in the last-formed chamber in the adult or in senescent forms, which may be often widely separated from the previously close-set series of chambers.

Other subgenera have been used, such as *Glandulina*, in which there is a tendency for the chambers to reach back and overlap the preceding ones, the last chamber being short and the sutures either close together or indistinct. In *Dentalina* there is a tendency toward a curved form, with the sutures oblique instead of at right angles to the axis of the test. In the microspheric form of such species there is much greater obliquity of the sutures and usually a greater curvature to that portion of the test. Such species are related to *Marginulina*, *Vaginulina*, and the uncoiled forms of *Cristellaria*. They indicate that perhaps even *Nodosaria* originated from a coiled ancestor, the coiling being usually lost, except as it shows in the microspheric form. If such is the development of *Nodosaria*, it is a derivative from a coiled form, similar to *Cristellaria*, rather than the coiled forms being derived from straight forms. As both *Cristellaria* and *Nodosaria* are recorded from the Cambrian, it is difficult to say which came first geologically.

As with *Lagena*, the species of *Nodosaria* are here grouped for convenience, usually according to their ornamentation.

NODOSARIA ROTUNDATA (Reuss).

Glandulina rotundata Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 366, pl. 46, fig. 2.

Nodosaria (*Glandulina*) *rotundata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 491, pl. 61, figs. 17–19; Journ. Roy. Micr. Soc., 1887, p. 907.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482; Irish Nat., vol. 9, No. 3, 1900, p. 54.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255.

Description.—Test composed of a few chambers, each reaching well back from the preceding, thus forming a compact test, the test broadly rounded, the apertural end slightly extended, with a radiate aperture; sutures distinct; surface smooth.

Length up to 1.50 mm.

Distribution.—Such specimens are common in most of the oceans and may represent more than one species. It is recorded at numerous stations off the British Isles, and specimens referred to this species occur in the Caribbean.

NODOSARIA (GLANDULINA) LAEVIGATA D'Orbigny.

There are numerous records for this species from about the British Isles, but specimens are not figured. The specimens I have seen from European waters are more nearly like our variety *occidentalis* than like the typical form of d'Orbigny.

Some of the records are as follows: Shetland (Waller, Brady); Cumbrae (Robertson); southwest of Ireland (Wright) (Brady);[16] rare, Island of Skye (Robertson);[17] warm area, Faroe Channel (Pearcey);[18] off the southwest of Ireland (Wright);[19] very rare, Bognor, Sussex (Earland);[20] "very rare, but excellent and typical, west of Scotland" (Heron-Allen and Earland).[21]

NODOSARIA (GLANDULINA) LAEVIGATA D'Orbigny, var. OCCIDENTALIS, new variety.

Plate 12, fig. 8.

Nodosaria (*Glandulina*) *laevigata* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 340, pl. 13, fig. 1.

Description.—Variety differing from the typical in the shape of the test, this variety being more elongate, the chambers higher, sides at the base usually convex instead of concave or straight, sutures farther apart.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17811) from *Albatross* station D2003, in 641 fathoms (1,172 meters), off the northeastern coast of the United States. Specimens are fairly numerous at moderate depths from the latitude of Georges Bank southward to the general region of Cape Hatteras with a single station off Cuba.

This differs markedly from the following variety, more so than a verbal description can easily show.

There is a considerable difference in the microspheric and megalospheric forms, the latter having a much broader, rounded base with a short spine, the former much more pointed and the spine more developed.

Parker and Jones figure this variety in the reference given above, and note that it differs from the typical form of d'Orbigny. Their

[16] Journ. Roy. Micr. Soc., 1887, p. 907.
[17] Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1889 (1892), p. 241.
[18] Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 177.
[19] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482.
[20] Journ. Quekett Micr. Club, ser. 2, vol. 9, no. 57, 1905, p. 214.
[21] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 255.

specimens were "from Nordland, in the Arctic Circle, at a depth of 160 fathoms (283 meters) . . . not uncommon, on a muddy bottom."

Nodosaria (Glandulina) laevigata, var. occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17811	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Few.
17862	U.S.N.M.	4						
17863	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
17864	U.S.N.M.	3	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Few.
17865	U.S.N.M.	7	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., blk. sp...	Frequent.
17866	U.S.N.M.	8	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Common.
17867	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
17868	U.S.N.M.	10+	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Abundant.
17869	U.S.N.M.	2	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
17870	U.S.N.M.	1	D2339....	23 10 40 N.; 82 20 15 W..	191	.....	co.....	Rare.
17871	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.....	Rare.
17872	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.....	Rare.
17873	U.S.N.M.	2	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Rare.
17874	U.S.N.M.	1	D2584....	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.....	Rare.
17875	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.
17876	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.

NODOSARIA (GLANDULINA) LAEVIGATA D'Orbigny, var. TORRIDA, new variety.

Plate 12, fig. 10.

Nodosaria laevigata FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 55, fig. 3.

Description.—Variety differing from the typical in the more tumid form, shorter test and greater overlapping of the chambers.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17859) from *Albatross* station D2398, in 227 fathoms (416 meters), in the Gulf of Mexico. This very short, broad variety was found only in the warmer parts of the western Atlantic. It is the same as that figured by Flint and probably the same as those Goës had from stations in the Caribbean and Gulf of Mexico. Brady records *N. laevigata* from two *Challenger* stations off the West Indies, and it is probably this same variety.

Nodosaria (Glandulina) laevigata, var. torrida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17859	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
17860	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Rare.
17861	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.

NODOSARIA SUBANNULATA, new species.

Plate 12, fig. 9.

Nodosaria rotundata FLINT (not Reuss), Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 54, fig. 6.

Description.—Test composed of a few subglobular chambers somewhat overlapping, axis straight, initial end broadly rounded, sides somewhat lobulate; sutures distinct, slightly depressed; wall smooth, either glossy or dull; aperture terminal, central, radiate, very slightly raised above the broadly rounded surface of the test.

Length up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17819) from *Albatross* station D2682, in 990 fathoms (1,811 meters), off the northeastern coast of the United States. It has occurred at a number of stations in this vicinity. From a study of the specimens from *Albatross* station D2112, it seems probable that some at least of Flint's specimens of *Nodosaria rotundata* are the young of this species. Some of the specimens figured by Parker and Jones as "*Nodosaria Radicula* Linn,"[22] from near the Arctic Circle at Nordland (Norway) in 160 fathoms (293 meters), are very close if not identical with our species.

It is fairly large and conspicuous, the last-formed chamber often very broadly, almost truncately rounded at the apertural end, the aperture itself hardly extending above the surface. Some of the specimens are quite glossy, while others are dull and have a matt surface. These may, with larger amounts of material, be found to be distinct as other characters seem to go with the difference in surface.

Nodosaria subannulata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17809	U.S.N.M.	3	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Few.
17810	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
3110	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
17812	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.....	Rare.
17813	U.S.N.M.	7	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Frequent.
17814	U.S.N.M.	5	D2213....	39 58 30 N.; 70 30 45 W..	384	39.5	gn. m.....	Frequent.
17815	U.S.N.M.	1	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.....	Rare.
17816	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Rare.
17817	U.S.N.M.	5	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Frequent.
17818	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17819	U.S.N.M.	1	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Frequent.
17820	U.S.N.M.	6						
17821	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Rare.

[22] Philos. Trans., vol. 155, 1865, pl. 13, figs. 2, 3, 6.

NODOSARIA CALOMORPHA Reuss.

Plate 12, fig. 13.

Nodosaria calomorpha Reuss, Denkschr. Akad. Wiss. Wien, vol. 25, 1865, p. 129, pl. 1, figs. 15–19.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 497, pl. 61, fig. 7.—Chaster, First. Rep. Southport Soc. Nat. Sci., 1890–1891 (1892), p. 63, pl. 1, fig. 12.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 482.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 340, pl. 11, figs. 21, 26.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 72, pl. 13, figs. 712, 713.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 118, pl. 1, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 48, pl. 25, fig. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 91.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256; Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test elongate, usually somewhat arcuate, composed of a few elliptical chambers in adult specimens, three to five in number; wall smooth or occasionally with a few very delicate hispid spines; wall transparent, both ends broadly rounded, smooth; aperture a simple opening without neck.

Length 0.50—1 mm.

Distribution.—Brady recorded specimens under this name from three stations in deep water in the Atlantic; in the North Atlantic in 1,215 fathoms (2,222 meters), in the South Atlantic, in midocean in 1,990 and 2,220 fathoms (3,640 and 4,061 meters), and in very shallow water, 6 fathoms (11 meters), off the Falkland Islands. Egger records it off Western Africa; Pearcey records it from a station in 1,998 fathoms (3,654 meters) in the middle South Atlantic, and in 2¼ fathoms (4 meters), Stanley Harbor, Falkland Islands. It has been recorded a number of times off the coast of the British Isles, the deepest stations those given by Wright off the southwest of Ireland, very rare at 750 and 1,020 fathoms (1,370 and 1,866 meters). The only specimens that I have had which can be referred to this species are from an *Albatross* station south of Nantucket.

Nodosaria calomorpha—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
18775	U.S.N.M.	1	D2543....	° ′ ″ ° ′ ″ 39 58 15 N.; 70 42 30 W..	166	°F. 45.2	gn. s., bk. sp.	Rare.

NODOSARIA SIMPLEX Silvestri.

Plate 12, fig. 14; pl. 14, fig. 10.

Nodosaria simplex Silvestri, Atti Accad. Gioenia Sci. Nat., ser. 3, vol. 7, 1872, p. 95, pl. 11, figs. 268–272.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 496, pl. 62, figs. 4, 5, and 6?—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 340, pl. 11, fig. 6.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 309, pl. 55, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 49, pl. 28, fig. 5.

Description.—Test composed of two or more chambers, the initial chamber globular with a short spine at the base, the second pyriform with a well drawn out neck and radiate aperture; wall smooth; sutures well depressed.

Length about 1 mm.

Distribution.—Brady records two stations in the *Challenger* records for this species, one off Cape Hatteras and the other off the Canaries. Flint records it at an *Albatross* station very close to that of Brady, off Hatteras. I have it from a single station off the southern coast of Brazil. On the European coast the only records seem to be that of Pearcey,[23] as rare in the warm area of the Faroe Channel, and a very queer-looking specimen which Heron-Allen and Earland figure from the Clare Island region.[24] It does seem at all like the specimen I have had or the figures given by other authors.

Nodosaria simplex—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18774	U.S.N.M.	1	D2763....	24 17 00 N.; 42 48 30 W..	671	37.9	br. glob.....	Rare.

NODOSARIA SUBANTENNULA, new name.

Nodosaria antennula Cushman, Proc. U. S. Nat Mus., vol. 51, 1917, p. 653; Bull. 100, U. S. Nat. Mus, vol 4, 1921, p. 197, pl. 35, fig. 3.

The above name may be used for the species which I have described from the Philippine region in the reference given above. It is not the same as *Dentalina antennula* D'Orbigny, 1846.

NODOSARIA ATLANTICA, new species.

Plate 12, figs. 11, 12.

Description.—Test elongate, slightly tapering, arcuate, composed of a few inflated chambers, short; sutures of the early portion

[23] Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.
[24] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 91, pl. 8, fig. 1.

oblique, later ones less so, slightly depressed; wall smooth; aperture radiate, eccentric, very slightly extended.

Length up to 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18779) from *Albatross* station D2756, in 417 fathoms (763 meters), off the coast of Brazil. It has also occurred at stations in the Gulf of Mexico and in the Caribbean.

This is a peculiar form in its very short chambered test, initial end broadly rounded, arcuate form, and the eccentric aperture. It is apparently limited to the warmer portion of the western Atlantic.

Nodosaria atlantica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18777	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. ers. s...	Rare.
18778	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.
18779	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk.....	Rare.

NODOSARIA PYRULA D'Orbigny.

Plate 16, figs. 1–4.

"Orthoceras Monile" Soldani, Testaceographia, vol. 2, 1798, p. 35, pl. 10, figs. *b, c.*

Nodosaria pyrula D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 253, No. 13.—Williamson, Rec. Foram. Great Britain, 1858, p. 17, pl. 2, fig. 39.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 497, pl. 62, figs. 10–12; Journ. Roy. Micr. Soc., 1887, p. 908.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 343, pl. 12, fig. 23.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, fig. 2.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 345, pl. 11, figs. 14, 15.—Woodward, The Observer, vol. 4, 1893, p. 143.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 30.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 309, pl. 55, fig. 4.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Millett, Journ. Roy. Micr. Soc., 1902, p. 514.—Balkwill and Millett, Rec. Form. Galway, 1908, p. 6.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 341.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 49, pl. 26, figs. 1–3.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 23.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256; Journ. Roy. Micr. Soc., 1916, p. 47.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 132.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 611; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 187, pl. 33, figs. 3–5.

Description.—Test elongate, very slender, composed of numerous chambers, either in a straight or slightly curved line, pyriform in

shape with long tapering necks; surface smooth, chambers varying little in size; proloculum extended backward in a long-drawn-out point.

Length up to 8 mm.

Distribution.—There are numerous records for this species in the Atlantic. Those from the tropical western Atlantic are very close to the form found in the Philippine region, which has a large elongate, tapering proloculum. The right-hand specimen in Flint's figure shows this very well. The species is either a very widely distributed one or else has more than one form. In the *Albatross* collection specimens have occurred off the coast of Georgia, in the Gulf of Mexico, and in the Caribbean. Flint's specimens were from the northern part of the Gulf of Mexico. Goës also had it from several of the stations from which I have had it. One of the *Challenger* stations off the West Indies is given by Brady for this species as well as one off the Canary Islands. There are numerous reports of its occurrence off the coast of the British Isles.

Nodosaria pyrula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18753	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18754	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s.,bk.sp.	Rare.
18755	U.S.N.M.	2	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s.,bk.sp.	Rare.
18756	U.S.N.M.	9	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Common.
18757	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.

NODOSARIA PYRULA D'Orbigny, var. SEMIRUGOSA D'Orbigny.

Plate 16, fig. 5.

Nodosaria semirugosa D'Orbigny, Foram. Foss. Vienne, 1846, p. 34, pl. 1, figs. 20–23.—Millett, Journ. Roy. Micr. Soc., 1902, p. 515, pl. 11, fig. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 50, pl. 26, figs. 4–8.

Nodosaria No. 35, Von Schlicht, Foram. Septarienthones von Pietzpuhl, 1870, p. 24, pl. 7, fig. 20.

Nodosaria stipitata Reuss, var. *costulata* Reuss, Sitz. Akad. Wiss. Wien, vol. 62, Abth. 1, 1870, p. 471.

Nodosaria costulata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 515, pl. 63, figs. 23–27.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 1.

Nodosaria pyrula D'Orbigny, var. *semirugosa* Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 187, pl. 33, figs. 6, 7.

Description.—Variety differing from the typical in having the basal portion of each chamber with several costae and alternating depressions, the upper end smooth.

Distribution.—The records given by Brady in the *Challenger* report for *Nodosaria costulata* from three stations in the Northern Atlantic, off Sombrero Island, 450 fathoms (823 meters), off Culebra Island, 390 fathoms (713 meters), and off Bermuda, 435 fathoms (796 meters). He also records it from one station in the Philippine Islands, 95 fathoms (174 meters). Flint's records for *Nodosaria costulata* are both in the northern part of the Gulf of Mexico. I have seen his material and it seems to be *Nodosaria pyrula*, var. *semirugosa*. I have also had material from the Gulf of Mexico and the Caribbean. It is recorded from the Malay Archipelago by Millett, and I have had it from off southern Japan as well as from numerous stations in the Philippine region. It usually occurs, as the records of Flint, Brady, and mine show, at depths of 100–500 fathoms (183–914 meters).

Nodosaria pyrula, var. semirugosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17898	U.S.N.M.	1	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Rare.
17899	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Rare.
17900	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.

NODOSARIA PYRULA D'Orbigny, variety.

At four *Albatross* stations, all in the general locality southeast of Nantucket, there are broken specimens of a variety of *Nodosaria pyrula* which have much more elongate chambers than the typical form from farther south.

Nodosaria pyrula, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18758	U.S.N.M.	2	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. sp.	Rare.
18759	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s.....	Rare.
18760	U.S.N.M.	4	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk., sh...	Few.
18761	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Rare.

NODOSARIA FARCIMEN Soldani?

Plate 14, figs. 8, 11.

I have had a few specimens from stations in the Gulf of Mexico and in the Caribbean which are very similar to specimens figured by Brady in the *Challenger* report (pl. 62, figs. 17, 18) under this

name. Flint records it off the coast of Carolina, in the Gulf of Mexico and the Caribbean, and Brady from off the West Indies and off the eastern coast of Brazil. The only records from the eastern Atlantic for *Nodosaria farcimen* seem to be those of Wright's from off the coast of Ireland. Wright and Pearcey both record *Nodosaria inflexa* Reuss: Wright as rare off the southwestern coast of Ireland, and Pearcey with a question mark as very rare in the warm area of the Faroe Channel. It was not found in any of the abundant material from the region from Cape Hatteras northward. Therefore it appears that we have here a species confined, as far as the western Atlantic shows, to tropical and subtropical waters.

Nodosaria farcimen?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17877	U.S.N.M.	2	D2144.....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
17878	U.S.N.M.	2	D2396.....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.

NODOSARIA PAUPERATA (D'Orbigny).

Plate 14, fig. 13.

Dentalina pauperata D'Orbigny, Foram. Foss. Vienne, 1846, p. 46, pl. 1, figs. 57, 58.

Nodosaria (*Dentalina*) *pauperata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 500, fig. 14 (in text); Journ. Roy. Micr. Soc., 1887, p. 909.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Woodward, The Observer, vol. 4, 1893, p. 1.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 61.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 257.

There are, as will be seen by the above references, numerous records for this species in the Atlantic. Except those of Goës, they are all from the eastern Atlantic, off the coast of Europe. Goës records it from the Caribbean and the Gulf of Mexico, but the only specimens I have seen from the *Albatross* collections that are at all like figures of this species are rare specimens from off the northeastern coast of the United States.

Nodosaria pauperata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18769	U.S.N.M.	1	D2018.....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
18770	U.S.N.M.	1	D2029.....	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.....	Rare.
18771	U.S.N.M.	2	D2038.....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Rare.

NODOSARIA ABYSSORUM H. B. Brady.

The only record from the Atlantic for this species seems to be that of Egger, who records it from a single *Gazelle* station off western South Africa.[25]

NODOSARIA PROXIMA Silvestri?

Plate 15, fig. 3.

There are specimens from two *Albatross* stations off the northeastern coast of the United States which in general represent the figures given by Brady of this species. The only record given by Brady from the Atlantic was off the Azores. Pearcey records it from Burdwood Bank in 56 fathoms (102 meters), and Heron-Allen and Earland record a single specimen from off South Cornwall[26] and as rare off the west of Scotland.[27]

Nodosaria proxima?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
17879	U.S.N.M.	1	D2192.....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.....	Rare.
17880	U.S.N.M.	1	D2262.....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s.....	Rare.

NODOSARIA RADICULA (Linnaeus).

"Cornu Hammonis erectum" Plancus, Conch. Min., 1739, p. 14, pl. 1, fig. 5.

Nautilus radicula Linnaeus, Syst. Nat., ed. 12, 1767, p. 1164, 285; (Gmelin's) ed. 13, 1788, vol. 1, pt. 6, p. 3373, No. 18.—Montagu, Test. Brit., 1803, p. 197, pl. 6, fig. 4.

Nodosaria radicula D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 252, No. 3; Modèles, No. 1.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 10.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 495, pl. 61, figs. 28–31.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 908.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 60.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 52.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 46.

Description.—Test elongate, straight, composed of a few subglobular chambers, more or less separated from one another, the initial end usually with a spine, apertural end slightly truncate with a radiate aperture; wall smooth.

Length about 2 mm.

[25] Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 342, pl. 11, fig. 11.
[26] Journ. Roy. Micr. Soc., 1916, p. 47.
[27] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 258.

Distribution.—Specimens of this species were recorded from numerous stations off the British Isles. Goës recorded it from the Caribbean, but, so far as I have seen, specimens from the western Atlantic should be referred elsewhere.

NODOSARIA SUBSOLUTA, new species.

Plate 13, fig. 1.

Nodosaria soluta H. B. Brady (not *Dentalina soluta* Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 503, pl. 62, figs. 13–16; pl. 64, fig. 28.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 70, pl. 12, fig. 690; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 62.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., 1913, p. 53, pl. 26, figs. 9–11; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 192, pl. 34, figs. 5, 6.

Description.—Test elongate, tapering, somewhat arcuate, rather stout, initial chamber usually large with a single short basal spine; chambers few, subglobular or slightly pyriform; sutures distinct; wall smooth except for the basal third of each chamber, which is typically very finely costate with numerous very fine, often interrupted costae, which in some specimens are almost spines; apertural end slightly produced, aperture radiate.

Length up to 7 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17772) from *Albatross* station D2751, in 687 fathoms (1,255 meters), off the coast of Brazil. It has also occurred at numerous stations in the *Albatross* collections from about 40° N. latitude off the northeastern coast of the United States southward into the Gulf of Mexico and Caribbean and off the coast of Brazil. This is the same range as found by Flint. Brady records it as "not uncommon in the North Atlantic, at depths ranging from 300 to 900 fathoms (549 to 1,646 meters), and has been found as low as 1,360 fathoms (2,487 meters)." He records it from the South Atlantic from 350 to 675 fathoms (640 to 1,234 meters). He also records it from the South Pacific. I have had the same species from the Philippine region in comparatively deep water.

Nodosaria soluta is recorded by Wright [28] from 1,000 fathoms (1,829 meters), and off the southwest coast of Ireland in 750 fathoms (1,370 meters).[29] Pearcey [30] records it as common in the warm area of the Faroe Channel. Earland records it as very rare off Bognor.[31] Heron-Allen and Earland [32] figure a minute specimen from the Clare Island region, but it, as they note, is not at all the typical form of the species (pl. 13, fig. 2).

[28] Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.
[29] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.
[30] Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.
[31] Journ. Quekett. Micr. Club, ser. 2, vol. 9, no. 57, 1905, p. 215.
[32] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92, pl. 8, fig. 2.

Nodosaria subsoluta—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17750	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
17751	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Rare.
17752	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 25 W..	2,035	.....	glob. oz.....	Rare.
17753	U.S.N.M.	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Rare.
17754	U.S.N.M.	1	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Rare.
17755	U.S.N.M.	3	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Few.
3140	U.S.N.M.	1	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Rare.
17757	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	.....	glob. oz.....	Rare.
17758	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
17759	U.S.N.M.	1	D2140....	17 36 10 N.; 76 46 05 W..	966	39.7	s.....	Rare.
17760	U.S.N.M.	1	D2226....	37 00 00 N.; 71 54 00 W..	2,045	36.8	glob. oz.....	Rare.
17761	U.S.N.M.	3	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Few.
17762	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
3086	U.S.N.M.	1	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.....	Rare.
17763	U.S.N.M.	4	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.....	Few.
17764	U.S.N.M.	2	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.....	Rare.
17765	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Rare.
17766	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s.....	Rare.
17767	U.S.N.M.	5	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Few.
17768	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17769	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17770	U.S.N.M.	1	D2680....	39 50 00 N.; 70 26 00 W..	555	.....	.....	Rare.
17771	U.S.N.M.	10+	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Abundant.
17772	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz.	Rare.
17773	U.S.N.M.	1						
17774	U.S.N.M.	1	D2754....	11 40 00 N.; 58 33 00 W..	880	38.0	glob. oz.....	Rare.
17775	U.S.N.M.	4	D2760....	12 07 00 S.; 37 17 00 W..	1,019	39.5	br. co.....	Few.

NODOSARIA COMMUNIS D'Orbigny.

Plate 12, figs. 3, 4, 15–17.

Nodosaria (*Dentalina*) *communis* D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 35.

Nodosaria communis Reuss, Verstein Böhm. Kreide, pt. 1, 1845, p. 28, pl. 12, fig. 21.—Parker and Jones, Philos. Trans., vol. 155, 1865, p. 342, pl. 13, fig. 10.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 26, pl. 1, figs. 11–16.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 504, pl. 62, figs. 19–22.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 343.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 908.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Woodward, The Observer, vol. 4, 1893, p. 143.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, 1893, p. 342, pl. 11, figs. 22–24.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 61, pl. 6, fig. 1.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 2.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Earland, Jour. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 215.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256; Journ. Roy. Micr. Soc., 1916, p. 47.

For convenience of future workers on this genus I have included in the synonymy many of the references to this species. It is obvious that several things have been included under this name and it is also

questionable whether any of them are really identical with D'Orbigny's Cretaceous species. A study of this group with material from various oceans should be made to determine the distribution of the various species.

Nodosaria communis.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17829	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17830	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
17831	U.S.N.M.	8	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Common.
17832	U.S.N.M.	2	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co.....	Rare.
17833	U.S.N.M.	4	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Few.
17834	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
17835	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
17836	U.S.N.M.	3	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Few.
17837	U.S.N.M.	1	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Rare.
17838	U.S.N.M.	1	D2425....	41 49 00 N.; 65 49 30 W..	72	43.6	s., brk., sh..	Rare.
17839	U.S.N.M.	1	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.
17840	U.S.N.M.	1	D2668....	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s.....	Rare.
17841	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.
17842	U.S.N.M.	7	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Frequent.

NODOSARIA FILIFORMIS D'Orbigny.

Plate 12, figs. 1, 2.

"Orthoceratia filiformia aut capillaria" Soldani, Testaceographia, vol. 2, 1798, p. 35, pl. 10, fig. *e*.

Nodosaria filiformis D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 253, No. 14.—Egger, Abh. Kön. bay. Akad. Wiss., München, Cl. II, vol. 18, 1893, p. 340, pl. 11, fig. 4.—H. B. Brady, Rep. Vol. *Challenger*, Zoology, vol. 9, 1884, p. 500, pl. 63, figs. 3–5.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 30.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 55, fig. 6.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 119.—Millett, Journ. Roy. Micr. Soc., 1902, p. 523.—Chapman, The Foraminifera, 1902, p. 402; Trans. N. Zealand Inst., vol. 38, 1905, p. 93, pl. 3, fig. 5.—Goddard, Rec. Austr. Mus., vol. 6, 1907, p. 308.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 427.—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 412.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 55, pl. 27, figs. 1–4.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 92.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1022.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256.—Mestayer, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 133.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 612; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 194, pl. 34, fig. 9.

Description.—Test elongate, slender, arcuate; chambers numerous, elliptical or ovate, elongate, tumid; sutures usually oblique, chambers increasing in length toward the apertural end; aperture radiate, slightly eccentric; wall smooth.

Length up to 7 mm.

Distribution.—The Atlantic records given by Brady for this species include two stations off the West Indies; off Culebra Island, 390 fathoms (713 meters), off Sombrero Island, 450 fathoms (823 meters), and also off Bermuda, 435 fathoms (796 meters). He also records it from off the mouth of the Rio La Plata and off the Canary Islands. Flint's specimens were from the northern part of the Gulf of Mexico. I have had specimens in the *Albatross* collections from the region of Cape Hatteras southward, off the coast of Florida and in the Gulf of Mexico. Although it is recorded from the British Isles, records are few and evidently specimens are very rare.

Whether these are the same as the large species found in the western tropical Atlantic it seems open to question. There are numerous records for it in various parts of the Indo-Pacific. There is also a decided question as to whether or not our recent western Atlantic species is really identical with that described by D'Orbigny from the Tertiary of Italy.

Nodosaria filiformis—*Material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17881	U.S.N.M.	2	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.....	Rare.
17882	U.S.N.M.	2	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Rare.
17883	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
17884	U.S.N.M.	4	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Few.
17885	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy.,s. bk.sp.	Rare.
17886	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.
17887	U.S.N.M.	2	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Rare.

NODOSARIA CONSOBRINA (D'Orbigny).

There are a few records, especially from the British Isles, under this name. It is recorded by Balkwill and Wright[33] as very rare off Dublin and Wicklow, and again at a few stations in the same region.[34] Brady[35] adds a record from the Durham coast, and Robertson[36] records it as rare, off the Island of Skye. Wright[37] gives it as very rare at 7-1020 fathoms (13-1866 meters), off the southwest of Ireland. The only record given by Heron-Allen and Earland is off the west of Scotland, but specimens were not common.[38] I have failed to find specimens in the western Atlantic material which could be referred to this species.

[33] Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.
[34] Trans. Roy. Irish Acad., vol. 28, 1885, p. 343.
[35] Journ. Roy. Micr. Soc., 1887, p. 908.
[36] Proc. Nat. Hist. Soc., Glasgow, pt. 3, 1892, p. 241.
[37] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.
[38] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 256.

NODOSARIA CONSOBRINA D'Orbigny, var. EMACIATA Reuss.

Plate 13, figs. 3–5.

Brady figures under this name an elongate somewhat curved *Nodosaria* which does not seem so strikingly like Reuss's original figure of *Dentalina emaciata*, as do the specimens referred to *Dentalina intermedia* by Hantken. Whether the recent specimens are the same as the fossil ones of Europe must be left until a study of the latter can be made. Of the Atlantic *Challenger* records two occur in the western Atlantic, one off the West Indies, the other off Bermuda. Flint's specimens of this variety[39] were from the northern part of the Gulf of Mexico. I have had the species from stations in the same region, and also, as occurs with many other species, specimens from as far north on the southeastern Atlantic coast of the United States as latitude 34°. From these records of the *Challenger* and *Albatross* dredgings, therefore, there seems to be developed a species of the form figured by Brady and Flint and which I have again figured here, which is, so far as the material I have examined shows, confined to the western tropical and subtropical Atlantic. On the eastern side of the Atlantic there are records under this name by Pearcey as rare in the warm area of the Faroe Channel,[40] and by Wright from off the southwest of Ireland, rare, at 345 fathoms (631 meters).[41] This variety, however, does not seem to be mentioned in the works on the general region of the British Isles in the last 30 years.

Nodosaria consobrina, var. emaciata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18762	U.S.N.M.	1	D2312....	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s., bk. sp	Rare.
18763	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp	Rare.
18764	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
18765	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
18766	U.S.N.M.	5	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Frequent.
18767	U.S.N.M.	5	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Frequent.
18768	U.S.N.M.	4	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co., crs. s....	Few.

NODOSARIA AEQUALIS Reuss.

Under this name Brady has a *Challenger* record from the Atlantic from off the West Indies, and also off the Rio La Plata. Goës

[39] Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 1.
[40] Trans. Glasgow Nat. Hist., vol. 2, 1890, p. 178.
[41] Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.

records it from off the Azores, off the coasts of Norway and Sweden, and from the Arctic. Pearcey records it from the Faroe Channel. I have not seen the species from the western Atlantic.

NODOSARIA ADVENA, new species.

Plate 14, fig. 12.

Nodosaria (*Dentalina*) *roemeri* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 505, pl. 63, fig. 1.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 5.

Description.—Test elongate, only slightly tapering, circular in transverse section, composed of few chambers, initial end broadly rounded, apertural end slightly drawn out; sutures oblique, distinct, slightly depressed; wall smooth; aperture radiate, eccentric.

Length up to 7 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17856) from *Albatross* station D2389, in 525 fathoms (960 meters), off the northeastern coast of the United States. Specimens of this general character occur at numerous *Albatross* stations off the eastern coast of the United States, in the Gulf of Mexico, and in the Caribbean. Flint's specimens referred to in the synonymy were from off the northeastern coast of the United States, and off the Bahamas. In the *Challenger* report Brady gives the following sentence in regard to its distribution: "It has been observed chiefly in the North Atlantic at depths of less than 400 fathoms (732 meters). In the volume on the Summary of Results it is recorded from off the West Indies, off Sombrero and Culebra Islands, 450 and 390 fathoms (823 and 713 meters), off Bermuda, 435 fathoms (796 meters), and off the Canaries.

It is evidently not the same as *N. roemeri* Neugeboren and is not the same as Reuss's *N. roemeri*, being more like his figure referred to *Cristellaria tenuis* Bornemann,[42] which is not like Bornemann's original figure at all.

Heron-Allen and Earland record *N. roemeri* (pl. 13, fig. 6) as very rare west of Scotland, and Pearcey had questionable rare material from the cold area of the Faroe Channel. Pearcey also records specimens from Burdwood Bank, 1,946 and 56 fathoms (3,559 and 102 meters), material which may be the same as *N. advena*.

[42] Foram. Pietzpuhl, 1870, pl. 10, fig. 16.

Nodosaria advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17843	U.S.N.M.	2	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
17844	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	.....	co.....	Rare.
17845	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.....	Rare.
17846	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
17847	U.S.N.M.	1	D2217....	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m.....	Rare.
17848	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp	Rare.
17849	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	.....	yl. oz.....	Rare.
17850	U.S.N.M.	2	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Rare.
17851	U.S.N.M.	1	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.....	Rare.
17852	U.S.N.M.	1	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.....	Rare.
17853	U.S.N.M.	1	D2575....	41 07 00 N.; 65 26 30 W..	1,710	37.1	gy. oz.....	Rare.
17854	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17855	U.S.N.M.	2	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Rare.
17856	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Rare.
17857	U.S.N.M.	1	.....	.....	.....	.....	.....	
17858	U.S.N.M.	1	H89.....	12 07 30 N.; 62 24 00 W..	1,552	.....	bu. m. for...	Rare.

NODOSARIA MUCRONATA (Neugeboren).

Plate 12, figs. 5–7; pl. 13, figs. 7–9.

"Orthoceras intortum" Soldani, Testaceographia, vol. 1, pt. 2, 1791, p. 98, pl. 105, fig. v.

Nodosaria (*Dentalina*) *obliqua* D'Orbigny (not Linnaeus), Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 36; Modèles, No. 5.

Dentalina mucronata Neugeboren, Denkschr. Akad. Wiss. Wien, vol. 12, 1856, p. 83, pl. 3, figs. 8–11.

Nodosaria mucronata Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 475, No. 30.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 506, pl. 62, figs. 27–31.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, fig. 10.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 342.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 56, pl. 24, fig. 3; pl. 25, fig. 2; pl. 27, figs. 5–7; pl. 35, fig. 6.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 257 [?].

Description.—Test elongate, tapering from the acute initial end to the broadest portion, that of the last-formed chamber, initial end often with a short spine; chambers comparatively few, not inflated; sutures distinct, oblique but not depressed; wall smooth; aperture radiate, eccentric.

Length up to 5 mm.

Distribution.—Specimens referred to this species occurred from the coast of Carolina northward to the Grand Banks and a single station above 50° N. latitude. There is a single station in the Caribbean. Flint records it from one station in the Gulf of Mexico. Brady's Atlantic records include one off New York and another off Bermuda. Parker, Jones, and H. B. Brady record it from the

Abrohlos Bank off Brazil. Records from Eastern Europe are very few. Wright records it off the southwest of Ireland, very rare at 7, 345, and 1,020 fathoms (13, 618, and 1,866 meters), and Heron-Allen and Earland record a single doubtful specimen west of Scotland.

This is another of the species which needs careful revision with abundant material from widely distributed localities.

Nodosaria mucronata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17724	U.S.N.M.	4	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Few.
17725	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
17726	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Rare.
17727	U.S.N.M.	2	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Rare.
17728	U.S.N.M.	10	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
17729	U.S.N.M.	4	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Few.
17730	U.S.N.M.	1	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., blk. sp...	Rare.
17731	U.S.N.M.	3	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Few.
17732	U.S.N.M.	5	D2453....	47 10 00 N.; 51 02 00 W..	82	29.7	gn. m., fne. s.	Frequent.
17733	U.S.N.M.	5	D2458....	46 48 30 N.; 52 34 00 W..	89	29.5	s., gn. m....	Frequent.
17734	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.....	Rare.
17735	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.
17736	U.S.N.M.	2	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17737	U.S.N.M.	1	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Rare.
17738	U.S.N.M.	1	D2696....	46 50 30 N.; 45 05 30 W..	98	.....	gn. m.....	Rare.
17739	U.S.N.M.	1	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Rare.
17740	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.

NODOSARIA SCALARIS (Batsch).

"Orthoceratia Flosculi" Soldani, Testaceographia, vol. 1, pt. 2, 1791, p. 91, pl. 95, figs. B–M.

Nautilus (*Orthoceras*) *scalaris* Batsch, Conch. des Seesandes, 1791, No. 4, pl. 2, figs. 4*a*, *b*.

Nodosaria scalaris Parker and Jones, Philos. Trans., vol. 155, 1865, p. 340, pl. 16, figs. 2 *a–c*.—Parker, Jones, and H. B. Brady, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 157, pl. 9, fig. 42.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 510, pl. 9, fig. 42.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 342.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 909.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 44, figs. 6, 19.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 483.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 344, pl. 11, figs. 40, 41.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 73, pl. 13, figs. 716–718.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 32.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 60.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 54.—Chapman, The Foraminifera, 1902, p. 402.—Millett, Journ. Roy. Micr. Soc., 1902, p. 520, pl. 11, fig. 2.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 215.—Chapman, Journ. Quekett Micr. Club, ser. 2, vol. 10,

1907, p. 129.—Goddard, Rec. Austr. Mus., vol. 6, 1907, p. 308.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 20, pl. 2, figs. 19–21.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 58, pl. 24, fig. 7.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 93; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 257; Journ. Roy. Micr. Soc., 1916, p. 47.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 134.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 613; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 199, pl. 35, fig. 6.

Nodosaria longicauda D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 28.

Description.—Test composed of few nearly spherical chambers, rapidly increasing in size as added, apical end often with a spine, surface ornamented with numerous longitudinal raised costae; aperture at the end of a fairly long neck ornamented with transverse ring-like costae.

Length 1.50–3 mm.

Distribution.—From the synonymy this species is very widely distributed. However, a study of the figures referred to this species will show that they are evidently not all one species. In the western Atlantic I have not seen specimens of the typical form such as are figured by Brady. He, however, records it from a *Challenger* station off Bermuda, and several off the Canaries. Egger records it from the western coast of Africa and there are numerous records for the species from the coast of Europe, especially about the British Isles. Specimens comparable to this figured by Brady do not occur in the *Albatross* material.

NODOSARIA SCALARIS (Batsch), var, SEPARANS H. B. Brady.

Nodosaria scalaris (Batsch), var. *separans* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 511, pl. 64, figs. 16–19.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484.—Chapman, Proc. Zool. Soc. London, pt. 1, 1895, p. 32; The Foraminifera, 1902, p. 402.—Dakin, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 235.—Chapman, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1907, p. 129.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 23.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 258.

According to Brady, this variety differs from the typical in having the last-formed chamber somewhat remote from the preceding ones. Such a character occurs in numerous other species, such as *Nodosaria intercellularis*, *N. sublineata*, etc. His type specimens were from the Indo-Pacific, but there are numerous records for it especially off the coast of the British Isles. The figures given by Millett and referred to this species [43] are not the same as Brady's, but have been made a new species.[44]

[43] Journ. Roy. Micr. Soc., 1902, p. 520, pl. 11, figs. 11, 12.

[44] *Nodosaria millettii* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 654; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 202, pl. 36, fig. 5.

NODOSARIA COMATULA, new species.

Plate 14, fig. 5.

Nodosaria comata H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 509, pl. 64, figs. 1–5.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 60.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 3.—Chapman, The Foraminifera, 1902, p. 402.—Millett, Journ. Roy. Micr. Soc., 1902, p. 512, pl. 11, fig. 2.

Nodosaria radicula (Linnaeus), var. *raphanus* Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, pl. 1, figs. 9, 10.

Description.—Test short and stout, composed of a few chambers, initial end broadly rounded, sometimes with a small central spine, apertural end slightly tapering; chambers inflated, giving a somewhat lobulate appearance to the periphery; sutures distinct, somewhat depressed; surface ornamented by numerous low, rounded, longitudinal costae, close together, 35–45 in the last-formed chamber of the adult, continuous from one chamber to another, in the adult the apertural end of the last-formed chamber sometimes smooth; aperture central, terminal, radiate.

Length up to 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17823) from *Albatross* station D2377, in 210 fathoms (384 meters), in the Gulf of Mexico. The species is fairly frequent in the northern part of the Gulf of Mexico at depths of 100–300 fathoms (183–549 meters). There is a single specimen from a station off the coast of Georgia. Flint had specimens from both these regions. Goës had specimens from the Caribbean, 300–400 fathoms (549–732 meters). Brady's records for *Nodosaria comata* are as follows: "Somewhat plentifully off Bermuda, 435 fathoms (796 meters); and more sparingly off Culebra Island, West Indies, 390 fathoms (713 meters); off Sombrero Island, West Indies, 450 fathoms (823 meters); and in harbour-mud from Port Louis, Mauritius." Chapman records it as frequent in 200 fathoms (366 meters) outside the Funafuti Reef and Millett as occurring in great abundance in the Malay Archipelago.

I failed to find it in the collections I had from the North Pacific and, more surprisingly, it did not appear in all the rich collections I examined from the Philippines and adjacent regions where *Nodosaria* was so abundant.

It would seem, therefore, that we have here a species distinct from either *N. comata* (Batsch) or from *N. glans* D'Orbigny. This new species, *N. comatula*, has a distinctly lobed periphery, the chambers being distinct, the costae close-set but rounded, and very numerous. Its habitat is in the Western Atlantic in warm waters of 100-400 fathoms (183-732 meters) or more, and possibly in the Indo-Pacific.

Nodosaria comatula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17822	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs.s., bk.sp.	Rare.
17823	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Few.
17824	U.S.N.M.	3						
17825	U.S.N.M.	1	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Rare.
17826	U.S.N.M.	2	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Rare.
17827	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
17828	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.

NODOSARIA RAPHANUS (Linnaeus).

Plate 15, fig. 6.

There are a few records from off the coast of the British Isles, mostly from single specimens, for this species. In the Summary of Results of the *Challenger* Expedition there are several *Challenger* stations given for this species, two off the West Indies, one off the northeastern coast of the United States, and one in the central part of the North Atlantic, west of the Azores. I have failed to find in the *Albatross* collections specimens which are at all like this species as figured by Brady in the *Challenger* report, which are similar to those I have found from the Philippine region.

NODOSARIA RAPHANISTRUM (Linnaeus).

Under this name Heron-Allen and Earland record two small specimens off the west of Scotland.[45]

NODOSARIA RAPHANISTRUM (Linnaeus), var. OBSOLETA Goës.

Plate 15, fig. 4.

Nodosaria raphanistrum (Linnaeus), *var. obsoleta* Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 63, pl. 6, fig. 3.

Under this varietal name, Goës figures a specimen 19 mm. in length which is similar to *Nodosaria raphanistrum*, except that the last-formed chambers are smooth, due to the disappearance of the ornamentation of the earlier part. They are from the Caribbean, 227–332 fathoms (416–608 meters), scarce. I have not found anything in the *Albatross* dredgings to correspond to this variety.

NODOSARIA SEMINUDA Reuss?

Plate 15 fig. 2.

Nodosaria obliqua (Linnaeus), var., Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 4, pl. 1, fig. 17.

Nodosaria seminuda Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 71, pl. 13, fig. 700; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 64, pl. 6, figs. 4, 5.

[45] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 258.

Under this name Goës figures a very large form from the Caribbean. His specimens measure from 17–22 mm. in length. The early portion of the test is longitudinally costate, the later portion smooth, the sutures broad and limbate. These occurred at a depth of 300 fathoms (549 meters), but I have failed to find similar material from the Caribbean.

NODOSARIA FLINTII, new species.

Plate 14, fig. 1.

Nodosaria obliqua H. B. Brady (part) (not Linnaeus), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 513, pl. 64, figs. 20–22.—Goës (part), Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 70, pl. 12, figs. 691, 692.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 59, pl. 25, fig. 5.

Description.—Test very elongate, slender, gracefully tapering, somewhat curved, the initial end with a stout spine; chambers numerous, early ones indistinct, last-formed ones much more distinct; sutures of the early portion often indistinct, not at all depressed, later ones very distinct between the inflated chambers; surface ornamented by longitudinal costae, increasing in number as the diameter of the test increases, earlier ones spirally twisted and reaching to or onto the terminal spine, later ones straight, in the adult 15–20 in number, running to the apertural end, and their ends forming a tooth-like crown about the aperture itself, the costae with the peripheral portion rounded, often broadest in the central portion of the chamber, narrowing over the sutures; aperture with a tapering neck, usually eccentric.

Length up to 8.50 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17804) from *Albatross* station D2682, in 990 fathoms (1,811 meters), off the northeastern coast of the United States. The species is a very common and characteristic one from the latitude of Cape Cod and Georges Bank southward along the Atlantic coast, and into the Gulf of Mexico, with a few stations in the Caribbean. Brady undoubtedly had this species from his figures. Some of his records in the *Challenger* Summary of Results volume include a station off New York in the midst of the area where there are numerous records for this species. Others are from the region of Bermuda, off the West Indies, and off the coast of Brazil. Some other records for the eastern Atlantic are off the Canaries and the west coast of Africa. Flint's records are all in the same region from which I have had abundant *Albatross* material. I have not seen this species in European material I have examined. It is recorded from about the British Isles by several authors.

I have had specimens from the eastern tropical Pacific which seem very similar to this, but that I have recorded from the Philippines is different.[46]

As developed in the western Atlantic this is a very well-defined species.

Nodosaria flintii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17776	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
17777	U.S.N.M.	8	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Common.
17778	U.S.N.M.	10+	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Abundant.
17779	U.S.N.M.	10+	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Abundant.
17780	U.S.N.M.	4	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Few.
17781	U.S.N.M.	8	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
17782	U.S.N.M.	2	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Rare.
17783	U.S.N.M.	10+	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Abundant.
17784	U.S.N.M.	3	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Few.
17785	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	.....	glob. oz.....	Rare.
17786	U.S.N.M.	2	D2116....	35 45 23 N.; 74 31 25 W..	888	39.0	bu.m.,fne.s.	Rare.
17756	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
17787	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
17788	U.S.N.M.	1	D2160....	23 10 31 N.; 82 20 37 W..	167	.....	co.....	Rare.
17789	U.S.N.M.	1	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.....	Rare.
3135	U.S.N.M.	1	D2174....	38 15 00 N.; 72 03 00 W..	1,594	.....	gy. m.....	Rare.
17790	U.S.N.M.	1						
17791	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m., s....	Rare.
3087	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Abundant.
3088	U.S.N.M.	1						
17792	U.S.N.M.	10						
17793	U.S.N.M.	2	D2204....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.....	Rare.
17794	U.S.N.M.	2	D2217....	39 47 20 N.; 69 34 15 W..	924	38.1	gy. m.....	Rare.
17795	U.S.N.M.	1	D2219....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.....	Rare.
17796	U.S.N.M.	2	D2228....	37 25 00 N.; 73 06 00 W..	1,582	36.8	br.m.....	Rare.
17797	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.....	Rare.
17798	U.S.N.M.	10	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. s.	Common.
17799	U.S.N.M.	2	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
17800	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Rare.
17801	U.S.N.M.	2	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
17802	U.S.N.M.	9	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Common.
17803	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17804	U.S.N.M.	1	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Abundant.
17805	U.S.N.M.	10+						
17806	U.S.N.M.	7	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Frequent.
17807	U.S.N.M.	1	D2706....	41 28 30 N.; 65 35 30 W..	1,188	.....	gy. oz., for..	Rare.
17808	U.S.N.M.	3	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Few.

NODOSARIA VERTEBRALIS (Batsch).

Plate 14, fig. 6.

There are various forms of this general type which may be referred to *Nodosaria vertebralis* (Batsch), although the original figure is not as perfect as might be wished. The West Indian species has stout, broad chambers, and the last-formed chamber rotund with a short apertural extension.

Flint records *Nodosaria catenulata* H. B. Brady from the Gulf of Mexico at *Albatross* station D2400.[47] I have a specimen from the

[46] Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 210, pl. 38, fig. 1.

[47] Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 2.

same station showing the same characters, and it seems to be a local variety of *Nodosaria vertebralis*. The true *N. catenulata* seems to be confined to the Indo-Pacific.

Nodosaria vertebralis, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17749	U.S.N.M.	1	D2400....	° ′ ″ ° ′ ″ 28 41 00 N.; 86 07 00 W..	169	°F.	gy. m.....	Rare.

NODOSARIA VERTEBRALIS (Batsch), var. ALBATROSSI, new variety.

Plate 15, fig. 1.

Nodosaria vertebralis H. B. Brady (not Batsch), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 514, pl. 63, fig. 35; pl. 64, figs. 11–14.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 57, fig. 5.

Description.—Test elongate, gradually tapering, often slightly curved, the proloculum or initial chamber often being of greater diameter than those immediately following; chambers numerous, distinct, not inflated, except those near the apertural end; sutures broad, of clear shell material, not depressed except near the apertural end; wall ornamented by numerous longitudinal costae, typically 15–18 in the adult, continuous from one chamber to another, sharp at the periphery, broader at the base, initial end of the test with a short stout spine; aperture slightly extended, radiate.

Length up to 8 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17743) from *Albatross* station D2377, in 210 fathoms (384 meters), in the Gulf of Mexico. This variety is common in the Gulf of Mexico and off the southeastern coast of the United States. Flint had it from the northern part of the Gulf of Mexico. Brady had it from off Bermuda, off the Azores, and among the West Indies, at depths of 300–450 fathoms (549–823 meters). He also records it from the South Pacific, 120–300 fathoms (220–549 meters). I have recorded it from the Philippines,[48] but the Philippine specimens are not of this variety. The chambers are longer and the apertural end much more extended.

[48] Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 211, pl. 38, figs. 2, 3; pl. 40, fig. 2.

Nodosaria vertebralis, var. albatrossi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17741	U.S.N.M.	3	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Few.
17742	U.S.N.M.	2	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Rare.
17743	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Abundant
17744	U.S.N.M.	10						
17745	U.S.N.M.	6	D2378....	29 14 30 N.; 88 09 30 W ;	68	.....	gy. m.....	Frequent.
17746	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W ;	420	41.8	gn. m.....	Rare.
17747	U.S.N.M.	7	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Frequent.
17748	U.S.N.M.	1	.....	Off Sand Key, Fla.....	72	.....	.....	Rare.

NODOSARIA STRIOLATA (Goës).

Plate 15, fig. 5.

Nodosaria striolata Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 71, pl. 13, fig. 701; Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 64, pl. 6, figs. 6, 7.

Goës described this species from the Caribbean. It is elongate, tapering, with rounded short chambers, and the surface faintly costate, the final chamber often smooth. I have failed to find specimens agreeing with this species.

NODOSARIA PLEBEIA Reuss.

Heron-Allen and Earland record one specimen which they refer to this species from the Clare Island region of western Ireland.[49]

NODOSARIA PERVERSA Schwager.

There are three *Challenger* stations for this species in the Atlantic, one with a question mark off Bermuda, one in the central part of the South Atlantic, and one off the Cape of Good Hope. Pearcey records it from the region south of the Falkland Islands in deep water. I have had no specimens which can be referred to this species, nor are any recorded from the coast of Europe.

NODOSARIA SUBLINEATA H. B. Brady.

Plate 17, fig. 1.

Nodosaria hispida D'Orbigny, var. *sublineata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 508, pl. 63, figs. 19–22.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 56, fig. 4.

Description.—Test elongate, composed of a very few chambers, the earlier ones especially in the microspheric form close-set, the later ones remote with the cylindrical neck of the preceding chamber

[49] Proc. Roy. Irish Acad., vol. 31, pl. 64, 1913, p. 92.

forming the connection; surface ornamented on the upper portion with delicate costae, the remainder of the test spinose; aperture at the end of a long cylindrical neck which tapers to the small aperture, the outside of the neck spinose.

Length up to 2.50 mm.

Distribution.—Brady's original records are *Challenger* station 33, off Bermuda, 435 fathoms (796 meters), and station 122, southwest of Pernambuco, Brazil, 350 fathoms (640 meters). Flint's station was in the northern part of the Gulf of Mexico, at a depth of 68 fathoms (125 meters). In the *Albatross* collections specimens have also occurred off the Carolina coast, in the Gulf of Mexico, and in the Caribbean.

It is probable that the specimens from the Philippines that I have referred to this species are not the same.[50]

Nodosaria sublineata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17888	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
17889	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
17890	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Rare.
17891	U.S.N.M.	4	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Few.
17892	U.S.N.M.	5	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Frequent.
17893	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
17894	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.
17895	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp.	Rare.
17896	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.

NODOSARIA INTERCELLULARIS H. B. Brady.

Plate 14, figs. 2–4; pl. 17, fig. 3.

Nodosaria intercellularis H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 63; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 515, pl. 65, figs. 1–4.

Nodosaria radicula Linnaeus, var. *scalaris* Goës (not Batsch), Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 21, pl. 1, fig. 8.

Nodosaria scalaris Goës (not Batsch), Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894 (in part?), p. 73, pl. 13, fig. 718 (not 716, 717).

Description.—"Test more or less arcuate, inferior extremity mucronate; composed of about 6 segments, the earlier of which are short and slightly inflated, the later ones elliptical or pyriform. Surface-ornament of the earlier segments consisting of longitudinal costae; the later chambers marked by lines of closely set perforations which communicate with chamberlets formed in the furrows between the ribs. Aperture situated in a produced terminal neck, with annular or spiral raised ornament and phialine or cleft lip.

"Length, 1/15 inch (1.70 mm.)."

[50] Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 207, pl. 37, fig. 1.

Distribution.—Brady originally described this species from *Challenger* station 33, off Bermuda, at a depth of 435 fathoms (796 meters). In the volume on Summary of Results of the *Challenger* Expedition *Nodosaria intercellularis* is recorded from station 23, off Sombrero Island, 450 fathoms (823 meters) with a question, and from station 24, off Culebra Island, 390 fathoms (713 meters), without question. As has already been noted in many species of the Lagenidae particularly, these two stations, with that from off Bermuda, contain many identical species and species which are also peculiar to the warmer waters of the western Atlantic. With these as a basis, it is interesting to find very typical specimens of this species from *Albatross* station D2756, in 417 fathoms (763 meters), off the coast of Brazil and a single broken fragment from D2150, in 382 fathoms (697 meters), in the Caribbean. All these stations together mark very definitely the range of so many and peculiar species of this region. An examination of Goës's paper on the Caribbean region shows that his figure is very clearly this species. He refers to it the specimen from off the Azores and which is referred to above. This may possibly be the same.

Brady gives a considerable note on the peculiar structure of this species. Our specimens show this character very well. In view of the restricted range of so many species of the western tropical Atlantic it is interesting to examine the other records referred to *Nodosaria intercellularis* H. B. Brady. The first of these, that of Egger,[51] records the species from Mauritius and off western Australia. A reference to his figure, however, shows decidedly that his figured specimen is not identical with the very well characterized specimens figured by Brady and which I have seen from the *Albatross* material. Chapman[52] records the species as very rare in the Arabian Sea, but the name is followed by a question mark in his text and may therefore probably be eliminated. He records it as very rare in 200 fathoms (366 meters) outside Funafuti Reef,[53] but no figure is given and the record will have to stand on Chapman's determination. Dakin records it sparingly from the Gulf of Manaar.[54] This also, without figure, may or may not be this species. Chapman also records "one typical specimen" from the Gingin Chalk of Australia. This specimen is figured and certainly does not appear to be identical with our western Atlantic species, as the form of the chambers is very different. It would seem, therefore, that this species is a recent one of the western Atlantic and a possibility that it occurs in the Indo-Pacific region.

[51] Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 345, pl. 11, figs. 12, 23.
[52] Proc. Zool. Soc. London, pt. 1, 1895, p. 32.
[53] Journ. Linn. Soc. Zoology, vol. 28, 1902, p. 402.
[54] Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 235.

Our species shows that the early chambers are globular and close set, as are those figured by Brady, the later ones becoming more elongate and remote. The neck is slender, long, and tapering, and ornamented with peculiar platelike ornamentation. The aperture itself is surrounded by projecting teeth, usually four in number. In certain of its characters it resembles *Nodosaria substriatula* Cushman, which occurs widely spread in the Indo-Pacific. There are evidently other species, both recent and fossil, which have a similar ornamentation of the surface but which are not identical with our western Atlantic species.

Nodosaria intercellularis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of abundance.	Abundance.
18772	U.S.N.M.	4	D2756....	° ′ ″ ° ′ ″ 3 22 00 S.; 37 49 00 W..	417	°F. 40.5	gy. sp.....	Few.

NODOSARIA ANTILLEA, new species.

Plate 14, fig. 9.

Sagrina virgula H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 583, pl. 76, figs. 9, 10 [?].

Description.—Test elongate, tapering, straight or slightly curved, composed of a few chambers in a linear series, the later ones somewhat remote, surface of the upper part of the chamber smooth, basal portion with a series of spines or broken costae, the chamber angled near the base, sutures distinct, apertural end contracted into a short cylindrical neck with a broad phialine lip.

Length up to 1 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18773) from *Albatross* station D2614, in 168 fathoms (307 meters), off the coast of Carolina. Brady records this species from off Pernambuco, Brazil, in 675 fathoms (1,234 meters). His other records are from the south Pacific.

There are two species involved in Brady's plate of *Sagrina virgula;* one of these, represented by figures 4–7, is a true *Siphogenerina*, that occurs at numerous stations in comparatively shallow water in the Indo-Pacific region. The other is apparently a *Nodosaria*, and while various forms occur in deeper water in various parts of the oceans, it is very distinct from the other form figured. The very flaring lip is often prominent at the base of the new-formed chamber. The chamber is usually somewhat angled below the median line and this

area often develops spines, reminding one somewhat of the condition seen in *Nodosaria adolphina* D'Orbigny and its relatives. This species is probably to be found at considerable depths throughout the West Indian region and should be carefully compared with that from the Pacific.

Nodosaria antillea—*material examined.*

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
18773	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy.s., bk.sp.	Few.
18780	U.S.N.M.	2						

NODOSARIA HISPIDA D'Orbigny.

Plate 16, fig. 6.

There are records for this species off Dublin and Wicklow, a single specimen only;[55] off the Isle of Man;[56] and from the Estuary of the Dee (Siddall).[57]

Balkwill and Wright's figure shows a species different from that of the western Atlantic unless it is similar to *Nodosaria sublineata* H. B. Brady. No typical *Nodosaria hispida* has been found in the material I have examined from the western Atlantic.

NODOSARIA HIRSUTA D'Orbigny, var. ACULEATA D'Orbigny.

Plate 17, fig. 4.

Nodosaria aculeata D'Orbigny, Foram. Foss. Vienne, 1846, p. 35, pl. 1, figs. 26, 27.

Nodosaria hirsuta D'Orbigny, var. *aculeata* Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 214, pl. 38, figs. 7, 8.

Description.—Variety with the test covered with coarse aculeate spines, radiately placed on the exterior, the chambers themselves elongate, and the apertural end with an elongate neck ending in a series of large triangular teeth.

Distribution.—I have already recorded this variety from the Philippine region, and it is interesting to find specimens apparently identical with the Philippine material in the northern part of the Gulf of Mexico at 196 and 210 fathoms (359 and 384 meters). The Philippine stations ranged from 201–554 fathoms (368–1,012 meters).

[55] Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.
[56] Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 343.
[57] H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 909.

Nodosaria hirsuta, var. aculeata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18751	U.S.N.M.	3	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Few.
18752	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.

NODOSARIA SETOSA Schwager.

The only record for this seems to be that of Pearcey,[58] who recorded it as rare from Burdwood Bank, station 346, 56 fathoms (102 meters).

NODOSARIA, species.

Plate 14, fig. 7.

From *Albatross* station D2614 there is a single specimen of an elongate, very slightly tapering species, the chambers gradually increasing in length, which somewhat resembles *Nodosaria exilis* Neugeboren. It is not like any other species of the genus that I have had from the western Atlantic.

Nodosaria, species—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18776	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp	Rare.

Genus LINGULINA D'Orbigny, 1826.

Lingulina D'Orbigny (type, *L. carinata* D'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 256.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 517.—Chapman, The Foraminifera, 1902, p. 190.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 61.

Description.—Test compressed; chambers arranged in a linear series, usually closely set; aperture usually elongate, corresponding to the form of the chamber.

This genus seems to be less clearly defined than many of the genera established by D'Orbigny. It is closely related to *Nodosaria*, differing from this genus only in the compressed character and the consequent changes in the aperture.

The largest and best developed species of this genus are found in warm seas.

[58] Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1021.

LINGULINA QUADRATA Heron-Allen and Earland.

Plate 17, fig. 12.

Lingulina quadrata Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 95, pl. 8, fig. 11.

Description.—"Test bilocular, highly compressed, quadrate and carinate, the final chamber drawn out sometimes at the apex, which is either simple or furnished with an entosolenian tube. The line of suture between the two chambers is slightly depressed and curved at the marginal edges toward the base of the shell.

"Length 0.16 mm.; breadth 0.13 mm."

Distribution.—Heron-Allen and Earland described this species from the Clare Island region and recorded it also from Noss Head, in the Moray Firth, and at several other *Goldseeker* stations about the British Isles, but always rare.

This is a peculiar little species which has its relations with the entosolenian Lagenas rather than elsewhere.

LINGULINA BILOCULI Wright.

Plate 18, figs. 3–5.

Lingulina carinata D'Orbigny, var. *biloculi* Wright, Rep. Belfast Nat. Field Club, ser. 2, vol. 3, No. 6, 1910 (1911), App. No. 2, p. 13, pl. 2, fig. 10.

Lingulina biloculi Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 94, pl. 8, figs. 5–7; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 259.

Lingulina carinata Sidebottom (part), Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 3, pl. 1, figs. 18, 19.

Description.—Test more or less compressed, composed of 2 and sometimes 3 chambers, periphery rounded, basal end rounded or slightly truncate; suture distinct, slightly depressed, somewhat limbate; wall smooth, thin, finely punctate; aperture elliptical, small, or with an entosolenian tube.

Length about 0.15 mm.

Distribution.—Wright originally described this species from the Estuarine Clays of Ireland. Heron-Allen and Earland have recorded it from off the coast of Ireland, in the Clare Island region, off the west of Scotland, and note that they have found it in several *Goldseeker* dredgings and that "it will probably be found to occur in muddy shallow-water deposits all round the western coast of Scotland and Ireland." It does not occur in the western Atlantic material.

LINGULINA CARINATA D'Orbigny.

Plate 19, figs. 1, 2.

Lingulina carinata D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 257, No. 1; Modèles, No. 26; in Barker, Webb, and Berthelot, Hist. Nat. Isles Canaries, vol. 2, pt. 2, Foraminifères, 1839, p. 124, pl. 1, figs. 5, 6.—Goës (part), Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 65.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 3.

Description.—Test elongate, tapering, much compressed, periphery carinate, with a definite keel, which is continuous from the last-formed chamber to the initial end; chambers distinct, somewhat inflated, periphery not lobulate; sutures distinct, slightly depressed; wall smooth; aperture elongate, with lateral projections rising above the apertural end of the test.

Length up to 4 mm.

Distribution.—D'Orbigny's type-specimens were from the Antilles, probably from Cuba in shallow water. Flint had specimens from *Albatross* station D2416, off the coast of Georgia, which I have seen. They are young specimens and I have a similar specimen from the same station. There is a much finer specimen in the collection from off Ajax Reef, Florida, in 40 fathoms (73 meters). This would seem to indicate that this species is well developed in this region in comparatively shallow water. It is very doubtful if much of the material from other regions referred to this species is really the same.

It is close to *Lingulina grandis* which I described from the Philippine region.

Lingulina carinata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°*F.*		
17456	U.S.N.M.	1	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Rare.
17457	U.S.N.M.	1	.....	Ajax Reef, Fla.....	40	.....	.....	Rare.

LINGULINA SEMINUDA Hantken.

Plate 17, figs. 8, 9, 11; pl. 18, figs. 1, 2.

Lingulina costata D'Orbigny, var. *seminuda* Hantken, Mitth. Jahrb. ung. geol. Anstalt, vol. 4, 1875, p. 41, pl. 4. figs. 8*a*, *b*.

Lingulina carinata D'Orbigny, var. *seminuda* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 518, pl. 65, figs. 14. 15.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 4.

Nodosarina carinata Goës (not D'Orbigny), Kongl. Svensk. Vet. Akad. Handl., vol. 19. No. 4, 1882, p. 58, pl. 1, fig. 67 (not figs. 65, 66).

Description.—Test ovate, only slightly longer than broad, rapidly tapering from the subacute initial end to the greatest breadth at the last-formed chamber, compressed; chambers few, increasing rapidly in size as added, inflated, the periphery with numerous fine longitudinal costae; remainder of chamber smooth and polished; sutures very distinct, depressed; wall thick; aperture with an elongate depression, formed by two lip-like projections from the end of the test.

Length up to 2.50 mm.

Distribution.—The first record for this as a recent form is that of Brady in the *Challenger* report who speaks of it as follows: "The larger Lingulinae, not uncommon in certain areas of the North Atlantic, are seldom really carinate, but the lateral edges of the test are slightly rounded, and each margin is ornamented with a few delicate longitudinal ribs. With this exception the lateral faces are smooth." He gives 6 *Challenger* stations in the North Atlantic for this form, ranging from 390–862 fathoms (713–1,577 meters). Two of these are definitely given: Station 24, off Culebra Island, West Indies, 390 fathoms (713 meters), and station 75, off the Azores, 450 fathoms (823 meters), from which stations he obtained the finest specimens. He also gives two stations in the South Atlantic, 350 and 675 fathoms (640 and 1,234 meters), off Pernambuco, Brazil, and records it in the Mediterranean in 1,200 fathoms (2,195 meters). Flint recorded this form from the Gulf of Mexico, 169 and 170 fathoms (309 and 311 meters). Chapman has recorded it as very rare in 200 fathoms (366 meters), outside the Funafuti Reef in the Pacific. Heron-Allen and Earland[59] record and figure some small specimens with two chambers which they refer to this form, but after seeing a large series of the typical form from the western Atlantic, I do not think that their form from off the British coast is the same. The *Albatross* specimens, as the table shows, range from the coast of Brazil northward into the Caribbean and Gulf of Mexico, with one station off the coast of Georgia and one farther north, along the eastern coast of the United States.

Some of the specimens have the costae of the periphery practically wanting, but usually traces may be seen near the base and the periphery even in such cases is rounded and not carinate.

[59] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 259, pl. 42, figs. 6, 7.

Lingulina seminuda—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17458	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
17459	U.S.N.M.	1	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Rare.
17460	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	.....	yl. oz.....	Rare.
17461	U.S.N.M.	10+	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Abundant.
17462	U.S.N.M.	3	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Few.
17463	U.S.N.M.	2	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co. crs. sh...	Rare.
17464	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz.	Rare.
17465	U.S.N.M.	1	D2760....	3 22 00 S.; 37 49 00 W..	417	40.5	br. co.....	Rare.

LINGULINA BICARINATA Sidebottom.

Plate 17, figs. 5–7; pl. 18, figs. 6, 7.

Lingulina carinata D'Orbigny, var. *bicarinata* Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, no. 9, 1907, p. 3, pl. 1, fig. 20; vol. 54, 1910, p. 20.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 94, pl. 8, figs. 3, 4; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 259, pl. 42, figs. 3–5.

Description.—Test elongate, much compressed, composed of two or three chambers, periphery of the test with two parallel keels; chambers distinct, slightly inflated; sutures slightly depressed, distinct; wall smooth, thin, finely punctate; aperture elongate, terminal central, between the keels which are much extended about the apertural end.

Length, 0.10–0.25 mm.

Distribution.—Sidebottom originally described this species as very rare from the Mediterranean, from off the coast of the Island of Delos, and from the Bay of Palermo, Sicily. Heron-Allen and Earland record it from off the British Isles, in the Clare Island region, from the west of Scotland, from off Noss Head, in the Moray Firth, and at several other stations about the Scottish coast. I have seen no material from the western Atlantic.

This seems to be a true *Lingulina*, but does not seem closely enough related to typical *L. carinata* D'Orbigny of the West Indies to allow its being placed as a variety of that species, and I have therefore given it specific rank.

LINGULINA ARMATA Sidebottom.

Plate 17, fig. 2.

Lingulina armata Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, no. 9, 1907, p. 4, pl. 1, fig. 21.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 95, pl. 8, fig. 8.

Description.—Test composed of two chambers, somewhat compressed, the periphery of the initial chamber with a series of small

spines; suture distinct, not depressed; wall smooth; aperture elongate with an entosolenian tube.

Length 0.08–0.10 mm.

Distribution.—Sidebottom originally described this minute species from the Mediterranean, off the coast of the Island of Delos, and Heron-Allen and Earland have recorded it from the Clare Island region as well as the following: *Goldseeker* dredgings from Noss Head (Moray Firth), Scapa Flow (Orkney Islands), and in the Minch.

This is a peculiar little species and seems almost like a young form of a larger species. The finding of it by Heron-Allen and Earland at numerous stations off the British Isles seems to show that it is a valid species with these peculiar characters. It has not occurred in the western Atlantic as far as I have seen.

LINGULINA PELLUCIDA Sidebottom.

Plate 17, fig. 10.

Lingulina pellucida Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 4, pl. 1, figs. 22–25; vol. 54, 1910, p. 20.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 96, pl. 8, fig. 10; Journ. Roy. Micr. Soc., 1916, p. 47.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 136.

Description.—Test longer than broad, compressed, especially in the later chambers, periphery rounded in transverse section; composed of 2 or 3 chambers, earlier one subglobular, the second and third much more compressed, the initial chamber oval, the second somewhat embracing and broader than the first, with a spine from each of the posterior angles of the periphery; chamber three may be of the same form or may be remote, with a short neck, with or without a spine developed in the second chamber; sutures distinct, depressed; wall smooth and finely punctate; aperture elliptical, at the end of a definite neck, with a phialine lip.

Length, 0.15–0.25 mm.

Distribution.—Sidebottom originally described this species from the Mediterranean, it being common off the Island of Delos in the Aegean Sea, and rare at the Bay of Palermo, Sicily. Heron-Allen and Earland have recorded typical specimens from off the coasts of the British Isles, in the Clare Island region, off Noss Head in the Moray Firth, and off the coast of South Cornwall. Sidebottom also records two specimens from the eastern coast of Australia in 465 fathoms (850 meters).

This is another of the species which has not occurred, so far as I have seen, in the western Atlantic. The elongate, tubular aperture, with a phialine lip, makes the species very different from typical *Lingulina*.

TRIFARINA, new genus.

Rhabdogonium H. B. Brady (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 524 (and subsequent authors).

Triplasia Cushman (not Reuss), Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 62.

Description.—Test elongate, triangular in transverse section; the early chambers in an irregular spiral, later ones very loosely so or even uniserial; wall thin, translucent, finely punctate; aperture terminal not radiate, at the end of a short, often phialine lip.

The recent material which composes this genus has been referred to a number of genera. *Triplasia* of Reuss is based on Cretaceous species which are three-sided and seem to belong rather to the Textulariidae, possibly to *Tritaxia*. His name later changed by him to *Rhabdogonium*, on account of the finding of species polygonal in transverse section, is based on similar Cretaceous material.

The Recent material is different from these. It is more nearly allied to *Uvigerina* and *Siphogenerina* than to *Nodosaria*. The early development is similar to that of *Uvigerina* and the aperture is not of the radiate form seen in most of the *Nodosaria* group. A new genus has been erected for this. The Pacific species which I have called *Triplasia reussi* should be known as *Trifarina reussi* Cushman.

Type-species.—*Trifarina bradyi* Cushman, new species.

TRIFARINA BRADYI, new species.

Plate 22, figs. 3–9.

Rhabdogonium tricarinatum H. B. Brady (not *Vaginulina tricarinata* d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884 p. 525, pl. 67, figs. 1–3; Journ. Roy. Micr. Soc., 1887, p. 910.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 223, pl. 45, fig. 3.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 355, pl. 11, figs. 49, 50; pl. 12, figs. 36–38.

Description.—Test elongate, slightly tapering toward either end, often somewhat twisted, triangular in transverse section, with carinae at three angles, thin and fairly high, running from the initial end to the aperture, even onto the neck itself; chambers distinct, those of the earlier portion at least irregularly spiral, later ones less distinctly so; sutures distinct but not depressed; wall thin, translucent, finely punctate, smooth; aperture terminal, central, at the end of a short tubular neck, usually with a phialine lip.

Length up to 0.50 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17443) from *Albatross* station D2150, in 382 fathoms (697 meters), in the Carib-

bean Sea. It has also occurred at several stations, as shown on the accompanying table. These cover fairly well the region from south of Cape Hatteras on the southeastern coast of the United States to Brazil, including the Gulf of Mexico and Caribbean. In his *Challenger* collections Brady had the species from off Bermuda, off the Lesser Antilles, off Brazil, and off the Canaries at depths from 350–1,360 fathoms (640–2,487 meters). It is also recorded from off the Abrohlos Bank, Brazil (H. B. Brady, Parker, and Jones); off the Irish coast, 100–1,000 fathoms (183–1,829 meters) (Wright; Balkwill and Wright); and from off the West Coast of Africa (Egger). The specimens of Balkwill and Wright are evidently not this species, and it may be that those of Wright were not. If so the species would be confined to the more restricted distribution given.

There are numerous records for the species from the Pacific, especially the South Pacific, and it may be that this species, like a number of others, has a wide range. A specimen which I have from the Gulf of Oman in 200 fathoms (366 meters) seems to be different from typical western Atlantic material, and specimens from the South Pacific and elsewhere should be examined and compared with typical material from the Atlantic.

While the species has previously been referred to *Vaginulina tricarinata* D'Orbigny, an examination of D'Orbigny's Modèle shows a form that can hardly be considered in connection with our Atlantic species. The arrangement of the chambers, the shape of the test, the angles, and the aperture are all very different.

There is almost no real variation in the characters of the species in the series of specimens I have had, nor in the specimens figured by Brady, or by Brady, Parker, and Jones, showing that the species is well defined. Its nearest relationships are with *Uvigerina*.

Trifarina bradyi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17442	U.S.N.M.	1	D2117....	15 21 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17443	U.S.N.M.	3	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
17444	U.S.N.M.	2	D2355....	20 56 48 N.; 86 27 00 W..	399	.....	yl. oz.....	Rare.
17445	U.S.N.M.	2	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
17446	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
17447	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Rare.
17448	U.S.N.M.	2	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp.	Rare.
17449	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.
17450	U.S.N.M.	3	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Few.
17451	U.S.N.M.	2	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. s., bk. sp.	Rare.
17452	U.S.N.M.	1	.....	Ragged Key, Fla.....	75	.....	.....	Rare.

Genus CRISTELLARIA Lamarck, 1812.

Nautilus (part) Linnaeus, Syst. Nat., ed. 12, 1767, p. 1162.
Lenticulites (part) Lamarck, Annales du Muséum, vol. 5, 1804, p. 188.
Cristellaria Lamarck (type, *C. calcar* (Linnaeus)), Extrait Cours Zool., 1812, p. 122.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 534.—Chapman, The Foraminifera, 1902, p. 193.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 63.

Description.—Test planospiral, typically close-coiled, but becoming much uncoiled in some species; chambers numerous; wall hyaline, perforate, variously ornamented; aperture usually distinctly radiate.

Typically this genus is close-coiled throughout, but various species are included under it in which the later chambers become uncoiled. It is often a question whether these species should be referred to *Cristellaria* or to *Marginulina*. Often in the uncoiled portion of such species the sutures between the chambers are oblique. There is great range of variation in the ornamentation of the test, which may be smooth or costate, the costae often breaking up into knobs and bosses, spines, or combinations of these, the sutures being frequently limbate, and the periphery often with a broad keel or ornamented by a series of spines. The aperture is almost always radiate, and in some species the apertures of the preceding chambers are visible, giving a peculiar appearance to such specimens.

The genus is recorded as far back as the Cambrian and is very abundant in the Cretaceous and in certain portions of the Tertiary. In the present oceans it is widely distributed, both geographically and bathymetrically. It reaches a very great development, especially in the number of species, in tropical waters from 100–500 fathoms (183–914 meters) in depth, and in cold waters of similar depths, while the species are not so numerous, specimens are often very abundant. The greatest ornamentation is seen in tropical species.

CRISTELLARIA ORBICULARIS (D'Orbigny)?

Plate 21, fig. 7.

Brady records this species from off Sombrero Island, West Indies, 450 fathoms (823 meters) and had several stations in the South Pacific. I have specimens from a single *Albatross* station off the coast of Georgia, one which is here figured and is apparently similar to the form which Brady had from the West Indies. Flint records it from the Gulf of Mexico, 169 and 210 fathoms (308 and 384 meters). There are numerous other records for the species, all from the Indo-Pacific. It is therefore to be doubted whether this species is really identical with that described by D'Orbigny from the Tertiary of Central Italy.

Cristellaria orbicularis?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18971	U.S.N.M.	4	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	crs. s.....	Few.

CRISTELLARIA D'ORBIGNII (Bailey).

Plate 22, fig. 1; pl. 26, fig. 3.

Robulina d'orbignii Bailey, Smithsonian Contrib., vol. 2, 1851, p. 10, pl., figs. 9, 10.

Description.—Test close-coiled, compressed, periphery with a slight blunt keel; chambers comparatively few, 8–10 in the last-formed coil, distinct, but very slightly inflated, often more so toward the later chambers; sutures distinct, very slightly if at all depressed, straight, generally radiate, apertural face truncated, the sides somewhat thickened and keeled; aperture at the peripheral angle, radiate, only slightly projecting; surface smooth.

Diameter up to 4 mm.

Distribution.—This species was originally described and figured by Bailey from dredgings off the northeastern coast of the United States, in the same region from which much of the *Albatross* dredgings used in the present paper were obtained. It somewhat resembles *Cristellaria occidentalis* Cushman, but has a more rounded form, is larger, and its general appearance very different. The stations range from the latitude of Cape Cod southward nearly to Cape Hatteras. Specimens are not nearly so abundant as are those of *Cristellaria occidentalis.*

Cristellaria d'orbignii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18798	U.S.N.M.	2	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
18799	U.S.N.M.	4	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Few.
18800	U.S.N.M.	1	D2731....	36 45 00 N.; 74 28 00 W..	781	.....	gy. oz.....	Rare.
18801	U.S.N.M.	1	*Fish Hawk* 949.	.....	.....	.....	.....	Rare.

CRISTELLARIA OCCIDENTALIS, new species.

Plate 25, fig. 2; pl. 26, figs. 1, 2.

Cristellaria reniformis Flint (part) (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 62, fig. 2.

Description.—Test for the most part close-coiled, compressed, composed of comparatively few chambers, 6–8 in the last-formed coil,

periphery carinate or angled, apertural face of the last-formed chamber squarely truncate or even slightly concave, the sides angled, the apertural end projecting; sutures fairly distinct, in the later chambers slightly depressed, nearly straight, generally radiate; aperture radiate, at the end of the peripheral projection of the last-formed chamber.

Length up to 2.50 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18785) from *Albatross* station D2041, in 1608 fathoms (2940 meters), off the northeastern coast of the United States. This species is common, often abundant, at *Albatross* stations south of latitude 40° N., off the northeastern coast of the United States, with a few stations south of Cape Hatteras, off the coasts of Carolina and Georgia. Several of the stations from which Flint records *Cristellaria reniformis* are in this same general area. The species is very different from *C. reniformis* as described by D'Orbigny, and seems to be one of the more characteristic and abundant species off the eastern coast of the United States.

Cristellaria occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18781	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Rare.
18782	U.S.N.M.	1	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
18783	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Rare.
18784	U.S.N.M.	9	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Common.
18785	U.S.N.M.	1	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Abundant.
18786	U.S.N.M.	10+						
18787	U.S.N.M.	10+	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Abundant.
18788	U.S.N.M.	8	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Common.
18789	U.S.N.M.	3	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Few.
18790	U.S.N.M.	1	D2174....	38 15 00 N.; 72 03 00 W..	1,594	.....	gy. m.....	Rare.
18791	U.S.N.M.	2	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Rare.
18792	U.S.N.M.	1	D2219....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.....	Rare.
18793	U.S.N.M.	1	D2228....	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.....	Rare.
18794	U.S.N.M.	2	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.....	Rare.
18795	U.S.N.M.	1	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Rare.
18796	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
18797	U.S.N.M.	1	D2679....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.

CRISTELLARIA OCCIDENTALIS, new species, var. GLABRATA, new variety.

Plate 25, fig. 3.

Description.—Variety differing from the typical in the more circular form, very smoothly finished surface, the sutures being distinct but not disturbing the very even polished character of the surface, about 10 chambers in the last-formed coil, the periphery angled, very slightly carinate.

Diameter up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18823) from *Albatross* station D2541, in 134 fathoms (245 meters), off the north-

eastern coast of the United States. This variety occurs in the same general region as the typical form, but is easily distinguished from it. The surface is peculiarly smooth and uniform, the sutures, though distinct, are neither raised above or depressed below the surface, and the generally smooth polished character is continued over all the chambers, and from the umbo to the periphery.

Cristellaria occidentalis, var. glabrata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18819	U.S.N.M.	1	D2046....	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.....	Rare.
18820	U.S.N.M.	10+	D2243....	40 10 15 N.; 70 26 00 W..	63	52.4	gn. m.....	Abundant.
18821	U.S.N.M.	8	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m...	Frequent.
18822	U.S.N.M.	1	D2539....	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s.....	Rare.
18823	U.S.N.M.	1	D2541....	39 57 45 N.; 70 50 30 W..	134	47.7	gn.s.....	Frequent.
18824	U.S.N.M.	7						
18825	U.S.N.M.	5	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s.....	Frequent.
18826	U.S.N.M.	2	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.

CRISTELLARIA OCCIDENTALIS, new species, var. NOVANGLIAE, new variety.

Plate 23, fig. 1; pl. 24, fig. 1.

Description.—Variety differing from the typical in the larger size of the test, the broad keel extending nearly the whole circumference of the test, showing lines of growth from each chamber, chambers about 8 in the last-formed coil.

Diameter up to 5 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18926) from *Albatross* station D2237, in 520 fathoms (951 meters), southeast of Nantucket. This is an abundant variety dredged by the *Albatross* off the coast of New England. At first glance it might seem to be quite different from *Cristellaria occidentalis*, but a study of abundant specimens shows that they probably belong to one species.

Cristellaria occidentalis, var. novangliae—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
3121	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
18919	U.S.N.M.	10+	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.....	Abundant.
18920	U.S.N.M.	8	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.....	Common.
18921	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Abundant.
18922	U.S.N.M.	4	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Few.
18923	U.S.N.M.	3	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Few.
18924	U.S.N.M.	10+	D2213....	39 58 30 N.; 70 30 00 W..	384	39.5	gn. m.....	Abundant.
18925	U.S.N.M.	10+	D2214....	39 57 00 N.; 70 32 00 W..	475	39.5	gn. m.....	Abundant.
18926	U.S.N.M.	10+	D2237....	39 12 17 N.; 72 09 30 W..	520	39.5	gn. m.....	Abundant.
18927	U.S.N.M.	7	D2504....	44 23 00 N.; 61 22 45 W..	82	40.6	bk. m., g....	Frequent.
18928	U.S.N.M.	6	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Frequent.

CRISTELLARIA OCCIDENTALIS, new species, var. TORRIDA, new variety.

Plate 25, fig. 1.

Description.—Variety differing from the typical in the very translucent character of the test and the keel which is thin and transparent, 7 or 8 chambers in the last-formed coil, the aperture not distinctly projecting as in the typical.

Diameter up to 2 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18813) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. It has also occurred at other stations in this same region, off the southern coast of Florida, and at two stations south of Cape Hatteras on the Atlantic coast, thus following the distribution of numerous other species of the Lagenidae. This is probably the form recorded by Flint as *Cristellaria reniformis* from stations D2377 and D2385 from the Gulf of Mexico. At least one of Flint's specimens which he records as *Cristellaria cultrata* (Rep. U. S. Nat. Mus., 1897 (1899), pl. 65, fig. 2, right-hand specimen) is probably this variety.

Cristellaria occidentalis, var. torrida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18812	U.S.N.M.	2	D2115....	35 49 30 N.; 74 34 45 W..	843	39.0	m., fne. s....	Rare.
18813	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
18814	U.S.N.M.	1						
18815	U.S.N.M.	1	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
18816	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Rare.
18817	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.
18818	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.

CRISTELLARIA GIBBA D'Orbigny.

Plate 25, fig. 4.

Cristellaria gibba D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 292, No. 17; in De la Sagra, Hist. Fis. Pol. Nat. Cuba, "Foraminifères," 1839, p. 63, pl. 7, figs. 20, 21.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 546, pl. 69, figs. 8, 9.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Woodward, The Observer, vol. 4, 1893, p. 144.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 352, pl. 12, figs. 21, 27, 39.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 55.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 317, pl. 64, fig. 1.—Chapman, The Foraminifera, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1902, p. 255.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 216.—Chapman, Subantarctic Ids. N. Zealand, 1909, p. 344.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 69, pl. 35, fig. 1.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 99; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 263.—Mestayer, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—Chapman, Rep. Sci. Invest., 1916 (1917), p. 44, pl. 5, fig. 8.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 615.

Description.—Test close-coiled, somewhat longer than broad, 7 or 8 chambers in the last-formed coil, periphery slightly keeled or at least acute, apertural face broad and truncate, triangular; chambers not inflated; sutures curved, very slightly if at all depressed; wall smooth; aperture radiate at the periphery.

Length, up to 1 mm.

Distribution.—This species was originally described by D'Orbigny from the Antilles. It is a small, not very conspicuous species. There are numerous records for it in the western Atlantic. Brady records it from the *Challenger* collections from off Sombrero and Culebra Islands, and off Bermuda, and also off the southeastern coast of South America. Flint recorded it from several stations along the eastern coast of the United States, in the Gulf of Mexico, and in the Caribbean, and Goës also records it from the Gulf of Mexico. I have had numerous specimens which can be referred to this species from the Caribbean and the Gulf of Mexico and the eastern coast of the United States. From the eastern side of the Atlantic it is recorded by Pearcey in the warm area of the Faroe Channel, by Earland from off Bognor, Sussex, and by Heron-Allen and Earland from the Clare Island region and from the west of Scotland. Specimens on the coast of England, however, are recorded as very rare. Most of the other records for the species are from moderate depths in the Indo-Pacific. The specimens that I have figured as this species from the Philippines do not belong here.

Cristellaria gibba—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18941	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Rare.
18942	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
18943	U.S.N.M.	1	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.....	Rare.
18944	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.....	Rare.
18945	U.S.N.M.	1	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co.....	Rare.
18946	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
18947	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
18948	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Rare.
18949	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.
18950	U.S.N.M.	2	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh...	Rare.

CRISTELLARIA CONVERGENS Bornemann?

Plate 36, figs. 1–4.

There are a few *Challenger* stations in the Atlantic from which this species is recorded, one in the western Atlantic, off Culebra Island, 390 fathoms (713 meters), one off the coast of Brazil, 675 fathoms (1,234 meters), and two others in deep water, one just south of the Equator, and the other southeast of the Azores. Pearcey has recorded it from deep water in the South Atlantic. The only Eu-

ropean specimens seem to be those recorded by Heron-Allen and Earland from off the west of Scotland.[60] I have had very few specimens in the western Atlantic *Albatross* material which could be referred to this species. These are from the Gulf of Mexico, and the eastern coast of the United States. One of the most nearly typical is here figured.

Cristellaria convergens—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18951	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
18952	U.S.N.M.	1	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Rare.
18953	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
18954	U.S.N.M.	1	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	crs. s., sh., for.	Rare.

CRISTELLARIA SEPTENTRIONALIS, new species.

Plate 27, figs. 1, 2.

Description.—Test comparatively large, close-coiled, much compressed, periphery subacute, not keeled; chambers numerous, 15–18 in the last-formed coil, not inflated; sutures curved, especially toward the periphery where they are somewhat raised above the general surface; umbo raised, large; wall smooth; aperture at the peripheral angle, radiate.

Diameter up to 4 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18956) from *Albatross* station D2202, in 515 fathoms (942 meters), off the northeastern coast of the United States. I have had numerous specimens of this species, all from the general region northeastward from Cape Hatteras. It is distinguished by its large size, prominent umbo, large number of chambers in the last-formed coil, and peculiar curvature of the sutures.

Cristellaria septentrionalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18955	U.S.N.M.	1	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.....	Rare.
18956	U.S.N.M.	1	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Rare.
18957	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Rare.
18958	U.S.N.M.	1	D2214....	39 57 00 N.; 70 32 00 W..	475	39.5	gn. m.....	Rare.
18959	U.S.N.M.	2	D2237....	39 12 17 N.; 72 09 30 W..	520	39.5	gn. m.....	Rare.
18960	U.S.N.M.	1	D2263....	37 08 00 N.; 74 33 00 W..	430	.....	gn. m.....	Rare.
18961	U.S.N.M.	1	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp	Rare.
18962	U.S.N.M.	2	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.....	Rare.
18963	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.
18964	U.S.N.M.	6	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Frequent.
18965	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Rare.

[60] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 262, pl. 42, figs. 11–14.

CRISTELLARIA ROTULATA (Lamarck)?

Plate 22, fig. 2, pl. 28, figs. 1, 2.

Description.—Test comparatively large, close-coiled, strongly umbonate, carinate or the periphery angled, the last-formed coil composed of few, not usually more than 7 or 8, chambers; sutures distinct, straight, not extending to the center of the test, but to the umbo so that each chamber overlaps the preceding; surface smooth throughout; aperture at the peripheral angle of the test, large, radiate.

Diameter up to 2.50 mm.

Distribution.—I have limited the name *Cristellaria rotulata* to this simple type composed of a few chambers, with very large umbonate center, and the sutures of a peculiar type, shown in plate 28, figure 2. Such specimens are found especially in the Gulf of Mexico, Caribbean, and in the warmer portions of the western Atlantic. They also occur in the Tertiary of the Gulf Coastal Plain of the United States. Such specimens are also found in the Indo-Pacific and are probably related to these. Also in the Gulf of Mexico there are found specimens more like those figured by Brady as *Cristellaria rotulata.*[61] This has many more chambers, the sutures are curved, and their arrangement where they impinge against the central umbo is different. Such forms may possibly be varieties of *Cristellaria iota* Cushman which lack the peripheral keel.

Cristellaria rotulata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18929	U.S.N.M.	1	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.....	Rare.
18930	U.S.N.M.	4	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Few.
18931	U.S.N.M.	10+	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Abundant.
18932	U.S.N.M.	3	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Few.
18933	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Rare.
18934	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s.....	Rare.

CRISTELLARIA VORTEX Fichtel and Moll.

There are a few records for this species from both sides of the Atlantic. Brady records it from off Bermuda at 435 fathoms (796 meters), Goës records it as scarce in the Caribbean Sea, 130 fathoms (238 meters), and Flint from the Caribbean and the eastern coast of the United States in 130 and 276 fathoms (238 and 505 meters).

[61] Rep. Voy. *Challenger,* Zoology, vol. 9, 1884, pl. 69, fig. 13.

From the European side Balkwill and Wright record a single specimen from off Ireland's Eye, 7–9 fathoms (13–16 meters), Brady "small starved specimens doubtfully referable to this species" from the west of Scotland, and Heron-Allen and Earland [62] from off South Cornwall. I have failed to find good typical material in the *Albatross* collections that I have examined.

CRISTELLARIA SUBMAMILLIGERA Cushman.

Plate 28, fig. 3.

Cristellaria mamilligera H. B. Brady (not Karrer), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 553, pl. 70, figs. 17, 18.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 74, pl. 34, fig. 6*a* (not 6*b*, which should read 5*b*).

Cristellaria submamilligera Cushman, Proc. U. S. Nat Mus., vol. 51, 1917, p. 657; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 235.

Description.—Test biconvex, close-coiled, periphery with a thin keel; sutures curved, limbate externally, ornamented by a raised ridge which ends near the umbilical region in a protuberant knob, often a distinct raised boss over the center of the umbilical region; keel entire and not denticulate in well-preserved specimens; wall between the raised ridges, smooth; aperture radiate.

Diameter of Atlantic specimen 2 mm.

Distribution.—This species described from the Philippine region has a fairly broad distribution in the Indo-Pacific region. I had it from many stations in the Philippines and Brady records it from the Philippines and Fiji. Chapman records it from off Great Barrier Island. It is interesting, therefore, to find a single well-developed specimen from the northern part of the Gulf of Mexico where numerous other Indo-Pacific species have been found. In the Summary of Results of the *Challenger* Expedition the species is recorded from off the southeastern coast of South America, off the mouth of the Rio la Plata. This is a peculiar distribution and the specimens should be reexamined.

Cristellaria submamilligera—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18970	U.S.N.M.	1	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Rare.

[62] Journ. Roy. Micr. Soc., 1916, p. 48.

CRISTELLARIA FORMOSA, new species.

Plate 29, fig. 1; pl. 30, fig. 6.

Cristellaria calcar H. B. Brady (part) (not Linnaeus), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 551, pl. 70, figs. 13, 14.—Flint (part), Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 1 (central figure).

Description.—Test large, close-coiled, somewhat compressed, central portion strongly umbonate, periphery with a thin keel and flattened rowel-like spines; chambers numerous, 11–13 in the last-formed coil; sutures distinct, slightly limbate, of clear shell material, not raised, much curved; surface smooth, central portion occupied by a large somewhat projecting boss of clear shell material through which the chambers of the earlier coils are visible; aperture peripheral, radiate, slightly projecting.

Diameter up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18807) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. Flint gives this same station among his records for *Cristellaria calcar*. I have also a single specimen from *Albatross* station D2150, in the Caribbean.

It is interesting in this connection to note that in his records for the occurrence of *Cristellaria calcar*, Brady mentions three stations in the northern Atlantic at which good specimens have been found—off Sombrero Island, West Indies, 450 fathoms (823 meters), off Culebra Island, 390 fathoms (713 meters), and off the Azores, 450 fathoms (823 meters). His figures (pl. 70, figs. 13, 14) are of the typical form seen in the Gulf of Mexico, and from the identity of most of the species at the two *Challenger* West Indian stations noted and those of the Gulf of Mexico, it may be supposed that the two figures given by Brady were from one or the other of these two stations. It is a very different species from the others which have been assigned to *Cristellaria calcar*. The number of chambers, the compact form, the flattened rowel-like spines and the clear boss of shell material are enough to distinguish it from most of the other species assigned to *Cristellaria calcar*.

Cristellaria formosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18806	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18807	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.

CRISTELLARIA IOTA, new species.

Plate 29, fig. 2; pl. 30, fig. 1.

Cristellaria cultrata H. B. BRADY (not Montfort), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 550, pl. 70, figs. 4–6.

Description.—Test close-coiled, compressed, umbonate, the periphery with a thin broad keel, nearly transparent, 13–15 chambers in the last-formed coil, narrow; sutures slightly curved, very slightly limbate, but not raised above the general surface, umbonal region occupied by a large thickened transparent knob; wall smooth, thin; aperture radiate, at the peripheral angle of the test, those of the early chambers distinct throughout the last-formed coil.

Diameter up to 2.50 mm. without the keel.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18939) from *Albatross* station D2399, in 196 fathoms (359 meters), in the northern part of the Gulf of Mexico. I have a single specimen also from an *Albatross* station in the Caribbean. It would be interesting to know the station from which Brady's specimens figured in the *Challenger* report came. However, as the species is recorded from both stations 23 and 24, off Sombrero and Culebra Islands, and as these specimens are so similar to those in the Gulf of Mexico and Caribbean, they may have come from one of these stations. This was referred to *Cristellaria cultrata* Montfort by Brady. There are numerous records for *C. cultrata* Montfort, many of them from the Atlantic, especially off the British Isles, but figures are not given, and I doubt very much if this species which seems to be rather widely distributed in the warmer western Atlantic is found on the shores of the British Isles.

Cristellaria iota—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18938	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
18939	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
18940	U.S.N.M.	1						

CRISTELLARIA LUCIDA, new species.

Plate 30, fig. 2.

Cristellaria articulata H. B. BRADY (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 547, pl. 69, figs. 10–12.—FLINT (part), Rep. U. S. Nat. Mus., 1897 (1899), p. 317, pl. 64, fig. 2.

Description.—Test close-coiled, somewhat compressed, umbilical region not umbonate, periphery slightly keeled, 6 or 7 chambers in the last-formed coil, somewhat inflated, periphery slightly lobulated; sutures distinct, very slightly if at all depressed, nearly straight and

radiate, central portion of the test often transparent, showing the earlier coils; apertural end projecting, truncate; aperture radiate, sometimes with an elongate elliptical opening at the top of the somewhat truncated apertural face.

Diameter up to 2.25 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18993) from *Albatross* station D2544, in 131 fathoms (240 meters), off the southeastern coast of the United States. There are numerous specimens of this form, ranging from the latitude of Cape Cod southward, and into the Gulf of Mexico. Flint's specimens are also from this same general region. Brady records this species as *Cristellaria articulata* Reuss, but a reference to the original figures of Reuss will show that the two are not identical. Brady mentions that fine examples of *C. articulata* occur in the dredged sands from off Culebra Island, 390 fathoms (713 meters), and it is to be suspected that his figured specimens came from this station. He also figures (pl. 69, figs. 1–4) what he called wild-growing forms which came from off Nightingale Island, Tristan da Cunha, 100–150 fathoms (183–274 meters). Although specimens from both these localities were referred to the same species by Brady, a reference to the plates will show how different are the two forms. Our species has a very different form, a very peculiar apertural region, and is very constant in the character of the chambers, the sutures, and the general form. In the Summary of Results of the *Challenger* Expedition, the species is also recorded from off Bermuda and at other stations from Spain to the Canary Islands, and in the southern Atlantic, but from a study of western Atlantic species and their distributions it is probable that there is distributed in the warmer portion of the western Atlantic a distinct species to which I have here given a definite name. Its affinities are to be looked for rather in the Indo-Pacific.

Cristellaria lucida—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18981	U.S.N.M.	3	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.....	Few.
18982	U.S.N.M.	1	D2214....	39 57 00 N.; 70 32 00 W..	475	39.5	gn. m.....	Rare.
18983	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.....	Rare.
18984	U.S.N.M.	1	D2242....	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.....	Rare.
18985	U.S.N.M.	3	D2265....	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m., g....	Few.
18986	U.S.N.M.	4	D2309....	35 43 30 N.; 74 52 00 W..	56	.....	gy. s.....	Few.
18987	U.S.N.M.	2	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Rare.
18988	U.S.N.M.	1	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Rare.
18989	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
18990	U.S.N.M.	3	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	crs. s., sh., for.	Few.
18991	U.S.N.M.	7	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Frequent.
18992	U.S.N.M.	10+	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Abundant.
18993	U.S.N.M.	1	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Few.
18994	U.S.N.M.	3						

CRISTELLARIA PEREGRINA Schwager.

Plate 30, figs. 3, 4.

Cristellaria peregrina Schwager, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 245, pl. 7, fig. 89.

Cristellaria variabilis H. B. Brady (not Reuss), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 541, pl. 68, figs. 11–16; Journ. Roy. Micr. Soc., 1887, p. 912.—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 224, pl. 44, fig. 12.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—Woodward, The Observer, vol 4, 1893, p. 144.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 353, pl. 11, figs. 61, 62; pl. 12, figs. 16–18.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 58.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 1.—Chapman, Journ. Linn. Soc. Zool., vol. 28, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1903, p. 256, pl. 5, fig. 1.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 8, pl. 2, fig. 3.—Chapman, Subantarctic Ids. N. Zealand, 1909, p. 343; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 413.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 21.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 2, 1916, p. 263.—Mestayer, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 141, pl. 5, fig. 8.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 615.

Description.—Test small, compressed, in the adult longer than broad, with a thin peripheral keel, in the young stages the test is close-coiled, usually with a peripheral keel; chambers usually three in the coil, overlapping, the apertural end slightly produced; aperture radiate but not projecting, in later development the last-formed chambers become somewhat more inflated and the sutures depressed, a thin peripheral keel is developed, running from the aperture around the test, the aperture itself terminal, produced, surrounded by a ring of spinose projections; wall thin, transparent, smooth.

Length usually less than 0.50 mm.

Distribution.—There are numerous Atlantic records for this species, as follows: From *Challenger* material Brady records it from off the coast of Brazil, off the eastern coast of the United States, off the West Indies, off the Azores, and off the Canaries. Wright records it from 100–1,000 fathoms (183–1,829 meters), off the southwest of Ireland; Brady, Parker, and Jones, from the Abrohlos Bank, 40 and 260 fathoms (73 and 476 meters); Goës records it from the northern part of the Gulf of Mexico, the Caribbean, and the North Sea; Egger from off the western coast of Africa. Flint had it from several *Albatross* stations in the Caribbean off Panama, three stations in the northern part of the Gulf of Mexico, and two off the eastern coast of the United States. Heron-Allen and Earland record a single small typical specimen from the west of Scotland. In the *Albatross* material that I have examined it has occurred at

numerous stations; off the northeastern coast of the United States, up to latitude 41° N., southward into the Gulf of Mexico, the Caribbean, and one station off southeastern Brazil.

From a study of the original figures and description of *Cristellaria variabilis* Reuss, it does not seem to me that our common recent species is the same as that described by Reuss from the Miocene of Central Europe. Our specimens usually have only three chambers in the coiled portion and one or two in the later development, the sutures being straight and the general form of the test peculiar. These characters do not occur in Reuss's figure and his description does not indicate them. *Cristellaria peregrina* as figured by Schwager is undoubtedly the adult of this species, especially of the form which is common in the Pacific. I have given a series of figures showing the development of the species and allowing for the change from the close-coiled test with three chambers in a whorl to the adult character of a peripheral keel, somewhat inflated chambers, and terminal aperture. The amount of variation outside of the changes in development are not great. There is often a small chamber developed in senescent specimens, as is shown in some of the figures.

Cristellaria peregrina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18827	U.S.N.M.	1	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Rare.
18828	U.S.N.M.	2	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Rare.
18829	U.S.N.M.	1	D2093....	39 42 50 N.; 71 01 20 W..	1,000	39.0	for., s.....	Rare.
18830	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
18831	U.S.N.M.	8	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Common.
18832	U.S.N.M.	7	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Frequent.
18833	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Abundant.
18834	U.S.N.M.	1	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.....	Rare.
18835	U.S.N.M.	10+	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Abundant.
18836	U.S.N.M.	8	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Common.
18837	U.S.N.M.	2	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co.....	Rare.
18838	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Rare.
18839	U.S.N.M.	3	D2392....	28 47 30 N.; 87 27 00 W..	724	40.7	br. gy. m....	Few.
18840	U.S.N.M.	2	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
18841	U.S.N.M.	6	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Frequent.
18842	U.S.N.M.	10+	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Abundant.
18843	U.S.N.M.	8	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Common.
18844	U.S.N.M.	1	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Rare.
18845	U.S.N.M.	5	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Few
18846	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Few.
18847	U.S.N.M.	3	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Few.
18848	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Few.
18849	U.S.N.M.	5	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Few.
18850	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.

Cristellaria peregrina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″				
18851	U.S.N.M.	2	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Rare.
18852	U.S.N.M.	2	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz .	Rare.
18853	U.S.N.M.	4	D2763....	24 17 00 S.; 68 11 00 W..	671	37.9	br. glob. oz..	Few.
18854	U.S.N.M.	1	.....	Off Fowey Light, Fla....	100	.....	.....	Rare.

CRISTELLARIA CASSIS Fichtel and Moll?

H. B. Brady, Parker, and Jones (Trans. Zool. Soc. London, vol. 12, 1888, p. 224, pl. 44, fig. 16) figure a broken specimen which they refer to this species. It was from the Abrohlos Bank, 40 fathoms (73 meters), and shows a flattened test with the sutures ornamented by fine knobs. I have failed to find specimens of this character in the Atlantic material I have examined.

CRISTELLARIA CALCAR (Linnaeus).

Plate 30, fig. 7; pl. 31, figs. 4, 5,

"Nautilus minimus non umbilicatus" Gaultieri, Index Test., 1742, pl. 19, fig. C.

"Nautili (Lenticulae radiatae)" Soldani, Testaceographia, vol. 1, pt. 1, 1789, p. 54, pl. 33, figs. *aa*, *bb*.

Nautilus calcar Linnaeus, Syst. Nat., ed. 12, 1767, p. 1162, No. 272; (Gmelin's ed. 13, 1788, p. 3770, No. 2.

Cristellaria calcar H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 55, pl. 70, figs. 9–12 (not figs. 13–15).—H. B. Brady, Parker, and Jones, Trans. Zool. Soc. London, vol. 12, 1888, p. 224, pl. 44, fig. 14.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 1 (part).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 72, pl. 32, fig. 4.

Description.—Test close-coiled, biconvex, umbonate; chambers comparatively few, usually only 5 or 6 in the last-formed coil, the earlier ones often seen through the transparent umbilical region; sutures distinct but not depressed, nearly straight; wall smooth, periphery with a narrow carina, with a typically long acicular spine, one from each chamber; aperture at the angle of the chamber, radiate, slightly projecting.

Diameter without spines about 1 millimeter.

Distribution.—From a study of the various figures referred to this species it will at once become evident that there are numerous forms, varieties, and species included under this name. As it is somewhat difficult to determine exactly what should be the type of the Linnaean species, I have referred to it here specimens fitting the above description, and similar to some of those figured by Brady

and Flint. The Atlantic material which fits this restricted requirement is almost without exception from the warmer portions of the Western Atlantic, south of Cape Hatteras, along the Florida coast, and the Gulf of Mexico and the Caribbean. This also includes the range of the stations from which Flint records the species. Brady records it from off the West Indies and from the northwestern coast of Africa. Such specimens are common in warm waters of the Pacific also. None of the English workers on the foraminifera seem to have recorded it from off the British Isles. In view of the very considerable work done on this area, this lack of record is significant.

Some of the specimens have very reduced spines, similar to the form that I have described as var. *aspinosa* Cushman from the Miocene of the Bowden Marl, Bowden, Jamaica.[63]

Cristellaria calcar—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18855	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
18856	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18857	U.S.N.M.	1	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s., bk. sp.	Rare.
18858	U.S.N.M.	5	D2312....	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s., bk. sp.	Few.
18859	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Rare.
18860	U.S.N.M.	1	D2318....	24 25 45 N.; 81 46 00 W..	45	75.0	co.....	Rare.
18861	U.S.N.M.	1	D2335....	23 10 39 N.; 82 20 21 W..	204	.....	.....	Rare.
18862	U.S.N.M.	1	D2339....	23 10 40 N.; 82 20 15 W..	191	.....	co.....	Rare.
18863	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	.....	yl. oz.....	Rare.
18864	U.S.N.M.	10+	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Abundant.
18865	U.S.N.M.	3	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Few.
18866	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
18867	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
18868	U.S.N.M.	2	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Rare.
18869	U.S.N.M.	7	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Frequent.
18870	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Few.
18871	U.S.N.M.	2	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Rare.
18872	U.S.N.M.	2	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp.	Rare.
18873	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Rare.
18874	U.S.N.M.	1	D2644....	25 40 00 N.; 80 00 00 W..	193	43.4	gy. s.....	Rare.
18875	U.S.N.M.	5	D2648....	25 53 00 N., 80 03 30 W..	84	.....	gn. m.....	Few.
18876	U.S.N.M.	2	.....	Off Sand Key, Fla.....	72	.....	.....	Rare.

CRISTELLARIA ANTILLEA, new species.

Plate 31, fig. 1; pl. 32, fig. 1; pl. 33, fig. 1; pl. 34, fig. 1.

Nodosarina crepidula (Fichtel and Moll), var. *cassis* Goës (not Fichtel and Moll), Kongl. Svensk. Vet. Akad. Handl., vol. 19. no. 4, 1882, p. 49, pl. 3, figs. 50, 51.

Cristellaria echinata Flint (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 2.

Description.—Test much compressed, periphery with large acicular spines, carinate between, the last two or three chambers uncoiled, remaining ones close-coiled; chambers distinct, somewhat inflated;

[63] Publ. 291, Carnegie Inst., Washington, 1919, p. 37, pl. 6, fig. 8.

sutures distinct, those of the early coiled portion with beads along the sutures, decreasing in the later portion where they are often depressed and unornamented; wall between the sutures often beaded, sometimes with longitudinal rows; aperture in the coiled portion near the periphery, in specimens becoming uncoiled in the middle of the end of the chamber, broad, radiate.

Diameter up to 4 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18803) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. This species was originally figured by Goës in his paper on the Caribbean foraminifera, and later by Flint from the Gulf of Mexico, 169–210 fathoms (309–384 meters). I have had specimens from three stations, one identical with one of those of Flint, in the northern part of the Gulf of Mexico, one off the coast of Georgia, and one off the Carolinas.

This is a large beautiful species with its spinose margin and peculiar ornamentation. The figure of Goës shows a senescent form in which the last-formed chamber is much reduced in size and the aperture broken. The species is apparently limited to the western Atlantic in tropical and subtropical waters.

Cristellaria antillea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18802	U.S.N.M.	1	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Rare.
18803	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
18804	U.S.N.M.	5						
18805	U.S.N.M.	1	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Rare.

CRISTELLARIA CREPIDULA (Fichtel and Moll).

Plate 35, figs. 3, 4.

Nautilus crepidula Fichtel and Moll, Test. Micr., 1803, p. 107, pl. 19, figs. *g–i.*

Cristellaria crepidula D'Orbigny, in De la Sagra, Hist Fis. Pol. Nat. Cuba, "Foraminifères," 1839, p. 64, pl. 8, figs. 17, 18.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 542, pl. 67, figs. 17, 19, 20.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 57.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 70, pl. 29, fig. 5, 6,[?]; pl. 31, figs. 2–5.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 57.

Description.—Test elongate, somewhat compressed, the early chambers coiled, the later ones somewhat uncoiled; chambers com-

paratively few, slightly inflated; sutures distinct, usually slightly depressed; wall smooth; aperture terminal, radiate.

Length up to 1.50 mm.

Distribution.—Various forms of uncoiled compressed Cristellarias are included under this name by various authors. Specimens have occurred at a considerable number of stations in the Western Atlantic, in the Gulf of Mexico, and off the southeastern coast of the United States. There are numerous records for the species elsewhere, off the Abrohlos Bank, Brazil, numerous records from off the British Isles, also in the northern regions about the coast of Greenland, and in other parts of the world from most of the regions where foraminifera have been recorded. From a study of specimens from various regions it seems to me that it should be possible to distinguish different forms which have a definite geographical distribution.

Cristellaria crepidula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18972	U.S.N.M.	1	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. s.	Rare.
18973	U.S.N.M.	1	D2358....	20 19 00 N.; 87 03 30 W..	222	.....	fne. wh. co..	Rare.
18974	U.S.N.M.	2	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
18975	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.
18976	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp	Rare.
18977	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.
18978	U.S.N.M.	5	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Frequent.
18979	U.S.N.M.	1	D2648....	25 53 00 N.; 80 03 30 W..	84	.....	gn. m.....	Rare.
18980	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. s., bk. sp	Rare.

CRISTELLARIA HAUERINA D'Orbigny.

The only record for this species seems to be that of Heron-Allen and Earland,[64] who record "a single typical specimen off South Cornwall."

CRISTELLARIA SCHLOENBACHI Reuss?

Plate 35. figs. 8–10.

Cristellaria schloenbachi Reuss, Sitz. Akad. Wiss. Wien, vol. 46, 1862, (1863), p. 65, pl. 6, figs. 14, 15.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 539, pl. 67, fig. 7.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 63, fig. 4.—Chapman, The Foraminifera, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1902, p. 253.—Chapman, Trans. N. Zealand Inst., vol. 38, 1905, p. 96; Subantarctic Ids. N. Zealand, 1909, p. 342.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1022.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 24.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 616; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 249.

Description.—Test elongate, several times as long as broad, very early portion close-coiled, very quickly becoming uncoiled, elliptical

[64] Journ. Roy. Micr. Soc., 1916, p. 47.

in transverse section, periphery rounded, about 12 visible chambers, increasing rapidly in size as added, early ones more compressed, later ones more inflated; sutures distinct, oblique, slightly depressed; wall smooth, thin; aperture terminal, at the periphery, radiate.

Length up to 2 mm.

Distribution.—Brady's Atlantic specimens were from off Bermuda, 435 fathoms (796 meters), and from off Culebra Island, 390 fathoms (713 meters). He also records it from off Raine Island, Torres Strait, 155 fathoms (283 meters). Flint had specimens from the northern part of the Gulf of Mexico, in 169 and 210 fathoms (309 and 384 meters). I have had specimens from the same region and also from the Caribbean. It seems very doubtful if this recent species which according to the records seems to be limited to the tropical western Atlantic and tropical Indo-Pacific is really the same as that described by Reuss from the upper Cretaceous of Northern Germany. I have had very few Atlantic specimens, however, and for the present have preferred to use the name which Brady used for this species. There are numerous records from the region of Australia and New Zealand and it is probably widely spread in the Indo-Pacific. Similar specimens have occured in the Philippine region, but usually not in considerable numbers.

Cristellaria schoenbachi?—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18908	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
18909	U.S.N.M.	3	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Few.
18910	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.
18911	U.S.N.M.	1	D2713....	38 20 00 N.; 70 08 30 W..	1,859	.....	br. oz.....	Rare.

CRISTELLARIA OBTUSATA Reuss, var. SUBALATA H. B. Brady.

Plate 30, fig. 5; pl. 31, figs. 2, 3.

Cristellaria obtusata Reuss, var. *subalata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 536, pl. 66, figs. 24, 25.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 61, fig. 3.

Description.—Test much elongate, the first few chambers close-coiled, the later ones becoming uncoiled, basal portion of the test with a transparent somewhat triangular projecting keel, which overlaps the sides of the coiled portion of the test; chambers distinct, those of the later portion slightly inflated; sutures distinct, somewhat limbate, of clear shell material, nearly transparent; wall smooth; aperture in the later portion terminal, radiate.

Length up to 6 mm.

Distribution.—Brady described this variety from the northern Atlantic at depths ranging from 130–630 fathoms (238–1,152 meters). The only one definitely placed, so far as I have been able to ascertain, is off the West Indies. Flint had this same form from the Gulf of Mexico, off Santa Lucia in the West Indies and perhaps off Cape Fear. Wright[65] records it from 1,000–1,020 fathoms (1,829–1,866 meters), off the southwest of Ireland. The only other record seems to be that of Chapman, who records it as rare from the Arabian Sea.[66] I have had it from four *Albatross* stations, three of them in the Caribbean, in the general region of Brady's and Flint's records, and the fourth from off the southeastern coast of the United States, where Flint records it.

This form differs from *Cristellaria albatrossi* in the clear limbate sutures and in the wing developed at the base of the test which is clear, fairly thick, and yet shows no lines of growth.

I doubt very much the relationship of this form to *Cristellaria obtusata* Reuss. As there is already a *Cristellaria subalata*, raising this form to specific rank would involve a new name.

Cristellaria obtusata, var. subalata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18904	U.S.N.M.	1	D2138....	17 44 05 N.; 75 39 00 W..	23	.....	co., brk. sh..	Rare.
18905	U.S.N.M.	2	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
18906	U.S.N.M.	5	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Few.
18907	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W..	821	.....	co. s., sh.....	Rare.

CRISTELLARIA ALBATROSSI, new species.

Plate 19, figs. 4, 5.

Cristellaria compressa FLINT (part) (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 62, fig. 1 (right-hand specimen).

Description.—Test composed of two portions, the earlier close-coiled, the later consisting of an uncoiled portion of several chambers, the early portion of the test with a thin broad keel, showing very clearly the lines of growth; chambers fairly distinct but not inflated except in the latest portion of the uncoiled part; sutures indistinct, in the early portion, or at least not raised above or depressed below the general surface, those of the later portion somewhat depressed; wall smooth; aperture radiate.

Length up to 5 mm.

[65] Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.

[66] Proc. Zool. Soc. London, 1895, p. 33.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18881) from *Albatross* station D2203, in 705 fathoms (1,289 meters), off the northeastern coast of the United States. This species is abundant at numerous stations off the northeastern coast of the United States. It is evidently the same as that figured by Parker and Jones[67] as *Marginulina lituus* from the Arctic in 160 fathoms (293 meters), at Nordland, Norway. Flint's specimens were from this same general region, and it is evidently a species which ranges south, perhaps to the latitude of Cape Hatteras, and in its northern distribution reaches to the Arctic Circle.

Cristellaria albatrossi—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
3114	U.S.N.M.	1	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Rare.
18877	U.S.N.M.	4	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Few.
18878	U.S.N.M.	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Rare.
18879	U.S.N.M.	2	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Rare.
18880	U.S.N.M.	2	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.....	Rare.
18881	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Common.
18882	U.S.N.M.	9						
18883	U.S.N.M.	2	D2208....	39 33 00 N.; 71 16 15 W..	1,178	38.4	gn. m.....	Rare.
18884	U.S.N.M.	1	D2219....	39 36 22 N.; 69 29 00 W..	948	38.8	gy. m.....	Rare.
18885	U.S.N.M.	5	D2234....	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.....	Few.
18886	U.S.N.M.	1	D2335....	23 10 39 N.; 82 20 21 W..	204	.....	.....	Rare.
18887	U.S.N.M.	1	D2530....	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.....	Rare.
3091	U.S.N.M.	1						
18888	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Rare.
18889	U.S.N.M.	2	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.....	Rare.
18890	U.S.N.M.	7	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Frequent.
18891	U.S.N.M.	10+	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Abundant.
18892	U.S.N.M.	4	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Few.
18893	U.S.N.M.	8	D2711....	38 59 00 N.; 70 07 00 W..	1,544	.....	glob. oz.....	Frequent.

CRISTELLARIA ALBATROSSI, new species, variety.

There is a variety of this species in which the keel is usually much less developed and the test more rounded. This occurs at many of the stations with the typical form, as the following table shows.

Cristellaria albatrossi, var.—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18894	U.S.N.M.	3	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Few.
18895	U.S.N.M.	7	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Frequent.
18896	U.S.N.M.	8	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Frequent.
18897	U.S.N.M.	10+	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Abundant.
18898	U.S.N.M.	5	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Few.
18899	U.S.N.M.	2	D2072....	41 53 00 N.; 66 35 00 W..	858	39.0	gy. m.....	Rare.
18900	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
18901	U.S.N.M.	6	D2174....	38 15 00 N.; 72 03 00 W..	1,594	.....	gy. m.....	Frequent.
18902	U.S.N.M.	5	D2221....	39 05 30 N.; 70 44 30 W..	1,525	36.9	gy. oz.....	Few.
18903	U.S.N.M.	1	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Rare.

[67] Philos. Trans., 1865, p. 343, pl. 13, figs. 14*a*, *b*.

CRISTELLARIA MARGINULINOIDES Goës.

Plate 19, fig. 3.

Cristellaria aculeata D'ORBIGNY, var. *marginulinoides* GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 56, pl. 5, figs. 15, 16.

Description.—Test elongate, much compressed, the early portion close coiled, the later chambers uncoiled and becoming more inflated, periphery slightly keeled in the early portion, with or without spines; sutures marked by a series of fine beadlike processes, slightly elongate across the sutures; sutures in the later portion depressed, somewhat limbate, not beaded, general surface between the sutures of the early portion somewhat spinose, later smooth, apertural face rounded, not truncate; aperture becoming terminal, slightly projecting, small, radiate.

Length of *Albatross* specimens slightly exceeding 1 mm.; as given by Goës, up to 2.50 mm.

Distribution.—I have had specimens from two *Albatross* stations, one in the northern part of the Gulf of Mexico, the other off the coast of Georgia. These differ somewhat from Goës's originals in having very little trace of the spines on the margin, but they have the characteristic sutural ornamentation and the rounded later portion of the test, in these characters differing from *Cristellaria subaculeata*, var. *glabrata*. Goës's specimens were from the Caribbean in 200 fathoms (366 meters).

Cristellaria marginulinoides—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18912	U.S.N.M.	2	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs.s., bk.sp.	Rare.
18913	U.S.N.M.	2	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Rare.

CRISTELLARIA LIMBATA Flint.

Plate 32, figs. 2, 3.

Cristellaria limbata FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 67, fig. 1.

Description.—Test elongate, early chambers close-coiled, later ones forming a linear series, dorsal side subacute, ventral side broadly rounded; chambers comparatively few, distinct; sutures limbate, with a thick band of raised clear shell material, periphery of the early portion with a few short rounded acicular spines, upper portion smooth; aperture projecting, at the dorsal side of the last-formed chamber.

Length up to 2 mm.

Distribution.—The type specimens of this species described by Flint were from *Albatross* stations in the northern part of the Gulf of Mexico in 196 and 210 fathoms (359 and 384 meters). I have had material from this same region and from two other stations, one off the southern tip of Florida, the other off the coast of Georgia. This is a common range for numerous species.

In some ways the species resembles the young of *Vaginulina spinigera*, but the specimens are always small and more *Cristellaria*-like in every way.

Cristellaria limbata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18808	U.S.N.M.	7	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs.s., bk.sp.	Frequent.
18809	U.S.N.M.	6	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Frequent.
18810	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.
18811	U.S.N.M.	1	D2648....	25 53 00 N.; 80 03 30 W..	84	.....	gn. m.....	Rare.

CRISTELLARIA SUBACULEATA, new species.

Plate 34, fig. 2.

Cristellaria aculeata H. B. Brady (not D'Orbigny), Rep. Voy. *Challenger*, vol. 9, 1884, p. 555, pl. 71, figs. 4, 5.

Description.—Test slightly longer than broad, somewhat compressed, periphery with a narrow thin keel, test becoming slightly uncoiled in the later portion; chambers comparatively few, about 8 in the last-formed coil, distinct, but not inflated; sutures marked by lines of raised bead-like prominences, the surface of the test between with finer more spinose projections, apertural face truncate, smooth, the sides with a raised keel; aperture projecting, rather broad, radiate, at the peripheral angle of the last-formed chamber.

Length up to 1.6 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18914) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. Brady gives two records for this species—off Culebra Island, 390 fathoms (713 meters), and off Sombrero Island, 450 fathoms (823 meters). The only specimen I have had which is identical with Brady's is from the type station. This has the typical surface ornamentation as figured by Brady and seems distinct from the following variety. The species seems to be limited to the tropical western Atlantic. However, Earland[68] records one small and immature specimen and one large shell from Bognor, Sussex, England.

[68] Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 216.

Cristellaria subaeuleata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18914	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.

CRISTELLARIA SUBACULEATA, new species, var. GLABRATA, new variety.

Plate 32, fig. 4; pl. 33, figs. 2, 3; pl. 34, fig. 3.

Cristellaria aeuleata FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 318, pl. 66, fig. 3.

Description.—Variety differing from the typical in the larger proportion of the uncoiled part and especially the greater development of spines on the periphery and the lack of the secondary ornamentation between the sutural lines, the wall there being smooth.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 18915) from *Albatross* station D2377, in 210 fathoms (384 meters), in the northern part of the Gulf of Mexico. At the type station this species occurs abundantly, and specimens were also obtained from two other stations in the northern part of the Gulf of Mexico, closely adjacent to the type station. Flint's specimens referred to *Cristellaria aculeata* are the same as this, coming from two of the stations which are recorded here.

Cristellaria subaculeata, var. glabrata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18915	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Abundant.
18916	U.S.N.M.	10						
18917	U.S.N.M.	7	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Frequent
18918	U.S.N.M.	3	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Few.

CRISTELLARIA ACUTAURICULARIS Fichtel and Moll.

Plate 35, fig. 1.

Specimens have been recorded under this name from a few Atlantic stations. Flint records and figures specimens from off the coasts of Florida and South Carolina, 60–90 fathoms (110–165 meters). Pearcey records it from 56 fathoms (102 meters), Burdwood Bank. The other Atlantic records are those given by Heron-Allen and Earland,[69] who record it from off Clare Island, and[70] "few, not typical," west of Scotland.

[69] Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 99, pl. 8, fig. 15.
[70] Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 262.

CRISTELLARIA ITALICA (Defrance).

Plate 35, figs. 2, 5–7.

Saracenaria italica Defrance, Dict. Sci. Nat., vol. 32, 1824, p. 177; vol. 47, 1827, p. 344; Atlas Conch., pl. 13, fig. 6.—Blainville, Man. de Mal., 1825, p. 370, pl. 5, fig. 6.

Cristellaria (*Saracenaria*) *italica* D'Orbigny, Ann. Sci. Nat., vol. 7. 1826, p. 293, No. 26; Modèles, Nos. 19 and 25.

Cristellaria italica Parker, Jones, and H. B. Brady, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, pp. 21, 32, pl. 1, figs. 41, 42.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 544, pl. 68, figs. 17, 18, 20–23; Journ. Roy. Micr. Soc., 1887, p. 912.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—Egger, Abh. kön. bay. Akad. Wis. München, Cl. II, vol. 18, 1893, p. 350, pl. 12, figs. 22, 23, 26, 40–42.—Fornasini, Mem. Accad. Sci. Ist. Bologna, ser. 5, vol. 4, 1894, p. 219, pl. 3, fig. 8; vol. 5, 1895, p. 12, pl. 4, fig. 28.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 58.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 6.—Millett, Journ. Roy. Micr. Soc., 1902, p. 256.—Chapman, Trans. N. Zealand Inst., vol. 38, 1905, p. 96.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 428.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 78, pl. 33, fig. 3.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 47.—Cushman, Bull. 103, U. S. Nat. Mus., 1918, p. 61; Publ. 291, Carnegie Inst. Washington, 1919, p. 38; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 617; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 252, pl. 51, fig. 2.

Description.—Test stout, trihedral, triangular in cross section, early chambers close-coiled, later ones uncoiling but short, not extending back to the earlier volutions; sutures somewhat depressed; wall smooth; face of the last-formed chamber nearly triangular.

Length of *Albatross* Atlantic specimens 3.50 mm.

Distribution.—The Atlantic records for this species are given by Brady off Sombrero and Culebra Islands, West Indies, off Bermuda, and off the coast of Spain. It is recorded by Goës from the Caribbean and the Gulf of Mexico, 169–658 fathoms (308–1,203 meters). He records specimens attaining the length of 8 mm. Flint had specimens from the Gulf of Mexico and off the coast of Georgia, 196 and 440 fathoms (359 and 805 meters). I have had specimens from four *Albatross* stations, two stations in the Gulf of Mexico, one of which is the same as that from which Flint records the species, one off the northern coast of Cuba, and one off the South Carolina coast. From the British Isles it is recorded from the Estuary of the Dee, a single specimen off the southwest of Ireland, at 345 fathoms (631 meters) (Wright); and off South Cornwall (Heron-Allen and Earland). It occurs in the Miocene of the Bowden marl of Jamaica as fairly large specimens, and is known from numerous records in the Indo-Pacific, often reaching a large size at moderate depths in tropical waters.

Cristellaria italica—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18967	U.S.N.M.	2	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.
18968	U.S.N.M.	2	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Rare.
18966	U.S.N.M.	4	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Few.
18969	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy.s., bk.sp.	Rare.

CRISTELLARIA LATIFRONS H. B. Brady.

Cristellaria latifrons H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 544, pl. 68, fig. 19; pl. 113, figs, 11*a*, *b*.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 3.—Chapman, Trans. N. Zealand Inst., vol. 38, 1905, p. 97.—Mestayer, Trans. N. Zealand Inst., vol. 48, 1916, p. 129.—Sidebottom (?), Journ. Roy. Micr. Soc., 1918, p. 140.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 617; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 254.

Description.—Test elongate, generally triangular in transverse section; chambers comparatively few, periphery carinate; sutures distinct, curved, very slightly if at all depressed; apertural face of the last-formed chamber truncate, reaching from the apertural end of the test nearly to the initial end; wall smooth; aperture radiate, terminal.

Length up to 1.50 mm.

Distribution.—Brady described this species from two *Challenger* stations, one off the western coast of New Zealand, 275 fathoms (503 meters), and the other in the Atlantic, off Culebra Island, West Indies, 390 fathoms (713 meters). Apparently the only other Atlantic records are those given by Flint, off Careysfort Light, off Southern Florida, in 60 fathoms (110 meters), and *Albatross* station D2377, in the northern part of the Gulf of Mexico, in 210 fathoms (384 meters). The other records are from the Indo-Pacific, especially the area of Australia and New Zealand, with a few records which I have given from the Philippines. I have had Atlantic specimens from three stations, one in the northern part of the Gulf of Mexico and two off the eastern coast of the United States. In the Summary of Results of the *Challenger* Expedition the species is recorded off Bermuda. Therefore there are either two or more species, one in the western Atlantic, the other in the Indo-Pacific, or else a single widely spread species covering these two regions.

Cristellaria latifrons—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
18935	U.S.N.M.	1	D2399.....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
18936	U.S.N.M.	1	D2544.....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Rare.
18937	U.S.N.M.	1	*Fish Hawk* 1038.	.....	.....	.....	.....	

Genus MARGINULINA D'Orbigny, 1826.

Marginulina D'ORBIGNY (type, *M. glabra* D'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 258.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 526.—CHAPMAN, The Foraminifera, 1902, p. 191.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 79.

Description.—Test subcylindrical, early portion close-coiled, later chambers uncoiled, rounded in transverse section, the last-formed chambers often inflated; aperture in early chambers marginal, later often becoming nearly median, usually radiate.

It is a question whether the species placed under this genus might not be included under the uncoiled Cristellarias. In general the chambers of the uncoiled portion in *Marginulina* are nearly circular in transverse section and the ornamentation is usually limited to longitudinal costae.

Its geological history goes back, as does that of *Cristellaria* and *Nodosaria*, to the Cambrian.

MARGINULINA GLABRA D'Orbigny.

Plate 36, figs. 5, 6.

Marginulina glabra D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 259, No. 6; Modèles, No. 55.—PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 27, pl. 1, fig. 36.—H. B. BRADY, Proc. Somerset Arch. and Nat. Hist. Soc., vol. 13, 1867, p. 109, pl. 2, fig. 22.—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 527, pl. 65, figs. 5, 6.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 344, pl. 12, figs. 24, 25.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 910.—PEARCEY, Trans. Glasgow, Nat. Hist. Soc., vol. 2, 1890, p. 178.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—ROBERTSON, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—HERON-ALLEN and EARLAND, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 97; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261.

Description.—Test elongate, tapering, cylindrical in transverse section; chambers in the early portion coiled, later portion uniserial, uncoiled, the last formed chamber fairly elongate, tapering to the

aperture which is somewhat produced, radiate; sutures distinct, oblique, slightly depressed; wall smooth, finely punctate.

Length up to 2 mm.

Distribution.—This typical form of the species is recorded at numerous stations about the British Isles. There are numerous other records for it in the Atlantic, and numerous authors have referred to it specimens from various parts of the world. The only figures are those given by Balkwill and Wright, and they show a more nearly typical, more slender form than that found on the western side of the Atlantic which is here referred to the following variety.

MARGINULINA GLABRA D'Orbigny, var. OBESA, new variety.

Plate 37, fig. 1.

Marginulina glabra FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 133, pl. 60, fig. 1 (in part).

Description.—Variety differing from the typical in the larger size and much shorter, broader form.

Length up to 3 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17489) from *Albatross* station D2043, in 1467 fathoms (2683 meters), off the northeastern coast of the United States. This larger, stouter form which may be referred to D'Orbigny's species as a variety, is very common at numerous stations around latitude 40 and longtiude 70, southwest of the New England coast, and runs south at occasional stations about the Gulf of Mexico and the Caribbean. Flint's stations for the species were mostly in this same region, and Brady records *M. glabra* from a *Challenger* station off New York where he presumably had this same large form. There are numerous other scattered records for the species in the *Challenger* report, and from off the coast of the British Isles, but specimens are not figured and it is very difficult to say just where they should belong without seeing the originals.

In the microspheric form of the species there are a few chambers which show the coiling condition, but in the megalospheric form specimens occur which, except for their association with the microspheric form and their slightly oblique sutures, might be referred to *Nodosaria*.

Marginulina glabra, var. obesa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17482	U.S.N.M.	3	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Few.
17483	U.S.N.M.	2	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
17484	U.S.N.M.	3	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Few.
17485	U.S.N.M.	3	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Few.
17486	U.S.N.M.	2	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Rare.
17487	U.S.N.M.	7	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Common.
17488	U.S.N.M.	3	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Few.
17489	U.S.N.M.	6	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Common.
17490	U.S.N.M.	1	D2046....	40 02 49 N.; 68 49 00 W..	407	40.0	bu. m.....	Rare.
17491	U.S.N.M.	5	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Few.
17492	U.S.N.M.	1	D2138....	17 44 05 N.; 75 39 00 W..	23	.....	co. brk. sh...	Rare.
17493	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m., s....	Rare.
17494	U.S.N.M.	5	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Few.
17495	U.S.N.M.	4	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Few.
17496	U.S.N.M.	1	D2204....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.....	Rare.
17497	U.S.N.M.	1	D2219....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.....	Rare.
17498	U.S.N.M.	1	D2228....	37 25 00 N.; 73 06 00 W..	1,582	36.8	br. m.....	Rare.
17499	U.S.N.M.	1	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.....	Rare.
17500	U.S.N.M.	1	D2234....	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.....	Rare.
17501	U.S.N.M.	1	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Rare.
17502	U.S.N.M.	1	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co. crs. s. sh.	Rare.
17503	U.S.N.M.	1	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.....	Rare.
17504	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Few.
17505	U.S.N.M.	1	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Rare.
17506	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Rare.
17507	U.S.N.M.	2	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Rare.

MARGINULINA BACHEII Bailey.

Plate 36, figs. 7–9.

Marginulina bacheii Bailey, Smithsonian Contrib., vol. 2, 1851, p. 10, pl., figs. 2–6.

Marginulina ensis Flint (not Reuss, 1846), Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 59, fig. 3.

Description.—Test much elongate, subcylindrical, only slightly tapering, often slightly curved, early portion somewhat compressed; chambers close-coiled, later portion uncoiled, chambers inflated, distinct, the ventral side somewhat lobulate, dorsal side much less so; sutures distinct, depressed; wall smooth, fairly thick; aperture eccentric, at the dorsal angle somewhat projecting, radiate.

Length 2.50–4 mm.

Distribution.—This species was originally described by Bailey from numerous stations southeast of Montauk Point, New York, to southeast of Cape Henlopen where, he says, "This fine species is one of the largest and most conspicuous forms in these soundings." Flint's specimens were from three *Albatross* stations, one off the Atlantic coast and about the latitude of New York, another off Cape Hatteras, and the third in the Gulf of Mexico, depths ranging from 58–160 fathoms (106–293 meters). The first two of these stations are in the area where this species occurs very abundantly. In the *Albatross* material that I have examined this species has been very

abundant at several stations from about the latitude of Cape Cod, southward to the coast of Carolina, with a few specimens off Florida. It sometimes occurs in very considerable numbers and usually at moderate depths. In reviewing the literature the species does not seem to have been recorded in any recognizable form outside this general area.

The figures given by Bailey, while somewhat crude, show very well the general character of this species, and his designation of its occurrence, together with the very adequate description, make no question about referring these specimens from our Atlantic coast to his species.

Marginulina bacheii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17466	U.S.N.M.	1	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., crs., g....	Rare.
17467	U.S.N.M.	5	D2109....	35 14 20 N.; 74 59 10 W..	142	50.5	bu. m.....	Few.
17468	U.S.N.M.	5	D2242....	40 15 30 N.; 70 27 00 W..	58	51.4	gn. m.....	Few.
17469	U.S.N.M.	10+	D2243....	40 10 15 N.; 70 26 00 W..	63	52.4	gn. m.....	Abundant.
17470	U.S.N.M.	1	D2263....	37 08 00 N.; 74 33 00 W..	430	.....	gn. m.....	Rare.
17471	U.S.N.M.	4	D2264....	37 07 50 N.; 74 34 20 W..	167	46.8	gy. s.....	Few.
17472	U.S.N.M.	2	D2265....	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m., g....	Rare.
17473	U.S.N.M.	3	D2309....	35 43 30 N.; 74 52 00 W..	56	.....	gy. s., brk. sh.	Few.
17474	U.S.N.M.	1	D2312....	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s., bk. sp.	Rare.
17475	U.S.N.M.	8	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s., bk. sp.	Common.
17476	U.S.N.M.	10+	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fne. s.	Abundant.
17477	U.S.N.M.	2	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh....	Rare.
17478	U.S.N.M.	1	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Rare.
17480	U.S.N.M.	1	D2579....	32 40 00 N.; 76 40 30 W..	782	38.6	lt. gy. oz....	Rare.
17481	U.S.N.M.	3	*Fish Hawk* 949.	.....	.....	.....	.....	Few.

MARGINULINA BACHEII Bailey, var. ENSIFORMIS (Goës).

Plate 37, fig. 3.

Cristellaria ensiformis Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 57, pl. 5, figs. 17, 18.

Description.—Variety differing from the typical in the somewhat smaller size and the development of numerous acicular spines about the early coiled portion.

Distribution.—Goës described this species from the Caribbean Sea in 196–210 fathoms (359–384 meters). I have had this variety from but one station in the material of the *Albatross* dredgings, which I have studied. This is from off the southern coast of Florida. It is to be suspected that the one station given by Flint from the northern part of the Gulf of Mexico for *Marginulina ensis* may be this variety. This variety evidently replaces the typical form in warmer waters.

Marginulina bacheii, var. ensiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17479	U.S.N.M.	3	D2648....	25 53 00 N.; 80 03 30 W..	84	.....	gn. m.....	Few.

MARGINULINA STRIATULA Cushman.

Plate 37, fig. 4.

Marginulina striatula CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 79, pl. 23, fig. 4; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 255, pl. 41, fig. 2.

Description.—Test elongate, early part forming a portion of a coil, later chambers moniliform, tumid, separated by deep constrictions; wall typically with numerous very fine longitudinal striae; aperture at the end of a well-developed neck, eccentric on the dorsal side, radiate.

Length nearly 2 mm.

Distribution.—I originally described this species from a single *Nero* station, 2071, in 271 fathoms (496 meters), off the Hawaiian Islands. I have since had it from three stations in the Philippine region, ranging in depth from 78–554 fathoms (143–1012 meters). I have specimens from the Gulf of Mexico and Caribbean Sea which may be referred to this species; the Atlantic stations range from 169–683 fathoms (309–1,248 meters), but the species is rare at all the stations. It has not hitherto been recorded in the Atlantic.

This is another one of the examples of a species occurring in the Gulf of Mexico and Caribbean which has its range westward across the tropical Pacific.

Marginulina striatula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17508	U.S.N.M	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Rare.
17509	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m. fne. s.	Rare.
17510	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
17511	U.S.N.M	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
17512	U.S.N.M.	4	D2192....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.....	Few.
17513	U.S.N.M	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
17514	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
17515	U.S.N.M.	2	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Rare.
17516	U.S.N.M.	2	D2400....	28 41 00 N.; 85 07 00 W..	169	.....	gy. m.....	Rare.
17517	U.S.N.M	3	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.....	Few.
17518	U.S.N.M	1	D2573....	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m., s....	Rare.

MARGINULINA COSTATA (Batsch).

Plate 37, fig. 2.

Nautilus (*Orthoceras*) *costatus* Batsch, Conch. des Seesandes, 1791, p. 2, pl. 1, figs. 1 *a–g*.

Marginulina costata Brady, Rep. Roy. *Challenger*, Zoology, vol. 9, 1884, p. 528, pl. 65, figs. 10–13 (?).—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 344.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 485.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 347, pl. 11, fig. 19.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 98; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261; Journ. Roy. Micr. Soc., 1916, p. 47.

I have given above the references to Atlantic material recorded under this name. There is evidently a difference in that found off the British Isles and the species found in the West Indies of which I have but a single specimen. Many different things have been referred to this specific name, and until a study can be made of the forms recorded from various regions the whole complex is in a very unsatisfactory state.

Marginulina costata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17519	U.S.N.M.	1	D2339....	23 10 40 N.; 82 20 15 W..	191	.....	Co.....	Rare.

Genus VAGINULINA D'Orbigny, 1826.

Vaginulina D'Orbigny (type, *V. legumen* Linnaeus), Ann. Sci. Nat., vol. 7, 1826, p. 257.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 529.—Chapman, The Foraminifera, 1902, p. 192.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 80.

Description.—Test elongate; chambers in a linear series, placed so that the sutures are oblique; aperture marginal; chambers laterally compressed.

The species of *Vaginulina* are undoubtedly derived from coiled forms, such as *Cristellaria*. Most of the fossil forms are compressed and very different from the recent species usually placed under this genus. The aperture usually is kept at the margin of the test, and the sutures oblique throughout.

It reaches its greatest development in the Mesozoic. Its geological history evidently ranges from the Lias to the present time.

VAGINULINA LEGUMEN (Linnaeus).

Plate 37, fig. 5.

Nautilus legumen Linnaeus, Syst. Nat., ed. 10, 1758, p. 711, No. 248; ed. 12, 1767, p. 1164, No. 288.

Vaginulina legumen D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 257, No. 2.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 58.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 530, pl. 66, figs. 13–15.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 344.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 910.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 347.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 58.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 60, fig. 2.—Wright, Irish Nat., vol. 11, 1902, p. 213.—Chapman, The Foraminifera, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1902, p. 527, pl. 11, fig. 21.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 215.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 6.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 145.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 342; Journ. Linn. Soc. Zool., vol. 30, 1910, p. 412.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 63, pl. 18, figs. 6, 7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 80, pl. 39, fig. 4.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 98; Trans. Zool. Soc. London, vol. 20, 1915, p. 671; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261; Journ. Roy. Micr. Soc., 1916, p. 47.—Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—Chapman, Austral. Geol. Survey Bull. 72, 1917, p. 33, pl. 8, fig. 67.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 139.—Cushman, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 618; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 257, pl. 41, fig. 3.

Description.—Test elongate, tapering, initial end usually with a spine; chambers increasing in diameter as added, oval in transverse section, later ones more distinct than the early ones; sutures often rather indistinct, oblique, later ones somewhat depressed; wall smooth, in small specimens usually thin, translucent, in older ones becoming thickened, opaque; aperture eccentric, slightly elongate, radiate.

Length of the largest Atlantic specimen 1.25 mm.

Distribution.—This species has occurred at several stations along the eastern coast of the United States and at two stations in the northern part of the Gulf of Mexico. Brady records it from one station off New York and at several other stations, one west of the Azores, one south of the Canary Islands, and one in the middle of the South Atlantic. Flint recorded it from the northern part of the Gulf of Mexico. It is recorded by numerous authors off the coasts of the British Isles. There are many other records for this species outside the Atlantic as the above references show.

Several different forms have been included under this specific name as reference to the published figures will easily demonstrate.

Vaginulina legumen—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17420	U.S.N.M.	1	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., bk. sp....	Rare.
17421	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Rare.
17422	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.
17423	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
17424	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
17425	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	59.3	gn. m.....	Rare.

VAGINULINA PEREGRINA, new species.

Plate 39, fig. 5.

Description.—Test elongate, compressed, slightly curved, of nearly uniform diameter throughout, composed of a few chambers, the dorsal and ventral sides narrow, the other side broader, irregularly quadrangular in transverse section; type specimen with 7 chambers; sutures distinct, very slightly depressed, dorsal side of the test even, ventral side lobulate; wall smooth, thin, transparent; aperture eccentric, on the dorsal side, minute, slightly extended.

Length of type specimen 1.20 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17414) from *Albatross* station D2311, in 79 fathoms (145 meters), off the coast of South Carolina.

This species is peculiar in its form, unornamented surface, lobulate ventral side, thin test, and very small aperture.

Vaginulina peregrina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17414	U.S.N.M.	1	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s., bk. sp.	Rare.

VAGINULINA ADVENA, new species.

Plate 39, figs. 1–4.

Description.—Test elongate, early portion much compressed, later portion nearly circular in transverse section in the adult, initial end broadly rounded, sometimes with a slight keel in the microspheric form; early chambers in the megalospheric form with one or two showing a keeled condition, in the microspheric form close-coiled;

sutures distinct, depressed only in the last two or three chambers of the adult; wall ornamented by numerous fine distinct longitudinal costae, running the entire length of the test, usually somewhat oblique; aperture at the dorsal side, somewhat projecting, radiate.

Length of adult specimen up to 2 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17434) from *Albatross* station D2641, in 60 fathoms (110 meters), off the coast of southern Florida. It has occurred at a number of stations as indicated in the table, from Florida northward along the eastern coast of the United States, some of the stations in comparatively shallow water.

This species in some ways resembles the three preceding. It does not have the spinose initial end nor the ornamentation of typical *Vaginulina linearis*, and is much smaller and very much more compressed than either *V. americana* or *V. bermudensis*.

Vaginulina advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17426	U.S.N.M.	1	D2264....	37 07 50 N.; 73 34 20 W..	167	46.8	gy. s.....	Rare.
17427	U.S.N.M.	5	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s. bk. sp.	Frequent.
17428	U.S.N.M.	3	D2312....	32 54 00 N.; 77 53 30 W..	88	57.8	crs. s. bk. sp.	Few.
17429	U.S.N.M.	1	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	crs. s. bk. sp.	Rare.
17430	U.S.N.M.	4	D2318....	24 25 00 N.; 81 46 00 W..	45	75.0	co.....	Few.
17431	U.S.N.M.	2	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp.	Rare.
17432	U.S.N.M.	1	D2329....	23 48 00 N.; 75 10 40 W..	1,169	38.4	co. s.....	Rare.
17433	U.S.N.M.	4	D2639....	25 04 59 N.; 80 15 00 W..	56	.....	co. s.....	Few.
17434	U.S.N.M.	10+	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Abundant.
17435	U.S.N.M.	1	.....	Off Sand Key, Fla.....	72	.....	.....	Rare.
17436	U.S.N.M.	1	.....	Off Bell, Fowey, Fla.....	22	.....	.....	Rare.

VAGINULINA AMERICANA, new species.

Plate 38, figs. 3, 4.

Vaginulina linearis H. B. Brady (not Montagu), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 532, pl. 67, figs. 10–12.—Goës (part), Bull. Mus. Comp. Zoöl., vol., 29, 1896, p. 59.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 61, fig. 1.

Nodosarina legumen Linnaeus, var. *linearis* Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 39, pl. 2, fig. 33 (not 32, 34, 35).

Description.—Test elongate, very slightly if at all compressed, of nearly uniform diameter throughout, usually slightly curved, initial end broadly rounded, apertural end somewhat tapering; chambers 10–15 in the adult, the earlier ones showing a tendency toward coiling; sutures distinct, somewhat oblique, rather broader on the dorsal side; wall ornamented by coarse longitudinal somewhat

oblique costae, which in the adult do not reach the last-formed chambers.

Length up to 4 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17404) from *Albatross* station D2415, in 440 fathoms (805 meters), off the coast of northern Florida. This is evidently the species described and figured by Flint as *V. linearis.* It is probably also the same as the *Challenger* material referred by Brady to *V. linearis*, but who mentions that "the specimens are few in number and are hardly ever typical as to minor characters." The specimens were from off Bermuda, 435 fathoms (796 meters), off Culebra Island, 390 fathoms (713 meters), and off the coast of South America, southeast of Pernambuco, 350 fathoms (640 meters). Flint's specimens were from off the coast of Georgia and Florida, 37–276 fathoms (68–505 meters). Goës may have had this species from the Caribbean, mentioning one as "only being perhaps more cylindric in the circumference" than the typical. I have had specimens from several *Albatross* stations which are given in the accompanying table. They range from Florida along the eastern coast of the United States, the specimens being most abundant off the coast of Georgia, where they are also recorded by Flint.

This species has a rounded base and is much more cylindrical than *V. linearis.*

Vaginulina americana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17415	U.S.N.M.	4	D2314....	32 43 00 N.; 77 51 00 W..	159	47.4	crs. s., bk. sp.	Few.
17404 17416	U.S.N.M.	8	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	co., crs. s....	Common.
17417	U.S.N.M.	7	D2416....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Frequent.
17418	U.S.N.M.	1	D2668....	30 58 30 N.; 79 38 30 W..	294	46.3	gy. s., dd. co.	Rare.
17419	U.S.N.M.	1	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Rare.

VAGINULINA BERMUDENSIS, new species.

Plate 38, fig. 2.

Nodosarina legumen LINNAEUS, var. *linearis* Goës (part), Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 39, pl. 2, fig. 32 (not 33, 35).

Description.—Test elongate, curved, especially near the initial end, circular in transverse section, initial end broadly rounded, in the adult consisting of about 12 chambers; chambers very slightly inflated toward the apertural end; sutures rather indistinct, except

in the later portion where they are slightly depressed, only slightly oblique; wall ornamented by very numerous fine longitudinal costae which are continuous across the chambers and run from the initial end to the aperture, increasing in number as the size of the test increases, becoming finer toward the apertural end; aperture fairly large, at one side, radiate.

Length up to 7 mm.

Distribution.—Type-specimen from Challenger Bank, off the Bermudas, collected by Owen Bryant, collection of J. A. Cushman.

VAGINULINA LINEARIS (Montagu).

Plate 16. figs. 7–9.

Nautilus linearis Montagu, Test. Brit. Suppl., 1808, p. 87, pl. 30, fig. 9.

Dentalina legumen (Linnaeus), var. *linearis* Williamson, Rec. Foram. Great Britain, 1858, p. 22, pl. 2, figs. 46–48.

Vaginulina linearis Parker and Jones, Philos. Trans., vol. 155, 1865, p. 343, pl. 13, figs. 12, 13.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 532, pl. 67, figs. 10–12.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 548; Trans. Roy. Irish Acad., vol. 28, 1885, p. 344.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 910.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 484; Irish Nat., vol. 11, 1902, p. 213.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 66, pl. 12, fig. 664.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 98; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 261.

Description.—Test elongate, somewhat curved, initial end pointed with a short spine, whole test somewhat compressed; chambers comparatively few, about 10 in a fully grown specimen, inflated, especially toward the apertural end, earlier chambers more compressed; sutures distinct but only depressed toward the apertural end; surface ornamented by numerous somewhat oblique longitudinal lines, usually not extending out on to the last-formed chamber; aperture at the dorsal side, somewhat projecting, radiate.

Length up to about 3 mm.

Distribution.—This species described by Montagu from the shores of the British Isles seems to be restricted to the European side of the North Atlantic. It has been recorded by numerous authors from this general region. Its northernmost record is that of Parker and Jones from between Drontheim and North Cape. Some of the records given by Wright off the British Isles are as much as 50 fathoms (91 meters). In the *Challenger* report Brady mentions it from the Shetlands and Hebrides at depths of 15–90 fathoms (27–165 meters) where it is common, and states that it also occurs off the coasts of Norway and France, but that the *Challenger* material

which he had from the western Atlantic was not typical. That material has been placed in the following species:

VAGINULINA SPINIGERA H. B. Brady.

Plate 37, figs. 6–8; pl. 38, fig. 1.

Marginulina, species, Whiteaves, Rep. British Association, Brighton Meeting, Trans., 1872, p. 144.

Vaginulina spinigera H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 63; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 531, pl. 67, figs. 13, 14.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist., vol. 2, 1890, p. 178.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 60, fig. 3.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 259, pl. 42, fig. 1.

Description.—Test elongate, tapering, gradually increasing in diameter toward the apertural end, near the initial end are typically two long acicular spines, sometimes nearly half the length of the test itself, at widely divergent angles; chambers fairly numerous, the early ones coiled, the later ones uncoiled, oblique, the dorsal side higher than the ventral; sutures distinct, somewhat limbate, occasionally showing a slight tendency toward beading and the last-formed chambers sometimes depressed; aperture at the dorsal margin of the last-formed chamber, slightly projecting, radiate.

Length without the spines up to 5 mm.

Distribution.—This species was originally described by Whiteaves from the Gulf of St. Lawrence but he did not give it a specific name. M. Sars gave a name *Marginulina spinosa* in one of his lists from off the coast of Norway, but as no description or figure was given, the name has not been used. Brady described the species in 1881 and figured it in the *Challenger* report for the first time. The *Challenger* records are three—off the coast of South America, near Pernambuco, Brazil, 675 fathoms (1,234 meters), and from two in the Pacific, off Sydney, New South Wales, 410 fathoms (750 meters), and north of the Ki Islands, 580 fathoms (1,061 meters). Wright records the species as rare, off the southwest coast of Ireland, 1,000 fathoms (1,829 meters). Pearcey records a few from the warm area of the Faroe Channel. Flint recorded it from two stations off the northeastern coast of the United States in 328 and 430 fathoms (600 and 805 meters). Another record is that which I have given from off Bouro Island, at *Albatross* station D5637, in 700 fathoms (1,280 meters). This is not far from one of the *Challenger* stations.

There is some variation in the spines developed at the base of the test. The typical form has two, usually widely divergent, but occasionally a third is developed, more nearly in the axis of the test—very rarely the spines themselves are bifurcate. In specimens which are evidently senescent there is a reduction in the width of the final chamber.

Vaginulina spinigera—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17385	U.S.N.M.	6	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Frequent.
17386	U.S.N.M.	1	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Rare.
17387	U.S.N.M.	1	D2048....	40 02 00 N.; 68 50 30 W..	547	29.0	crs.s., m.&g.	Rare.
17388	U.S.N.M.	1	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Rare.
17389	U.S.N.M.	2	D2072....	41 53 00 N.; 66 35 00 W..	858	39.0	gy. m.....	Rare.
17390	U.S.N.M.	1	D2073....	41 54 15 N.; 65 39 00 W..	587	40.0	gy. s.....	Rare.
17391	U.S.N.M.	1	D2110....	35 12 10 N.; 74 57 15 W..	516	40.0	bu. m.....	Rare.
17392	U.S.N.M.	2	D2115....	35 49 30 N.; 74 34 45 W..	843	39.0	m., fne. s....	Rare.
17393	U.S.N.M.	10	D2171....	37 59 30 N.; 73 48 40 W..	444	39.5	gn. m.....	Common.
17394	U.S.N.M.	8	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.....	Common.
17395	U.S.N.M.	1	D2189....	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m., s....	Rare.
17396	U.S.N.M.	7	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Frequent
17397	U.S.N.M.							
3089	U.S.N.M.	10+	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Abundant.
3090	U.S.N.M.							
17398	U.S.N.M.	9	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Common.
17399	U.S.N.M.	10+	D2213....	39 58 30 N.; 70 30 00 W..	384	39.5	gn. m.....	Abundant.
17400	U.S.N.M.	3	D2214....	39 57 00 N.; 70 32 00 W..	475	39.5	gn. m.....	Few.
17401	U.S.N.M.	5	D2234....	39 09 00 N.; 72 03 15 W..	810	38.6	gn. m.....	Frequent.
17402	U.S.N.M.	1	D2263....	37 08 00 N.; 74 33 00 W..	430	.....	gn. m.....	Rare.
17403	U.S.N.M.	1	D2352....	22 35 00 N.; 84 23 00 W..	463	45.0	wh. co.....	Rare.
17405	U.S.N.M.	1	D2541....	39 57 45 N.; 70 50 30 W..	134	47.7	gn. s., brk. sh.	Rare.
17406	U.S.N.M.	2	D2544....	40 01 45 N.; 70 24 00 W..	131	47.7	gn. s., bk. sp.	Rare.
17407	U.S.N.M.	10+	D2547....	39 54 30 N.; 70 20 00 W..	390	39.6	gn. m.....	Abundant.
17408	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Few.
17409	U.S.N.M.	1	D2586....	39 02 40 N.; 72 40 00 W..	328	40.2	gn. m.....	Rare.
17410	U.S.N.M.	2	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.
17411	U.S.N.M.	10	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Abundant.
17412	U.S.N.M.	10+	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Abundant.
17413	U.S.N.M.	1	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Rare.

Genus FRONDICULARIA Defrance, 1824.

Frondicularia Defrance (type, *F. complanata* Defrance), Dict. Sci. Nat., vol. 32, 1824, p. 178.

Description.—Test compressed, in the adult consisting of chambers, elongate and narrow, running back on either side of the test; wall vitreous, finely perforate; aperture single, either radiate or surrounded with a lip which is usually cut in a radial manner; surface smooth or ornamented with costae; microspheric specimens with a coiled development in the earlier chambers; megalospheric specimens without the coiled chambers as a rule.

The genus *Frondicularia* is evidently derived from a coiled ancestry, such as *Cristellaria*. The microspheric forms invariably show coiled chambers in the young, and were formerly placed under the genus *Flabellina*. Megalospheric specimens of the same species often show typical adult characters appearing directly after the proloculum.

Its geological history ranges from the Permian to the present. It is particularly abundant in the Cretaceous. At the present time large typical *Frondicularia* species are comparatively rare. There is a development of it in the warmer waters of the western Atlantic, and in tropical and subtropical waters of the Pacific at depths

of 100–500 fathoms (183–914 meters). *Frondicularia advena* is found in deeper waters and is rather widely distributed. There are several species which have been referred to this genus in recent years which possibly should not be placed here. They are small, thin-walled species, described from the Mediterranean or the eastern North Atlantic, in which there is a compressed form, but the typical inverted V-shaped chamber is not characteristically developed. These species, moreover, instead of having the typical radiate aperture characteristic of *Frondicularia*, more often have a small aperture, and it seems that they should be studied to see whether or not they really belong to this genus.

FRONDICULARIA [?] TRANSLUCENS Heron-Allen and Earland.

Plate 21, fig. 4.

Frondicularia translucens Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 96, pl. 8, fig. 13.

Description.—"Test minute, ovate, compressed, rounded at both ends, and at the marginal edges, showing 3–4 chambers. The initial chamber large, inflated, lenticular in shape. Sutural lines somewhat obscure, especially in the later chambers. Shell walls transparent; surface minutely punctate; aperture a slit furnished with a curved entosolenian tube.

"Length 0.14–0.16 mm.; breadth 0.10–0.12 mm."

Distribution.—This species was described by the authors from Inishgoula Harbor, Ireland, in 14 fathoms.

It seems questionable whether this should be referred to *Frondicularia* or not.

FRONDICULARIA [?] SIDEBOTTOMI, new name.

Plate 21, fig. 6.

Frondicularia spathulata Sidebottom (not Williamson), Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, 1907, p. 5, pl. 1, fig. 26.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 97, pl. 8, fig. 12; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 260.

Description.—Test minute, hyaline, compressed, periphery rounded, lobulate; chambers in a straight axis, increasing in breadth as added; sutures distinct, slightly depressed; wall smooth; aperture simple, elliptical, often with an entosolenian neck.

Length of British specimens 0.20–0.35 mm.

Distribution.—Heron-Allen and Earland record this from five stations in the Clare Island region of Ireland in muddy localities. They also note its occurrence in the muddier dredgings from shallow water around the north and west coasts of Scotland and in the North Sea. Sidebottom figured the species from the coast of the Island of Delos. He referred to the same species a specimen

from the Bay of Palermo,[71] but this has a different shape and an exserted neck and does not appear to be the same species.

The name *Frondicularia spathulata* was first used by Williamson for a species of a very different form from the British Coast which does not appear to have been since recorded. Brady used the same name for a species of a different form occurring in the Indo-Pacific which I have named *F. bradyi* Cushman. The specific name *spathulata* being preoccupied in this genus, I have given the above name to the species of the Mediterranean and the coast of western Europe.

FRONDICULARIA [?] PYGMAEA Sidebottom.

Plate 21, fig. 3.

Frondicularia pygmaea Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, no. 9, 1907, p. 5, pl. 1, fig. 27.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 96, pl. 8, fig. 14.

Description.—"The initial chamber appears to be nearly globular, and the following ones are compressed, narrow and reflexed. The septa are arched, and slightly sunk, and the orifice is simple. A small wing commencing on the last chamber but one runs on either side of the test, gradually broadening out and terminating as a spine. The initial chamber is likewise armed with a small spine. Two specimens were found and both consist of five chambers."

Length of Delos figured specimen 0.20 mm.; off Clare Island specimen about 0.15 mm.

Distribution.—Sidebottom originally described this species from the coast of the Island of Delos in the Mediterranean. Heron-Allen and Earland record it from the Clare Island region, off Ireland, and Earland had it from off Noss Head, Moray Firth.

The microspheric form has a straight test without sign of coiling as does the megalospheric. It seems to belong rather to *Lingulina* than to *Frondicularia.*

FRONDICULARIA ADVENA, new species.

Plate 20, figs. 1, 2.

Frondicularia inaequalis H. B. Brady (not Costa), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 521, pl. 66, figs. 8–12.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 313, pl. 59, fig. 2.—Cushman, Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 216, pl. 40, figs. 5, 6.

Description.—Test compressed, irregularly elliptical, initial end usually narrow, bluntly pointed, proloculum subspherical, following chambers coiled in part or not at all, quickly giving place to typical V-shaped frondicularian chambers, highest in the center, thence gradually tapering to the pointed lower ends; test occasionally with a slight peripheral keel, sutures slightly depressed; aperture circular

[71] Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 21, pl. 2, fig. 22.

in the center of the periphery of the last-formed chamber; surface of test smooth and unornamented; wall translucent, thin.

Length 0.5–2 mm.

Description.—Type-specimen (U.S.N.M. Cat. No. 17526) from *Albatross* station D2205, in 1073 fathoms (1962 meters), off the northeastern coast of the United States. The only *Challenger* record for this species is off New York in 1,240 fathoms (2,268 meters). Flint has also recorded it in the same general area from two *Albatross* stations, D2530 and D2584, in 956 and 541 fathoms (1,748 and 989 meters). I have had it from numerous stations, most of them in the general latitude of New York, but one off Cape Hatteras, depths ranging from 168–1,362 fathoms (307–2,491 meters). There is a development of this species in the Indo-Pacific region, Brady giving the following *Challenger* stations: Near the Ki Islands at depths of 129 and 580 fathoms (236 and 1,061 meters); off Raine Island, Torres Strait, 155 fathoms (283 meters); and off the west coast of New Zealand, 275 fathoms (503 meters). He also gives another station off the Cape of Good Hope, 150 fathoms (274 meters). I have had what seems to be identical material from *Albatross* station D5123, east coast of Mindoro, Philippine Islands, in 283 fathoms (517 meters), and from D5652, in the Gulf of Boni, Philippine Islands, in 525 fathoms (927 meters). This therefore seems to be another one of those species which occurs at considerable depths, both in the Western Atlantic and the Indo-Pacific. Heron-Allen and Earland have recorded a single imperfect specimen, fossil, from a clay which occurred in the shore sands of Selsey Bill. Sussex, England.[72] Bagg has recorded it as abundant from the Pliocene at San Pedro, California,[73] but his figures show very conclusively that it is an entirely different species from this. It is a small, delicate species, and very apt to be broken.

Frondicularia advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17520	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Rare.
17521	U.S.N.M.	1	D2050....	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz.....	Rare.
17522	U.S.N.M.	1	D2093....	39 42 50 N.; 71 01 20 W..	1,000	39.0	for., s., m...	Rare.
17523	U.S.N.M.	1	D2192....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.....	Rare.
17524	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Abundant.
17525	U.S.N.M.	1	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Rare.
17526	U.S.N.M.	2	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.....	Few.
17527	U.S.N.M.	3	D2205....	.....	.....	.....	.....	.....
17528	U.S.N.M.	1	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Rare.
17529	U.S.N.M.	1	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Rare.
17530	U.S.N.M.	4	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Few.
17531	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp.	Rare.
17532	U.S.N.M.	1	D2684....	39 35 00 N.; 70 54 00 W..	1,106	.....	br. c., bk. sp.	Rare.
17533	U.S.N.M.	1	D2748....	39 31 00 N.; 71 14 30 W..	1,163	37.8	gy. m., for...	Rare.

[72] Journ. Roy. Micr. Soc., 1907, p. 427.

[73] Bull. 513, U. S. Geol. Survey, 1912, p. 60, pl. 18, figs. 1 *a–c*, 2 *a–e*.

FRONDICULARIA SAGITTULA Vanden Broeck.

Plate 21, fig. 2.

Frondicularia alata D'Orbigny, var. *sagittula* Vanden Broeck, Ann. Soc. Belg. Micr., vol. 2, 1876, p. 113, pl. 2, figs. 12, 14.

Description.—Test flattened, triangular in outline; chambers at the initial end gradually increasing in length posteriorly so as to form an angle from the initial chamber as its apex, apertural end bluntly pointed, chambers narrow, of uniform width throughout, the initial ends often with short blunt conical spines extending backward; wall smooth; sutures strongly limbate, distinct, sometimes slightly raised above the general surface; aperture terminal, radiate.

Length up to 4 mm.

Distribution.—This species, originally described by Vanden Broeck, is a variety of *F. alata* D'Orbigny. It occurs sparingly in the Gulf of Mexico, and in a still more definite form in the Bowden Marl, Bowden, Jamaica.

The following variety is more common.

Frondicularia sagittula—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17534	U.S.N.M.	1	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Rare.
17535	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.

FRONDICULARIA SAGITTULA Vanden Broeck, var. LANCEOLATA Vanden Broeck.

Plate 20, fig. 4; pl. 21, fig. 1.

Frondicularia alata D'Orbigny, var. *lanceolata* Vanden Broeck, Ann. Soc. Belg. Micr., vol. 2, 1876, p. 117, pl. 2, fig. 13.

Frondicularia alata H. B. Brady (not D'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 522, pl. 65, figs. 20–23; pl. 66, figs. 3–5.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 65.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 313, pl. 59, fig. 1.—Cushman, Publ. 291, Carnegie Inst. Washington, 1919, p. 36, pl. 8, fig. 1.

Nodosarina complanata Goës (not *Frondicularia complanata* Defrance), Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 56, pl. 3, figs. 62–64.

Description.—Variety differing from the typical in the form which is much broader, the base usually either a straight line or the chambers not reaching to the base, giving it a rounded form; chambers usually broader than the typical and often with a single stout spine developed from the proloculum.

Length up to nearly 5 mm.

Distribution.—This variety which is described by Vanden Broeck from off the Barbadoes in 84 fathoms (153 meters), is much more

common than the typical form. It has occurred at several stations in the *Albatross* collection from the Gulf of Mexico and off the Florida coast. Brady recorded this species from off Culebra Island, West Indies, 395 fathoms (721 meters), and from off Bermuda, 435 fathoms (796 meters). Flint has recorded it at 198 and 210 fathoms (363 and 384 meters), at stations D2399 and D2377, from both of which I have also had material. The records of Goës are from the Caribbean, 300–400 fathoms (549–732 meters). It seems therefore to be a species confined to the warmer portions of the western Atlantic and which is developed at depths ranging from 100–400 fathoms (183–732 meters).

The microspheric form of this species has the chambers arranged in a coiled fashion and in such specimens a much more pointed form is usually given to the base of the test. This is shown in some of the early figures given by Goës, and is here shown, plate 21, figure 1.

This does not seem to be identical with the form named by D'Orbigny, *Frondicularia alata*, from the Mediterranean.

Frondicularia sagittula, var. lanceolata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
17536	U.S.N.M.	1	D2315....	24 26 00 N.; 81 48 15 W..	37	.....	co.....	Rare.
17537	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W..	399	.....	yl. oz.....	Rare.
17538	U.S.N.M.	1	D2377....	29 07 30 N.; 88 03 00 W..	210	67.0	gy. m.....	Rare.
17539	U.S.N M.	4	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Few.
17540	U.S.N.M.	1	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Rare.
17541	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Rare.

FRONDICULARIA, species?

Plate 20, fig. 3.

I have a single specimen of a peculiar species of *Frondicularia* from *Albatross* station D2192, off the northeastern coast of the United States, in 1,060 fathoms (1,938 meters). It is here figured.

The surface has costae which stand above the general surface of the test and which are sharp and plate-like. No other Atlantic specimens were obtained.

Frondicularia, species—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17542	U.S.N.M.	1	D2192....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.....	Rare.

FRONDICULARIA [?] TENERA (Bornemann).

Plate 21, fig. 5.

Under this name Heron-Allen and Earland record and figure[74] a single specimen from off the west coast of Scotland. There seems to be some doubt as to the exact origin of this specimen and whether it might have been a fossil or not.

Subfamily 3. Polymorphininae.

Test polythalamous; chambers usually arranged in an irregular spiral, in later growth sometimes approaching a biserial arrangement or sometimes uniserial; surface smooth or ornamented by spines or costae; aperture radiate.

This subfamily includes the genus *Polymorphina* and its closely allied form *Dimorphina*.

Genus POLYMORPHINA D'Orbigny, 1826.

Polymorphina D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 265.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 197, et seq.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 557.—Chapman, The Foraminifera, 1902, p. 199.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 83.

Description.—Test more or less rounded, usually not equilateral; chambers few, obliquely placed in a more or less spiral arrangement; aperture terminal, radiate; wall calcareous, perforate, either smooth or variously ornamented with spines, costae, or tubercles.

D'Orbigny divided this genus into several subgenera, none of which are at the present time recognized. The literature of this particular genus is more complicated than that of most of the genera, due largely to the fact that so many of the species have a smooth wall without ornamentation and specific characters have to be based almost entirely on the outline and arrangement of the chambers of the test. Allowing for the variation thought to occur in this and other groups of earlier authors, and the lack of close application of names in later work, the number of forms placed under almost any of the smooth species is very great.

With the limited material at my disposal it is impossible to work out many of these complex cases. I have therefore thought it best simply to give the references under the various names to the Atlantic records for the various species, and wait for the future to work out their real relations. That the species of *Polymorphina* are probably as well characterized in their distribution as are other species of other genera may be shown by such well characterized species as *Polymorphina myristiformis* Williamson. This species, which has a peculiar ornamentation, occurs in considerable numbers in a very limited distribution about the British Isles and Western Europe,

[74] Trans. Linn. Soc. London, ser. 2, vol. 2, 1916, p. 260, pl. 42, figs. 8–10.

possibly also in the Mediterranean. It seems therefore that other species of this genus when their characters are clearly defined and plenty of material is available for examination, will be found to have distributions equally clearly delimited, as in the case of other species of the foraminifera.

POLYMORPHINA LACTEA (Walker and Jacob).

Plate 39, figs. 9, 11.

"Serpula tenuis ovalis laevis" WALKER and BOYS, Test. Min., 1784, p. 2, pl. 1, fig. 5.

"Polymorpha Subcordiformia vel Oviformia" SOLDANI, Testaceographia, vol. 1, pt. 2, 1791, p. 114, pl. 112, figs. 11, *nn*, etc.

Serpula lactea WALKER and JACOB, Adams' Essays, ed. 2, 1798, p. 634, pl. 24, fig. 4.

Vermiculum lacteum MONTAGU, Test. Brit., 1803, p. 522.

Polymorphina lactea MAGILLIVRAY, Moll. Aberd., 1843, p. 320.—WILLIAMSON (part), Rec. Foram. Great Britain, 1858, p. 71, pl. 6, fig. 147.—(The following are Atlantic records referred to this species).—BALKWILL and WRIGHT, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 559.—BALKWILL and WRIGHT, Trans. Roy. Irish Acad., vol. 28, 1885, p. 345.—H. B. BRADY, Journ. Roy. Micr. Soc., 1887, p. 912.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., London, vol. 12, 1888, p. 224, pl. 44, fig. 11.—PEARCEY, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—WRIGHT, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486.—WOODWARD, The Observer, vol. 4, 1893, p. 144.—WRIGHT, Irish Nat., vol. 9, No. 3, 1900, p. 54.—WHITEAVES, Geol. Survey Canada, 1901, p. 10.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 216.—BALKWILL and MILLETT, Recent Foram. Galway, 1908, p. 6.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1907, p. 430; Proc. Roy Irish Acad., vol. 31, pt. 64, 1913, p. 100, pl. 8, fig. 16; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 48.

The figure of Williamson may be taken as a typical western European form of this species. Under this name in the literature are to be found a considerable collection of figures covering a variety of things not all of which certainly can be one species. Such forms as that figured by Williamson occur on the coast of the British Isles, and I have specimens of similar form from Iceland.

On the western side of the Atlantic another form is common in shallow water especially off the New England coast. This is here described.

POLYMORPHINA LACTEA (Walker and Jacob), var. NOVANGLIAE, new variety.

Plate 39, figs. 6–8.

Polymorphina lactea CUSHMAN (not Walker and Jacob), Proc. Boston Soc. Nat. Hist., vol. 34, 1908, p. 28.

Description.—Variety differing from the typical in the form of the test which is elongate, fusiform, the initial end rounded, apertural end slightly drawn out, wall smooth; sutures not depressed. Length up to 2 mm.

Distribution.—Type-specimen from Cobscook Bay, near Eastport, Maine. I have had other specimens from off Trials Island, Eastport, and Casco Bay, Maine, shore sands from Coffins Beach, Annisquam, Massachusetts, and Newport, Rhode Island, and from the Woods Hole region, all on the New England coast. It has also occurred in Gaspé Bay, 30–40 fathoms (55–73 meters). This variety apparently does not occur in the *Albatross* material of deeper water farther south.

A specimen of a fistulose form is figured (plate 39, fig. 8) which may possibly belong to this species. It is from off the New England coast, *Albatross* station D2097.

Polymorphina lactea, var. novangliae—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
17714	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	.....	glob. oz.....	Rare.
17715	U.S.N.M.	1	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.
17716	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.....	Rare.

POLYMORPHINA LACTEA (Walker and Jacob), var. OBLONGA Williamson.

Plate 40. figs. 7, 8.

Polymorphina lactea (Walker and Jacob), var. *oblonga* Williamson, Rec. Foram. Great Britain, 1858, p. 71, pl. 6, figs. 149, *a*.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 913.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486; Irish Nat., vol. 9, No. 3, 1900, p. 54.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 216.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.

Polymorphina oblonga Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 430; Proc. Roy. Irish Acad., vol. 31, pt. 63, 1913, p. 100, pl. 8, fig. 17; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 48.

This form described by Williamson from off the coast of the British Isles, has been recorded by numerous authors from the same general region, as given in the references above. I have not found it in the western Atlantic. Sidebottom records the variety from the Mediterranean, but in both cases says that the material is not typical. There are scattered records for it elsewhere.

POLYMORPHINA COMMUNIS D'Orbigny.

Plate 40. figs. 1, 2.

Polymorphina (*Guttulina*) *communis* D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 266, pl. 12, figs. 1–4; Modèle, No. 62.

Guttulina communis D'Orbigny, Foram. Foss. Vienne, 1846, p. 224, pl. 13, figs. 6–8.

Polymorphina communis H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 224, pl. 39, figs. 10*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 568, pl. 72, fig. 19.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 6.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 55.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 101; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 48.

Description.—Test slightly compressed, generally rounded, initial end broadly rounded, apertural end slightly produced; chambers comparatively few, inflated; sutures distinct and somewhat depressed; wall smooth; aperture radiate.

Length up to 0.90 mm.

Distribution.—There are numerous records for this species from the eastern Atlantic, and Flint has recorded it off the coast of Georgia. I have had specimens from three *Albatross* stations which may be referred to this species. They are from off the coasts of Georgia and Florida.

Polymorphina communis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17702	U.S.N.M.	5	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., bk., sp..	Few.
17703	U.S.N.M.	1	D2415....	30 44 00 N.; 79 26 00 W..	440	45.6	Co., crs. s., sh.	Rare.
17704	U.S.N.M.	1	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.

POLYMORPHINA CYLINDROIDES Roemer.

Plate 39, fig. 10.

Polymorphina cylindroides Roemer, Neues Jahrbuch, 1838, p. 385, pl. 3, fig. 26.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 221, pl. 39, figs. 6 *a–c*.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265, pl. 42, figs. 15, 16.

The only records for this species in the Atlantic are those given by Brady and Heron-Allen and Earland, off the coasts of the British Isles.

POLYMORPHINA AMYGDALOIDES Reuss.

Globulina amygdaloides Reuss, Zeitschr. deutsch geol. Gesell., vol. 3, 1851, p. 82, pl. 6, fig. 47.

Polymorphina amygdaloides Reuss, Sitz. kais. Akad. Wiss. Wien, vol. 18, 1855, p. 250, pl. 8, fig. 84.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 560, pl. 71, fig. 13.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 9, pl. 2, figs. 12–14;

vol. 54. No. 16, 1910, p. 22.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 263; Journ. Roy. Micr. Soc., 1916, p. 48.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 143.

Polymorphina lactea (Walker and Jacob), var. *amygdaloides* H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 214, woodcuts.

There are numerous records for this species, especially in the eastern Atlantic, but in the *Albatross* collections I have had no material which I can refer to this species.

POLYMORPHINA ANGUSTA Egger.

Polymorphina angusta Egger, Neues Jahrbuch für. Min., 1857, p. 290, pl. 13, figs. 13–15.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 563, pl. 72, figs. 1–3.—Woodward, The Observer, vol. 4, 1893, p. 144.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 432.

The only record for this species from the western Atlantic is that given by Woodward from Mnemsha Bight, Marthas Vineyard. This, from a study of my own collection, is probably *Polymorphina lactea* (Walker and Jacob), var. *novangliae* Cushman.

Heron-Allen and Earland record a single specimen, apparently recent, from shore sands of Selsey Bill, Sussex. There are numerous other records from Australia and the Indo-Pacific.

POLYMORPHINA EQUALIS D'Orbigny.

Plate 40, fig. 3.

Polymorphina equalis D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 265, No. 13.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 48.

Globulina aequalis D'Orbigny, Foram. Foss. Vienne, 1846, p. 227, pl. 13, figs. 11, 12.

Polymorphina gibba D'Orbigny, var. *aequalis* H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 216, pl. 39, figs. 2*c*, *d*.

Description.—Test much compressed, generally rounded in outline, about as broad as long; chambers few, very slightly inflated; sutures distinct, very slightly depressed; wall smooth; aperture very slightly produced, radiate.

Length up to 0.50 mm.

Distribution.—I have placed under this species two specimens of a flattened form which is somewhat similar to the figure given by D'Orbigny in 1846. They are from two stations, one in the Gulf of Mexico, the other off the coast of South America. The figured specimen (plate 40, fig. 3) shows a fistulose form from the Gulf of Mexico. There are numerous other records for the species, as the above references show.

Polymorphina equalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance
				° ′ ″ ° ′ ″		°F.		
17705	U.S.N.M.	1	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Rare.
17706	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. s. sp.....	Rare.

POLYMORPHINA FUSIFORMIS Roemer.

Balkwill and Wright[75] record this species as very rare off Dublin and Wicklow, and again as more rare, off Dublin.

These are the only records for this species in the Atlantic.

POLYMORPHINA GIBBA D'Orbigny.

Polymorphina (*Globulina*) *gibba* D'Orbigny, Ann. Sci. Nat., vol. 7, 1826. p. 266, No. 20; Modèle, No. 63.

Polymorphina gibba H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 216, pl. 39, figs. 2 *a–d*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 561, pl. 71, figs. 12 *a*, *b*; pl. 73, fig. 16.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol. 28, 1885, p. 345.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 912.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Wright, Irish Nat., vol. 11, 1902, p. 213.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 431.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 100.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1023.—Heron-Allen and Earland, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 48.

There are numerous records for the Atlantic as the above list of reference shows. I have, however, not found typical material in the western Atlantic.

POLYMORPHINA LANCEOLATA Reuss.

Plate 40, figs. 4, 5.

Polymorphina lanceolata Reuss, Zeitschr. deutsch geol. Gesell., vol. 3, 1851, p. 83, pl. 6, fig. 50.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 564, pl. 72, figs. 5, 6; Journ. Roy. Micr. Soc., 1887, p. 913.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 486; Irish Nat., vol. 9, No. 3, 1900, p. 55.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 432.

[75] Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol 28, 1885, p. 346.

Description.—Test elongate, fusiform, the initial end subacute, apertural end tapering; chambers comparatively few, somewhat inflated; sutures distinct and slightly compressed; wall smooth; aperture radiate.

Length up to 1 mm.

Distribution.—This species has occurred at several stations in the western Atlantic. It is recorded also from the eastern Atlantic. Whether the two lots of material are really the same species or not is questionable.

Polymorphina lanceolata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17707	U.S.N.M.	2	D2174....	38 15 00 N.; 72 03 00 W..	1,594	.....	gy. m.....	Rare.
17708	U.S.N.M.	1	D2677....	32 39 00 N.; 76 50 30 W..	478	39.3	gn. m.....	Rare.
17709	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17710	U.S.N.M.	1	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Rare.
17711	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.

POLYMORPHINA OVATA D'Orbigny.

Plate 40, figs. 11, 12.

Polymorphina ovata D'Orbigny, Foram, Foss. Vienne, 1846, p 233, pl. 13, figs. 1–3.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 564, pl. 72, figs. 7, 8.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 54.

Under this specific name Brady records specimens from a single *Challenger* station off Culebra Island, West Indies, 390 fathoms (713 meters). I have had it in West Indian material which seems identical with this. It has been recorded from the eastern Atlantic, as the above records will show.

POLYMORPHINA OBLONGA D'Orbigny.

Polymorphina oblonga D'Orbigny, Foram. Foss. Vienne, 1846, p. 232, pl. 12, figs. 29–31.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 569, pl. 73, figs. 2, 4.—Flint, Rep. U. S. Nat. Mus., 1897(1899), p. 319, pl. 67, fig. 5 [?].

Flint records this species from off the southeastern coast of the United States, but most of the material from this same station belongs to *Polymorphina flintii* Cushman. There are many records from Eastern Europe referred to *P. oblonga*, Williamson's form, which he described as *P. lactea*, var. *oblonga*, and which by several authors has been placed as a valid species.

It is obvious that with D'Orbigny's earlier name Williamson's variety can not be used in a specific sense.

POLYMORPHINA PROBLEMA D'Orbigny.

Guttulina problema D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 266, No. 14; Foram. Foss. Vienne, 1846, p. 224, pl. 12, figs. 26–28.

Polymorphina problema D'Orbigny, Modèle, 1826, No. 61.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc., vol. 27, 1870, p. 225, pl. 39, figs. 11*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 568, pl. 72, fig. 20; pl. 73, fig. 1; Journ. Roy. Micr. Soc., 1887, p. 913.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1916, p. 49.

This name seems to be one commonly used for almost any form of smooth *Polymorphina* that has the chambers much inflated and projecting out from the general surface. Such forms are recorded from many parts of the world, but do not seem to be present at least in the form figured by D'Orbigny from the western part of the Atlantic.

POLYMORPHINA ROTUNDATA (Bornemann).

Guttulina rotundata Bornemann, Zeitschr. deutsch geol. Gesell., vol. 7, 1855, p. 346. pl. 18, fig. 3.

Polymorphina rotundata H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 234, pl. 40, figs. 19 *a–e;* text figures *k*, *l*, *m*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 570, pl. 73, figs. 5–8.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487; Irish Nat., vol. 9, No. 3, 1900, p. 55; vol. 11, 1902, p. 213.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—Cushman, Proc. Boston Soc. Nat. Hist. Soc., vol. 34, No. 2, 1908, p. 29.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 434; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 101; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 49.

Rounded forms, such as are commonly referred to this species, seem to be common on the coasts of the British Isles but are rare on this side of the Atlantic. I have had specimens from the Woods Hole region.

POLYMORPHINA SORORIA Reuss.

Plate 41, figs. 3–5.

Polymorphina (*Guttulina*) *sororia* Reuss, Bull. Acad. Roy. Belg., ser. 2, vol. 15, 1862, p. 121, pl. 2, figs. 25–29.

Polymorphina sororia H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 562, pl. 71, figs. 15. 16; pl. 73, fig. 15; Journ. Roy. Micr. Soc., 1887, p. 914.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 308, pl. 9, fig. 20.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 55.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 102; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 364; Journ. Roy. Micr. Soc., 1916, p. 48.

Description.—Test somewhat longer than broad, not compressed, initial end subacute, somewhat broadly angled, apertural end slightly

extended, somewhat truncate; chambers few; sutures distinct but not depressed; wall smooth; aperture large, radiate.

Length up to 0.75 mm.

Distribution.—I have had the species or what seems to be it from several stations off the northeastern coast of the United States. It is also recorded from various other parts of the world, and especially from the coasts of the British Isles.

Fistulose forms have occurred at two of the stations.

Polymorphina sororia—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17717	U.S.N.M.	3	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Few.
17718	U.S.N.M.	2	D2038....	38 30 30 N.; 69 08 25 W..	2,033	.....	glob. oz.....	Rare.
17719	U.S.N.M.	1	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Rare.
17720	U.S.N.M.	1	D2097....	37 56 20 N.; 70 57 30 W..	1,917	.....	glob. oz.....	Rare.
17721	U.S.N.M.	6	D2713....	38 20 00 N.; 70 08 30 W..	1,859	.....	br. oz.....	Frequent.
17722	U.S.N.M.	1	D2714....	38 22 00 N.; 70 17 30 W..	1,825	.....	br. oz.....	Rare.

POLYMORPHINA SORORIA Reuss, var. CUSPIDATA H. B. Brady.

Plate 41, fig. 2.

Polymorphina sororia Reuss, var. *cuspidata* H. B. Brady. Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 563, pl. 71, figs. 17–19; pl. 72, fig. 4.

Description.—Variety differing from the typical in the development of a long acicular spine at the base of the test.

Distribution.—I have a single specimen from the Caribbean which is very close to one of the specimens figured by Brady. His records for the species include two from the North Atlantic, west of Ireland in 808 and 1,443 fathoms (1,477 and 2,639 meters).

Polymorphina sororia, var. cuspidata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17723	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s...	Rare.

POLYMORPHINA COMPLANATA D'Orbigny.

Polymorphina complanata D'Orbigny, Foram. Foss. Vienne, 1846, p. 234, pl. 13, figs. 25–30.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 230, pl. 40, figs. 14*a*, *b*; also text figures.—Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 84, pl. 4, fig. 9.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6, pl. 4, fig. 9.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 432, pl. 17, figs. 3–5.

The above references give the only ones of this species for the Atlantic from comparatively shallow water about the British Isles.

POLYMORPHINA THOUINI D'Orbigny.

Under this name Brady [76] records specimens from the Estuary of the Dee, based evidently on Siddall's specimens.

POLYMORPHINA COMPRESSA D'Orbigny.

Polymorphina compressa D'Orbigny, Foram. Foss. Vienne, 1846, p. 234, pl. 13. figs. 25–30.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 227, pl. 40, figs. 12 *a–f*.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 565, pl. 72, figs. 9–11.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—Robertson, Proc. Nat. Hist. Soc. Glasgow, pt. 3, 1892, p. 241.—Woodward, The Observer, vol. 4, 1893, p. 144.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 309, pl. 9, figs. 11–13.—Morton, Proc. Portland Soc., vol. 2, 1897, p. 119.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 55.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Wright, Irish Nat., vol. 11, 1902, p. 213.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 101; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 49.

I have found no typical *Polymorphina compressa* in the collections from the Western Atlantic. As the above list of references will show, however, the species has been recorded many times from the Eastern Atlantic, especially in the region of the British Isles. A reference to the few figures, however, will show what a diversity of form specimens referred to this species have.

POLYMORPHINA CONCAVA Williamson.

Plate 40, fig. 9.

Polymorphina lactea (Walker and Jacob), var. *concava* Williamson, Rec. Foram. Great Britain, 1858, p. 72, pl. 6, figs, 151, 152.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 14, pl. 3, fig. 89; vol. 54, No. 16, 1910, p. 22.

Polymorphina concava H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 236, pl. 40, figs. 22 *a*, *b*.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549; Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, No. 57, 1905, p. 217.—Cushman, Proc. Boston Soc. Nat. Hist., vol. 34, No. 2, 1908, p. 28.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 431; Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 102; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 264; Journ. Roy. Micr. Soc., 1916, p. 48.

[76] Journ. Roy. Micr. Soc., 1887, p. 913.

Description.—Test compressed, of few chambers, one side convex, the other nearly flat and expanded, apparently forming the attachment to the surface of some foreign body; surface smooth; sutures distinct, but very slightly if at all depressed; aperture radiate.

Diameter of the main portion usually not more than 0.60 mm.

Distribution.—This species was originally described from the coast of the British Isles by Williamson. Most of the records for it are from the same general region and in the Mediterranean. I have had what seems to be the same species from the Woods Hole region.

POLYMORPHINA FLINTII, new species.

Plate 40, fig. 10.

Polymorphina compressa FLINT (not D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 3.

Description.—Test oval or somewhat rhomboid, compressed; chambers arranged in an irregular biserial manner, four or five chambers on each side in the adult, chambers somewhat inflated; sutures distinct, but very slightly depressed; wall smooth and polished, thick; aperture terminal, radiate.

Length up to 2.30 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17691) from *Albatross* station D2415, in 440 fathoms (805 meters), off the coast of Georgia. Flint recorded this species as *P. compressa* from several stations off the southeastern coast of the United States, from Cape Hatteras southward. I have had specimens from *Albatross* stations from the region southward from Nantucket to the Florida coast. Brady records *P. compressa* from two stations in this general faunal area, one off Bermuda, and the other off the West Indies, which may probably belong here. So far as the material shows, this species has not occurred in either the Caribbean or the Gulf of Mexico.

It is a large, well-characterized species in its more or less compressed form, somewhat alternating chambers, and thickened test.

Polymorphina flintii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17692	U.S.N.M.	4	D2312.....	32 54 00 N.; 77 53 30 W..	88	57.8	crs.s., bk.sp.	Few.
17693	U.S.N.M.	1	D2314.....	32 43 00 N.; 77 51 00 W..	159	47.4	crs.s., bk.sp.	Rare.
17691	U.S.N.M.	1	D2415.....	30 44 00 N.; 79 26 00 W..	440	45.6	co., crs. s....	Rare.
17694	U.S.N.M.	2	.....	.....	.....	.....	.....	.....
17695	U.S.N.M.	1	D2416.....	31 26 00 N.; 79 07 00 W..	276	53.8	co., brk. sh..	Rare.
17696	U.S.N.M.	1	D2552.....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Rare.
17697	U.S.N.M.	1	D2639.....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Rare.
17698	U.S.N.M.	1	*Fish Hawk* 1038.	.....	.....	.....	.....	

POLYMORPHINA EXTENSA, new name.

Plate 41, figs. 7, 8.

Polymorphina longicollis H. B. Brady (not Karrer), Quart. Journ. Micr. Sci., vol. 21, 1881, p. 64; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 572, pl. 73, figs. 18, 19.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 310, pl. 9, fig. 21 [?]—Chapman, Journ. Linn. Soc. Zool., vol. 30, 1910, p. 414.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 90, pl. 41, figs. 1–3.

Description.—Test elongate, fusiform, outline not lobulate, initial end more or less pointed, apertural end produced into an elongate cylindrical neck; chambers few, slightly inflated; sutures fairly distinct, but not depressed, except in the case of the last-formed one; wall more or less hispid, last chamber especially more inflated and more spinose.

Length up to 0.60 mm.

Distribution.—Brady records this species from three stations in the North Atlantic, 1,125, 1,476, and 2,435 fathoms (2,057, 2,699, and 4,454 meters), and "the best examples of the species" occurring in the South Atlantic at *Challenger* station 338, in 1,990 fathoms (3,640 meters). Therefore it seems probable that his figured specimens came from that station. He also gives four stations in the South Pacific, 1,375, 1,825, 2,075, and 2,425 fathoms (2,515, 3,338, 3,795, and 4,436 meters). Egger recorded a specimen from off Mauritius in 411 meters (225 fathoms). His figure is poor, and it may not be the same. Chapman records it from off Funafuti, 2,195–2,715 fathoms (4,010–4,965 meters). I had material from the North Pacific which I referred to this species, from off the Hawaiian Islands, in 1,670 fathoms (3,054 meters), and between Guam and Japan, in 1884 and 2,167 fathoms (3,446 and 3,963 meters). All the records for this species therefore are in deep water. The two *Albatross* stations in the Atlantic at which I have had specimens of this species, are in 1,362 and 1,395 fathoms (2,491 and 2,552 meters), agreeing with the previous findings in their general depths. These are off the northeastern coast of the United States.

Polymorphina extensa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17699	U.S.N.M.	1	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Rare.
17700	U.S.N.M.	1	D2105....	37 50 00 N., 73 03 50 W..	1,395	41.0	glob. oz.....	Rare.

POLYMORPHINA SPINOSA (D'Orbigny).

Plate 41, figs. 1, 13.

Globulina spinosa D'Orbigny, Foram. Foss. Vienne, 1846, p. 230, pl. 13, figs. 23, 24.

Polymorphina (*Globulina*) *spinosa* Egger, Neues Jahrbuch für Min., 1857, p. 292, pl. 14, figs. 9, 10.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 243, pl. 42, figs. 36*a*, *b*.

Polymorphina spinosa Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 347, pl. 12, fig. 27.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 915.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 435, pl. 17, fig. 9.

The only recent records for the Atlantic seem to be from off the coasts of the British Isles.

POLYMORPHINA RUGOSA D'Orbigny.

Plate 41, fig. 6.

Polymorphina rugosa D'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, "Foraminifères," 1839, p. 138, pl. 2, figs. 14, 15.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 237, pl. 40, figs. 23 *a–d*.

Description.—Test slightly compressed, rounded, the apertural end slightly tapering, making the entire test a little longer than broad; chambers few; sutures rather indistinct; surface ornamented by numerous subspinose projections; aperture radiate.

Length up to 0.60 mm.

Distribution.—I have had specimens from two *Albatross* stations, one off the coast of Georgia, the other off the northeastern coast of the United States, about the latitude of New York. D'Orbigny originally described this species from shore sands of Cuba.

Polymorphina rugosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17712	U.S.N.M.	1	D2112....	35 20 50 N.; 75 18 00 W..	16	73.5	s., bk. sp...	Rare.
17713	U.S.N.M.	1	D2262....	39 54 45 N.; 69 29 45 W..	250	41.6	gn. m., s....	Rare.

POLYMORPHINA PULCHELLA (D'Orbigny).

Plate 40, fig. 6.

Guttulina pulchella D'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 129, pl. 2, figs. 4–6.

Polymorphina pulchella H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 239, pl. 41, figs. 28*a*, *b*.—Cushman, Publ. 311, Carnegie Inst. Washington, 1922, p. 33, pl. 4, figs. 7, 8.

Description.—Test elongate, fusiform, somewhat compressed, both ends acute; chambers few; sutures distinct, slightly depressed; wall

translucent, with numerous longitudinal costae; aperture slightly extended, radiate.

Length up to 0.75 mm.

Distribution.—D'Orbigny originally described and figured this species from the West Indies region recording it from the shore sands of Cuba and Martinique. The only other records for it are very typical specimens which I obtained at numerous stations in the Tortugas region of the Gulf of Mexico.

It is a very beautiful species, with a clear shell wall ornamented with very delicate longitudinal costae, and apparently has a fairly wide distribution in the West Indian region.

Polymorphina pulchella—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17701	U.S.N.M.	1	D2420....	37 03 20 N.; 74 31 40 W..	104	47.7	bk. s., m....	Rare.

POLYMORPHINA HIRSUTA H. B. Brady, Parker, and Jones.

Polymorphina hirsuta H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 243, pl. 42, fig. 37.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 435, pl. 17, fig. 1.

Brady, Parker, and Jones record this species from a single specimen from the West Indies. Other records for it seem to be as a fossil.

POLYMORPHINA MYRISTIFORMIS Williamson.

Plate 41, figs. 9–12.

Polymorphina myristiformis Williamson, Rec. Foram. Great Britain, 1858, p. 73, pl. 6, figs. 156, 157.—H. B. Brady, Trans. Linn. Soc., vol. 24, 1864, p. 473.—Alcock, Proc. Lit. Philos. Soc. Manchester, vol. 4, 1865, p. 206.—H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 240, pl. 41, figs. 30 *a–c*.—Fischer, Actes Soc. Linn. Bordeaux, vol. 27, 1870, p. 391, No. 26.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 571, pl. 73, figs. 9, 10.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 346.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 914.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—Robertson, Trans. Nat. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 241.—Wright, Irish Nat., vol. 9, 1900, p. 55.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 434.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 51, No. 9, 1907, p. 13, pl. 3, fig. 7.—Balkwill and Millett, Rec. Foram. Galway, 1908, p. 6, pl. 4, fig. 10.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 103, pl. 8, figs. 18, 19; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 265; Journ. Roy. Micr. Soc., 1916, p. 48.

Description.—Test subglobular; chambers indistinct; sutures indistinct, not depressed, surface ornamented with longitudinal costae, frequently broken into short sections; apertural end with a slightly projecting ring about the aperture.

Length up to about 0.50 mm.

Distribution.—The species is common about the southern portion of the British Isles and more rare in the northern portion. Goës does not record it from the Scandinavian region, and it has not occurred in the western Atlantic collections I have examined. The only records outside the British Isles seem to be that of Sidebottom who had specimens referable to this species from off the Island of Delos in the Mediterranean, and of Williamson, who quotes "Tenedos (Levant)."

The distribution of a striking species of this sort seems to show that the fauna of the southern coast at least of the British Isles is related to the Mediterranean, rather than to the western Atlantic.

I have had excellent material from Europe and if its distribution included the western Atlantic, it would have surely been seen in the *Albatross* collections.

Polymorphina myristiformis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
.....	J.A.C....	2	.....	Off Plymouth, England..	.....	°F.	.....	Rare.

POLYMORPHINA ELEGANTISSIMA Parker and Jones.

The only recent Atlantic records for this species are those given by Egger from western Africa and off the Cape Verde Islands. It is a species common in shallow water of the Indo-Pacific and has not occurred so far as I have seen where it might be most probably looked for, that is, in the tropical portion of the western Atlantic. It occurs as a fossil in the Tertiary of the Coastal Plain of the United States, and, according to Heron-Allen and Earland, fossil in England.

POLYMORPHINA REGINA H. B. Brady, Parker, and Jones.

Polymorphina regina H. B. Brady, Parker, and Jones, Trans. Linn. Soc. London, vol. 27, 1870, p. 241, pl. 41, figs. 32*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 571, pl. 73, figs. 11–13.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 310, pl. 9, figs. 45, 50, 51.—Millett, Journ. Roy. Micr. Soc., 1903, p. 265.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 217.—Dakin, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 236.—Chapman, Journ.

Quekett Micr. Club, 1907, p. 132, pl. 10, fig. 4.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 139.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1909, p. 435.—Chapman, Proc. Roy. Soc. Victoria, vol. 22, 1910, p. 281.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 91, pl. 41, figs. 6, 7.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 673.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 143.—Cushman, Bull. 676, U. S. Geol. Survey, 1918, p. 54; Proc. U. S. Nat. Mus., vol. 56, 1919, p. 619; Journ. Washington Acad. Sci., vol. 10, No. 7, 1920, p. 199; Publ. 311, Carnegie Inst. Washington, 1922, p. 33, pl. 4, figs. 5, 6.

Description.—Test fusiform; chambers several, inflated, with deep sutures; wall ornamented with elongate, coarse costae, usually not broken on the individual chambers; aperture radiate, produced.

Length not exceeding 0.75 mm.

Distribution.—The only specimens I have had of this species from the Atlantic have been from the Tortugas region. It is recorded by Earland from Bognor, Sussex, England, a single specimen, and by Heron-Allen and Earland from shore sands of Selsey Bill, Sussex, England. Most of the records for the species are from the Indo-Pacific. I have found fossil specimens which seem to belong to this species from the Miocene and Oligocene of the Coastal Plain region of the southeastern United States.

Subfamily 4. Uvigerininae.

Test composed of several chambers, typically spirally arranged, especially in the earlier portion, later chambers often becoming loosely arranged, or even uniserial; wall smooth or variously ornamented; aperture typically consisting of a neck with a definite phialine lip.

In *Uvigerina* the spirally arranged chambers are typical, old age characters appearing in the loss of ornamentation or in the tendency to become loosely spiral as in *U. interrupta*. In *Siphogenerina* the early chambers are spiral or biserial, especially well-developed in the micospheric form, and the later development is uniserial.

Genus UVIGERINA D'Orbigny, 1826.

Uvigerina D'Orbigny (type, *U. pigmea* D'Orbigny), Ann. Sci. Nat., vol. 7, 1826, p. 268.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 573.—Chapman, The Foraminifera, 1902, p. 200.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 91.

Description.—Test elongate, spiral, consisting of numerous chambers, usually arranged triserially, occasionally in later growth with fewer than three chambers in each volution; wall calcareous, perforate, hyaline, smooth or ornamented with spines or costae or modifications of them; aperture with usually a tubular neck at the end of which is a phialine lip.

The genus *Uvigerina* and its related genus *Siphogenerina* form a very distinctive group. The triserial arrangement of the chambers

with a tubular aperture and phialine lip will at once distinguish *Uvigerina* from any other of the foraminifera. The ornamentation usually consists either of longitudinal costae which may be more or less interrupted or broken, or of spines. There is often a secondary type of ornamentation developed, as in *U. aculeata* D'Orbigny where the early condition of the test is longitudinally costate, but in the adult a secondary wall is progressively laid down, finally covering the entire test, the surface of which is ornamented by coarse spines. Senescent characters appear most usually as a loss of ornamentation, or in the placing of the chambers at a distance from one another, as in *U. interrupta* H. B. Brady.

Geologically the genus does not seem to occur farther back than the beginning of the Tertiary. From a study of the western Atlantic material and of the fossil collections from the Coastal Plain of the United States, it seems that the number of species of *Uvigerina* is much greater than has been recognized. In the western Atlantic they certainly have a very definite distribution and the characters are very constant. Likewise in the fossil series species seem to be rather limited in their vertical range.

UVIGERINA CANARIENSIS D'Orbigny.

Plate 41, figs. 14–16.

"Testae pineiformes minusculae" Soldani, Testaceographia, vol. 2, 1789, p. 18, pl. 4, figs. E, F, G, H.

Uvigerina nodosa, var. β. D'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 3.

Uvigerina canariensis D'Orbigny, Foram. Canaries, 1839, p. 138, pl. 1, figs. 25–27.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 573, pl. 74, figs. 1–3; Journ. Roy. Micr. Soc., 1887, p. 915.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 52, pl. 9, figs. 489–492.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 311, pl. 9, fig. 43.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 218.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 103.

Description.—Test elongate, made up of numerous chambers, spirally arranged, three chambers making up each whorl; chambers inflated, rotund, distinctly separated externally by rather deep sutures; wall smooth, occasionally the early chambers showing traces of costae or spines; aperture usually with a tubular neck and broad phialine lip; color grayish-white.

Length 1 mm. or somewhat more.

Distribution.—D'Orbigny originally described this species from the Canaries (shore sand of Teneriffe), and referred to it certain forms he had previously found in the Mediterranean. In the *Challenger* collections Brady records it off Bermuda, 435 fathoms (796 meters), from the South Atlantic, off Buenos Aires, 1,900 fathoms

(3,475 meters), and off the Cape of Good Hope, 150 fathoms (274 meters). He also gives records from the Pacific. It occurs rarely about the British Isles, off Holy Island (Brady); estuary of the Dee (Siddall); southwest of Ireland (Wright); off Bognor, Sussex (Earland); Clare Island region of Ireland (Heron-Allen and Earland). Goës recorded it from off the Azores, and Egger, in the Atlantic, from off the Cape Verde Islands. There are numerous records for its occurrence elsewhere but they are not included here.

On the western side of the Atlantic the only records are those of Brady. I have had no smooth *Uvigerinae* from the *Albatross* collections, nor did Flint.

UVIGERINA AMPULLACEA H. B. Brady.

Plate 42, figs. 5, 6.

Uvigerina asperula Czjzek, var. *ampullacea* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 579, pl. 75, figs. 10, 11.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 5.

Description.—Test composed of a group of chambers, making a test broadly rounded at the base and with an oval form, compact, followed by one or two chambers somewhat detached from the general mass; sutures slightly depressed; wall finely spinose, the apertural end of the last-formed chamber somewhat drawn out into a tapering neck, with a slightly phialine lip.

Length slightly less than 1 mm.

Distribution.—Brady described this species as a variety of *U. asperula* Czjzek. His records in the *Challenger* report include in the Atlantic a station to the south of Ireland in 725 fathoms (1,326 meters); off Culebra Island, West Indies, 390 fathoms (713 meters), and off the coast of South America in 350–675 fathoms (640–1,234 meters). He also gives stations in the South Pacific 410–620 fathoms (750–1,134 meters). Flint's specimens were from off the coast of Brazil. I have had specimens referable to this species from the Gulf of Mexico, the Caribbean, and off the coast of Brazil.

It is recorded from other parts of the world, especially in the Pacific where it may occur.

Uvigerina ampullacea—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17678	U.S.N.M.	2	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17679	U.S.N.M.	1	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Rare.
17680	U.S.N.M.	2	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Rare.
17681	U.S.N.M.	1	D2751....	16 54 00 N.; 63 12 00 W..	687	40.0	bu. glob. oz..	Rare.
17682	U.S.N.M.	1	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk.....	Rare.
17683	U.S.N.M.	1	H60.....	17 39 00 N.; 65 44 00 W..	578	.....	co. s. for.....	Rare.

UVIGERINA AUBERIANA D'Orbigny.

Plate 42, figs 3, 4.

Uvigerina auberiana D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 106, pl. 2, figs. 23, 24.

Description.—Test elongate, rapidly tapering from the narrow base to the greatest breadth somewhat above the middle; periphery lobulate; chambers inflated; sutures depressed, distinct; wall ornamented, closely set with fine spinose projections; the last-formed chamber somewhat smoother and of lessened diameter; apertural end tapering, with an elongate neck which is spinose, ending in a phialine lip.

Length up to 1 mm.

Distribution.—D'Orbigny described this species from shore sands of Cuba, Jamaica, and Martinique. Brady records it from south of Rockall Bank in 630 fathoms (1,152 meters). His figure, however, is not like the typical form of the species as developed in the West Indies. I have specimens which may be referred to this species from stations off the coast of the Lesser Antilles.

It is probable that the material from Abrohlos Bank off Brazil, of Brady, Parker, and Jones[77] is this species, the smoother form (fig. 5) possibly var. *laevis* Goës.

Uvigerina auberiana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17684	U.S.N.M.	1	D2117....	15 24 20 N.; 63 31 30 W..	683	39.8	yl. m., fne. s.	Rare.
17685	U.S.N.M.	1	D2752....	13 34 00 N.; 61 04 00 W..	281	48.0	bk. s.....	Rare.
17686	U.S.N.M.	2	D2754....	11 40 00 N; 58 33 00 W..	880	38.0	glob. oz.....	Rare.

UVIGERINA AUBERIANA D'Orbigny, var. LAEVIS Goës.

Uvigerina auberiana Goës (not D'Orbigny), Kongl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 60, pl. 4, figs. 71–74.

Uvigerina auberiana D'ORBIGNY, forma *laevis* Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 51.

Description.—Variety differing from the typical in the much smoother surface and often smaller and more slender form.

Distribution.—Goës had this form from the Caribbean, and I have what I think is the same from a few stations in the Gulf of Mexico and off the southeastern coast of the United States.

[77] Trans. Zool. Soc. London, vol. 12, 1888, pl. 45, fig. 4.

Uvigerina auberiana, var. laevis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17687	U.S.N.M.	1	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Rare.
17688	U.S.N.M.	4	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Few.
17689	U.S.N.M.	3	D2614....	34 09 00 N.; 76 02 00 W..	168	.....	gy. s., bk. sp.	Few.
17690	U.S.N.M.	1	D2668....	30 58 30 N.; 79 38 00 W..	294	39.3	gn. m.....	Rare.

UVIGERINA ACULEATA D'Orbigny.

Uvigerina aculeata D'Orbigny, Foram. Foss. Bass. Tert. Vienne, 1846, p. 191, pl. 11, figs. 27, 28.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 578, pl. 75, figs. 1, 2.—Wright, Ann. Mag. Nat. Hist., ser. 6, vol. 4, 1889, p. 449; Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.

The only Atlantic records referred to this species are as follows: East of Buenos Aires, 1,900 fathoms (3,475 meters) (H. B. Brady); and off the southwest coast of Ireland, 1,000 and 1,020 fathoms (1,829 and 1,866 meters) (Wright).

From the collections I have examined such forms as those figured by Brady have been seen only from the Indo-Pacific. Wright's remark of his specimens that "many of the specimens are intermediate between *U. aculeata* and *U. pygmaea*" would probably indicate that he had the species I have in this paper named *U. peregrina.*

UVIGERINA SEMICOSTATA, new species.

Plate 42, figs. 1, 2.

Description.—Test elongate, tapering, greatest breadth near the apertural end, initial end broadly rounded; chambers numerous, much inflated; sutures distinct and much depressed; wall ornamented in the adult with numerous short, low, rounded costae, beginning near the base of the chamber and extending up part of the way on its surface, the upper part of the chamber smooth and unornamented; aperture circular at the end of a short cylindrical neck with a phialine lip.

Length up to 0.70 mm.

Distribution.—Type-specimens (U.S.N.M. Cat. No. 17642) from *Albatross* station D2160, in 167 fathoms (305 meters), on the southwestern coast of Cuba.

This is distinct from the other species of the western Atlantic in the peculiar ornamentation of the very inflated chambers.

Uvigerina semicostata—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17642	U.S.N.M.	2	D2160....	23 10 31 N.; 82 20 37 W..	167	.....	co.....	Rare.

UVIGERINA FLINTII, new species.

Plate 42, fig. 13.

Uvigerina tenuistriata FLINT (not *U. tenuistriata* Reuss), Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 1.

Description.—Test somewhat elongate, not more than twice as long as broad, fusiform or oval; chambers rather obscure; sutures only slightly depressed and partially hidden by the ornamentation of the surface which consists of numerous very fine longitudinal costae only slightly raised above the general surface, the whole test thin and translucent, shining; apertural end slightly depressed, the apertural neck with its base in this hollow, the outer end with a flaring lip, the sides of the neck with two or three ringlike projections.

Length up to 0.65 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17639) from *Albatross* stations D2641, in 60 fathoms (110 meters), off Carysfort Light, Florida. It also occurred in typical form at other stations about southern Florida, one off the coast of Georgia and one in the Caribbean Sea off Yucatan.

This is a very distinctive species and is evidently limited to the warmer portions of the western Atlantic, unless, as is the case of other species, it may extend westward into the Indo-Pacific.

The whole appearance is distinctive, in the very slightly lobulate outline, the sunken neck, the plates of the outside of the neck, the shining, translucent character of the test, and the fine ornamenttation.

Flint has this species from this same station and referred it to *U. tenuistriata* Reuss. This is probably the species Goës figures and refers to *U. pygmaea.*[78]

Uvigerina flintii—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17636	U.S.N.M.	3	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s., bk. sp.	Few.
17637	U.S.N.M.	2	D2358....	20 19 00 N.; 87 03 30 W..	222	.....	fne. wh. co...	Rare.
17638	U.S.N.M.	9	D2639....	25 04 50 N.; 80 15 10 W..	56	.....	co. s.....	Common.
17639	U.S.N.M.	1	D2641....	25 11 30 N.; 80 10 00 W..	60	69.2	co. s.....	Frequent.
17640	U.S.N.M.	6	D2641....	.....	.....	.....	.....	.....
17641	U.S.N.M.	2	.....	Off Sand Key, Fla.....	72	.....	.....	Rare.

UVIGERINA PIGMEA D'Orbigny?

There are very numerous records under this name in various parts of the Atlantic, as well as for the rest of the world. A study of D'Orbigny's type figure and Modéle shows that his type was a fusi-

[78] Kongl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 59, pl. 4, figs. 68, 69; 70 [?].

form test with numerous, rather low, rounded costae, closely conforming to the contour of the chamber, the later chambers roughened but without costae. The types were fossils from the region of Sienna, Italy.

Except for the species here named *U. peregrina*, costate Uvigerinae from the Western Atlantic are very rare. I have scattered specimens from a few stations, none of which can be specifically identical with that of D'Orbigny. After reviewing specimens of costate forms from various parts of the present ocean and from the Tertiary, I am convinced that there are several distinct forms with definite distributions that have all been included at various times under this name of D'Orbigny.

UVIGERINA PEREGRINA, new species.

Plate 42, figs. 7–10.

Uvigerina pygmaea FLINT (not *U. pigmea* D'Orbigny), Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 2.

Description.—Test elongate, about 2½ times as long as broad, widest in the middle, ends rounded; chambers fairly numerous, inflated, distinct; sutures depressed but the line of the suture indistinct; wall ornamented with longitudinal costae, about 10 on a full-grown chamber, those of each chamber usually not continuous with those of adjacent chambers, high and very thin and sharp, toward the base and apertural ends of the test becoming broken up into spinose or irregular short portions; the wall between the costae and the costae themselves distinctly granular; aperture circular at the end of a distinct cylindrical neck, often spinose and with a phialine lip.

Length up to 0.85 mm.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17574) from *Albatross* station D2029, in 1,168 fathoms (2,136 meters), off the northeastern coast of the United States. This is a very common species in the cool waters of moderate depths off the northeastern coast of the United States, and at a very few stations just south of Cape Hatteras. It occurs in great numbers, making up a decidedly important proportion of the bottom material.

It is very different from typical *U. pigmea* D'Orbigny, as a reference to D'Orbigny's figure and model will show. Our species may be distinguished by the high plate-like costae, the very granular surface, even of the costae, spinose or broken plates at the apertural and initial ends, and the often spinose neck. It is represented further southward by the following variety.

Uvigerina peregrina—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17571	U.S.N.M.	3	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Few.
17572	U.S.N.M.	10+	D2018....	37 12 22 N.; 74 20 04 W..	788	39.0	bu. m.....	Abundant.
17573	U.S.N.M.	1	D2022....	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.....	Rare.
17574	U.S.N.M.	1	D2029....					
17575	U.S.N.M.	10+	D2029....	39 42 00 N.; 70 47 00 W..	1,168	38.5	gy. m.....	Abundant.
17576	U.S.N.M.	2	D2029....					
17577	U.S.N.M.	7	D2034....	39 27 10 N.; 69 56 20 W..	1,346	38.0	glob. oz.....	Frequent.
17578	U.S.N.M.	10+	D2035....	39 26 16 N.; 70 02 37 W..	1,362	.....	glob. oz.....	Abundant.
17579	U.S.N.M.	3	D2036....	38 52 40 N.; 69 24 40 W..	1,735	38.0	glob. oz.....	Few.
17580	U.S.N.M.	10+	D2037....	38 53 00 N.; 69 23 30 W..	1,731	38.0	glob. oz.....	Abundant.
17581	U.S.N.M.	1	D2039....	38 19 26 N.; 68 20 20 W..	2,369	.....	glob. oz.....	Rare.
17582	U.S.N.M.	10+	D2041....	39 22 50 N.; 68 25 00 W..	1,608	38.0	glob. oz.....	Abundant.
17583	U.S.N.M.	3	D2042....	39 33 00 N.; 68 26 45 W..	1,555	38.5	glob. oz.....	Few.
17584	U.S.N.M.	10+	D2043....	39 49 00 N.; 68 28 30 W..	1,467	38.5	glob. oz.....	Abundant.
17585	U.S.N.M.	3	D2048....	40 02 00 N.; 68 50 30 W..	547	29.0	ers. s., m., g.	Few.
17586	U.S.N.M.	10+	D2050....	39 42 50 N.; 69 21 20 W..	1,050	44.5	glob. oz.....	Abundant.
17587	U.S.N.M.	10+	D2052....	39 40 05 N.; 69 21 25 W..	1,098	45.0	glob. oz.....	Abundant.
17588	U.S.N.M.	10+	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., ers. g.....	Abundant.
17589	U.S.N.M.	6	D2073....	41 54 15 N.; 65 39 00 W..	587	40.0	gy. s.....	Frequent.
17590	U.S.N.M.	10+	D2076....	41 13 00 N.; 66 00 50 W..	906	.....	bu. m.....	Abundant.
17591	U.S.N.M.	1	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Rare.
17592	U.S.N.M.	6	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Frequent.
17593	U.S.N.M.	9	D2093....	39 42 50 N.; 71 01 20 W..	1,000	39.0	for., s., m...	Common.
17594	U.S.N.M.	10+	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Abundant.
17595	U.S.N.M.	10+	D2111....	35 09 50 N.; 74 57 40 W..	938	.....	gn. m.....	Abundant.
17596	U.S.N.M.	10	D2112....	35 30 50 N.; 75 18 00 W..	16	73.5	s., bk., sp...	Common.
17597	U.S.N.M.	6	D2172....	38 01 15 N.; 73 44 00 W..	568	39.0	gn. m.....	Frequent.
17598	U.S.N.M.	10+	D2184....	40 00 15 N.; 70 55 30 W..	136	48.9	gn. m., s....	Abundant.
17599	U.S.N.M.	10+	D2189....	39 49 30 N.; 70 26 00 W..	600	39.7	gn. m., s....	Abundant.
17600	U.S.N.M.	10+	D2192....	39 46 30 N.; 70 14 45 W..	1,060	38.6	gy. oz.....	Abundant.
17601	U.S.N.M.	2	D2196....	39 35 00 N.; 69 44 00 W..	1,230	38.0	gn. m.....	Rare.
17602	U.S.N.M.	10+	D2202....	39 38 00 N.; 71 39 45 W..	515	39.1	gn. m.....	Abundant.
17603	U.S.N.M.	10+	D2203....	39 34 15 N.; 71 41 15 W..	705	38.9	gn. m., s....	Abundant.
17604	U.S.N.M.	10+	D2204....	39 30 30 N.; 71 44 30 W..	728	39.1	br. m.....	Abundant.
17605	U.S.N.M.	10+	D2205....	39 35 00 N.; 71 18 45 W..	1,073	38.1	gy. oz.....	Abundant.
17606	U.S.N.M.	8	D2212....	39 59 30 N.; 70 30 45 W..	428	40.0	gn. m.....	Frequent.
17607	U.S.N.M.	1	D2219....	39 46 22 N.; 69 29 00 W..	948	38.8	gy. m.....	Rare.
17608	U.S.N.M.	10+	D2231....	38 29 00 N.; 73 09 00 W..	965	36.8	gy. oz.....	Abundant.
17609	U.S.N.M.	2	D2313....	32 53 00 N.; 77 53 00 W..	99	57.2	ers. s., bk. sp.	Rare.
17610	U.S.N.M.	3	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Few.
17611	U.S.N.M.	10+	D2530....	40 53 30 N.; 66 24 00 W..	956	38.4	gy. oz.....	Abundant.
17612	U.S.N.M.	7	D2531....	40 42 00 N.; 66 33 00 W..	852	38.4	gy. m.....	Frequent.
17613	U.S.N.M.	10+	D2534....	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.....	Abundant.
17614	U.S.N.M.	10+	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.....	Abundant.
17615	U.S.N.M.	3	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh..	Few.
17616	U.S.N.M.	3	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Few.
17617	U.S.N.M.	10+	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Abundant.
17618	U.S.N.M.	10+	D2562....	39 15 30 N.; 71 25 00 W..	1,434	37.3	gy. oz.....	Abundant.
17619	U.S.N.M.	8	D2563....	39 18 30 N.; 71 23 30 W..	1,422	37.4	gy. oz.....	Frequent.
17620	U.S.N.M.	10+	D2564....	39 22 00 N.; 71 23 30 W..	1,390	37.3	gy. oz.....	Abundant.
17621	U.S.N.M.	10+	D2581....	39 43 00 N.; 71 34 00 W..	394	.....	gn. m.....	Abundant.
17622	U.S.N.M.	10+	D2584....	39 05 30 N.; 72 23 20 W..	541	39.5	gy. m.....	Abundant.
17623	U.S.N.M.	1	D2586....	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m...	Rare.
17624	U.S.N.M.	10+	D2677....	32 39 00 N.; 76 50 00 W..	478	39.3	gn. m.....	Abundant.
17625	U.S.N.M.	10	D2679....	32 40 00 N.; 76 40 00 W..	782	38.6	lt. gy. oz....	Common.
17626	U.S.N.M.	10+	D2680....	39 50 00 N.; 70 26 00 W..	555	.....	.....	Abundant.
17627	U.S.N.M.	10	D2682....	39 38 00 N.; 70 22 00 W..	990	.....	gn. m.....	Common.
17628	U.S.N.M.	10+	D2684....	39 35 00 N.; 70 54 00 W..	1,106	.....	br. e., bk. sp.	Abundant.
17629	U.S.N.M.	10+	D2689....	39 42 00 N.; 71 15 30 W..	525	.....	gn. m.....	Abundant.
17630	U.S.N.M.	10+	D2705....	42 47 00 N.; 61 04 00 W..	1,255	.....	lt. br. oz....	Abundant.
17631	U.S.N.M.	10+	D2706....	41 28 30 N.; 65 35 30 W..	1,188	.....	gy. oz., for..	Abundant.
17632	U.S.N.M.	10+	D2710....	40 06 00 N.; 68 01 00 W..	984	.....	gn. m.....	Abundant.
17633	U.S.N.M.	10	D2721....	38 56 00 N.; 72 11 30 W..	813	.....	gy. oz.....	Common.
17634	U.S.N.M.	4	D2740....	37 40 00 N.; 73 50 00 W..	1,011	38.0	br. oz.....	Few.
17635	U.S.N.M.	10+	D2748....	39 31 00 N.; 71 14 30 W..	1,163	37.8	gy. m., for..	Abundant.

UVIGERINA PEREGRINA, new species, var. BRADYANA, new variety.

Plate 42, fig. 12.

Description.—Variety differing from the typical in the more elongate and slender test, the much lower costae, and the less coarsely punctate test.

Length up to 1 mm. or slightly more.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17465) from *Albatross* station D2568, in 1781 fathoms (3257 meters), off the northeastern coast of the United States. The same variety has occurred at several other stations in the same region but not elsewhere.

This is distinct from the typical form and might be referred by some authors to *U. tenuistriata.* In the *Challenger* Summary of Results volume, *U. tenuistriata* is recorded from off Bermuda and off the northeastern coast of the United States, and these records may be our variety.

Uvigerina peregrina, var. bradyana—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17643	U.S.N.M.	6	D2105....	37 50 00 N.; 73 03 50 W..	1,395	41.0	glob. oz.....	Frequent.
17644	U.S.N.M.	10+	D2194....	39 43 45 N.; 70 07 00 W..	1,140	38.4	oz.....	Abundant.
17645	U.S.N.M.	1	D2568....	39 15 00 N.; 68 08 00 W..	1,781	36.9	gy. oz.....	Few.
17646	U.S.N.M.	3	D2568....	.....	.....	.....	.....	.....
17647	U.S.N.M.	4	D2572....	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.....	Few.
17648	U.S.N.M.	9	D2573....	40 34 18 N.; 66 09 00 W..	1,742	37.3	gy. m., s....	Common.
17649	U.S.N.M.	3	D2585....	39 08 30 N.; 72 17 00 W..	542	39.0	dk. gy. m...	Few.
17650	U.S.N.M.	1	D2586....	39 02 40 N.; 72 40 00 W..	328	40.2	dk. gy. m...	Rare.

UVIGERINA PEREGRINA, new species, var. PARVULA, new variety.

Plate 42, fig. 11.

Description.—Variety differing from the typical in the usually smaller size, the more inflated and remote character of the last chamber, and the shorter stouter form of the whole test.

Distribution.—Type-specimen (U.S.N.M. Cat. No. 17666) from *Albatross* station D2400, in 169 fathoms (309 meters), in the northern part of the Gulf of Mexico. The variety also occurs at several other stations in the same vicinity, near Cuba, off Central America in the Caribbean, and off the southeastern coast of Brazil with one station on the southeastern coast of the United States.

It is possible that the species figured by Brady, Parker, and Jones[79] may belong here. The *Albatross* material from the Brazilian coast is larger than that from the Gulf of Mexico.

[79] Trans. Zool. Soc., London, vol. 12, 1888, pl. 45, fig. 2.

Uvigerina peregrina, var. parvula—material examined.

Cat. No.	Coll. of—	No. of speci-mens.	Station.	Locality.	Depth in fath-oms.	Bot-tom tem-pera-ture.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17651	U.S.N.M.	10+	D2144....	9 49 00 N.; 79 31 30 W..	896	.....	gn. m.....	Abundant.
17652	U.S.N.M.	7	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Frequent.
17653	U.S.N.M.	4	D2160....	23 10 31 N.; 82 20 37 W..	167	.....	co.....	Few.
17654	U.S.N.M.	10+	D2335....	23 10 39 N.; 82 20 21 W..	204	.....	.....	Abundant.
17655	U.S.N.M.	1	D2339....	23 10 40 N.; 82 20 15 W..	191	.....	co.....	Rare.
17656	U.S.N.M.	10+	D2377....	29 07 30 N.; 88 08 00 W..	210	67.0	gy. m.....	Abundant.
17657	U.S.N.M.	4	D2383....	28 32 00 N.; 88 06 00 W..	1,181	39.6	br. gn. m....	Few.
17658	U.S.N.M.	2	D2385....	28 51 00 N.; 88 18 00 W..	730	40.1	gy. m.....	Rare.
17659	U.S.N.M.	5	D2392....	28 47 30 N.; 87 27 00 W..	724	40.7	br. gn. m....	Few.
17660	U.S.N.M.	6	D2393....	28 43 00 N.; 87 14 30 W..	525	41.1	lt. gy. m....	Frequent.
17661	U.S.N.M.	10+	D2394....	28 38 30 N.; 87 02 00 W..	420	41.8	gn. m.....	Abundant.
17662	U.S.N.M.	10+	D2395....	28 36 15 N.; 86 50 00 W..	347	44.1	gy. m.....	Abundant.
17663	U.S.N.M.	1	D2396....	28 34 00 N.; 86 48 00 W..	335	.....	gy. m.....	Rare.
17664	U.S.N.M.	10+	D2398....	28 45 00 N.; 86 26 00 W..	227	48.6	gy. m.....	Abundant.
17665	U.S.N.M.	5	D2399....	28 44 00 N.; 86 18 00 W..	196	51.6	gy. m.....	Few.
17666	U.S.N.M.	2	D2400....	28 41 00 N.; 86 07 00 W..	169	.....	gy. m.....	Abundant.
17667	U.S.N.M.	10+	D2400....					
17668	U.S.N.M.	1	D2405....	28 45 00 N.; 85 02 00 W..	30	.....	gy. s., brk. sh	Rare.
17669	U.S.N.M.	1	D2678....	32 40 00 N.; 76 40 30 W..	731	38.7	lt. gy. oz....	Rare.
17670	U.S.N.M.	4	D2760....	12 07 00 S.; 37 17 00 W..	1,019	39.5	br. co.....	Few.
17671	U.S.N.M.	3	D2761....	15 39 00 S.; 38 32 54 W..	818	39.0	pter. oz.....	Few.
17672	U.S.N.M.	10+	D2763....	24 17 00 S.; 42 48 30 W..	671	37.9	glob. oz.....	Abundant.

UVIGERINA PORRECTA H. B. Brady.

Uvigerina porrecta H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 60, pl. 8, figs. 15, 16; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 577, pl. 74, figs. 21–23.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 218.

One of the *Challenger* stations given for this species is off Bermuda, 435 fathoms (796 meters). The others are in the Pacific. Earland records it as very rare at Bognor, Sussex, England. There seem to be no other Atlantic records. I have failed to find it in the western Atlantic, even in the tropical portion, and it seems that the specimens recorded from the Atlantic should be reexamined to see if they are really the same as the species characteristic of the Indo-Pacific.

UVIGERINA OCCIDENTALIS, new species.

Uvigerina angulosa Cushman, Publ. 311, Carnegie Inst. Washington, 1922, p. 34, pl. 5, figs. 3, 4.

Description.—Test minute, elongate, triangular in transverse section, the periphery somewhat lobulate; chambers distinct, those of the last-formed portion becoming more distinct and remote; sutures distinct and depressed; wall ornamented with comparatively large, high costae on all the chambers except the last ones in the adult, apertural end drawn out into a tubular neck with a slight phialine lip.

Length not exceeding 0.50 mm.

Distribution.—Type-specimen from the Tortugas region. It has also occurred at several *Albatross* stations, ranging from the eastern

angle of South America into the Caribbean and Gulf of Mexico, one south of Cape Hatteras, and another south of the latitude of New York.

It is evidently a species with a southern range and occurring in warm waters. It may also be found to extend to the Indo-Pacific where *Uvigerina angulosa* has been recorded. The last-formed chambers in their loose arrangement, the rather coarse costae, the small size and thin hyaline test, will distinguish it from either the typical British *U. angulosa*, or the western Atlantic form of that species. It is probably the same as that I have recorded from the Pleistocene of Panama[80] and from the Pliocene, Waccamaw formation on Waccamaw River, South Carolina.[81] It resembles the Pacific collections I have had from off Hawaii and elsewhere.[82]

Uvigerina occidentalis—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17673	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W..	382	45.8	wh. crs. s....	Rare.
17674	U.S.N.M.	1	D2311....	32 55 00 N.; 77 54 00 W..	79	59.1	crs. s., bk. sp	Rare.
17675	U.S.N.M.	3	D2378....	29 14 30 N.; 88 09 30 W..	68	.....	gy. m.....	Few.
17676	U.S.N.M.	3	D2684....	39 35 00 N.; 70 54 00 W..	1,106	.....	br. c., bk. sp.	Few.
17677	U.S.N.M.	3	D2756....	3 22 00 S.; 37 49 00 W..	417	40.5	gy. spk.....	Few.

UVIGERINA ANGULOSA Williamson.

Plate 41, figs. 17–20.

Uvigerina angulosa Williamson, Rec. Foram. Great Britain, 1858, p. 67, pl. 5, fig. 140.—Seguenza, Atti Accad. Lincei, ser. 3, vol. 6, 1879, pp. 226, 307.—Bütschli, in Bronn, Klassen und Ordnungen Thier-Reichs, vol. 1, 1880, p. 200, pl. 7, fig. 31.—Balkwill and Wright, Proc. Roy. Irish Acad., ser. 2, vol. 3, 1882, p. 549.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 576, pl. 74, figs. 15–18.—Balkwill and Wright, Trans. Roy. Irish Acad., vol. 28, 1885, p. 347.—H. B. Brady, Journ. Roy. Micr. Soc., 1887, p. 915.—Wright, Ann. Mag. Nat. Hist., vol. 4, ser. 6, 1889, p. 449.—Pearcey, Trans. Glasgow Nat. Hist. Soc., vol. 2, 1890, p. 178.—Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 487.—Robertson, Trans. Roy. Hist. Soc. Glasgow, vol. 3, pt. 3, 1892, p. 241.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 314, pl. 9, figs. 40, 46, 47.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 51, pl. 9, figs. 502–509.—Schlumberger, Mem. Soc. Zool. France, vol. 7, 1894, p. 253.—Jones, Pal. Soc., 1895, p. 277, pl. 7, fig. 26.—Chapman, Proc. Zool. Soc. London, 1895, p. 35.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 3.—Wright, Irish Nat., vol. 9, No. 3, 1900, p. 55.—Liebus, Neues Jahrb.

[80] Amer. Geologist, vol. 33, 1904, p. 266.
[81] Bull. 676, U. S. Geological Survey, 1918, p. 10.
[82] Bull. 71, U. S. Nat. Mus., pt. 3, 1913, pl. 4, fig. 4.

für Min., vol. 1, 1901, p. 120, pl. 5, fig. 3.—Whiteaves, Geol. Survey Canada, 1901, p. 10.—Chapman, Journ. Linn. Soc. Zoology, vol. 28, 1902, p. 403.—Millett, Journ. Roy. Micr. Soc., 1903, p. 269.—Earland, Journ. Quekett Micr. Club, ser. 2, vol. 9, 1905, p. 218.—Chapman, Journ. Quekett Micr. Club, ser. 2, vol. 10, 1907, p. 132, pl. 10, fig. 5.—Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1907, p. 436.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 52, No. 13, 1908, p. 1, pl. 1, fig. 4.—Chapman, Subantarctic Ids. New Zealand, 1909, p. 349; Proc. Roy. Soc. Victoria, vol. 22, new series, pt. 2, 1910, p. 281.—Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 54, No. 16, 1910, p. 23.—Chapman, Journ. Linn. Soc. Zoology, vol. 30, 1910, p. 414.—Bagg, Bull. 513, U. S. Geol. Survey, 1912, p. 75, pl. 22, figs. 2 *a–f*.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 104.—Pearcey, Trans. Roy. Soc. Edinb., vol. 49, 1914, p. 1024.—Chapman, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 25.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 676; Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 266; Journ. Roy. Micr. Soc., 1916, p. 49.—Chapman, Rep. Sci. Invest., 1916, (1917), pp. 32, 44, 67, pl. 3, fig. 22.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 147.

Uvigerina angularis Mestayer, Trans. New Zealand Inst., vol. 48, 1916, p. 129.

Uvigerina pygmaea d'Orbigny, var. *angulosa* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 374, pl. 13, fig. 58; pl. 17, fig. 66.

Description.—Test elongate, tapering toward either end, composed of numerous chambers, three making each whorl; chambers compressed at two sides, making a decided angle in the middle and making up a trifacial test, triangular in end view and section; wall more or less costate, usually the costae numerous and distinct; aperture with a short tubular neck and with a phialine lip usually more developed on the outer side.

Length up to 1 mm.

Distribution.—From the above synonymy it will be seen that this species is apparently very widely distributed. Just how many of the above references are to typical material it is impossible, without a study of the originals, to really determine. In the Atlantic the species is well developed and characteristic of the comparatively shallow waters of western Europe. On the western side of the Atlantic it is well developed and abundant only on the northeastern coast of the United States, with scattered records in the colder waters nearly as far south as Cape Hatteras. It is most abundant in waters of 100–300 fathoms (183–549 meters) off the New England coast, and to or beyond the Grand Banks. It is a thick-walled form with somewhat rounded angles, differing in these particulars from European material.

The species is replaced in the warm tropical waters of the Gulf of Mexico and Caribbean by another species, as it is in the Tertiary of the Coastal Plain of the southeastern United States. It is

to be suspected that many of the records from various parts of the world when carefully compared with typical material from western Europe will be found to be different.

The form originally described by Brady as *U. spinipes* H. B. Brady and later referred to *U. angulosa* as a variety, has not been found in the Atlantic and is evidently a distinct Pacific species.

Uvigerina angulosa—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17544	U.S.N.M.	1	D2003....	37 16 30 N.; 74 20 36 W..	641	.....	.....	Rare.
17545	U.S.N.M.	1	D2022....	37 32 00 N.; 74 13 20 W..	487	40.0	bu. m.....	Rare.
17546	U.S.N.M.	3	D2048....	40 02 00 N.; 68 50 30 W..	547	29.0	crs. s., m. & g.	Few.
17547	U.S.N.M.	10	D2063....	42 23 00 N.; 66 23 00 W..	141	46.0	s., crs. g.....	Common.
17548	U.S.N.M.	10+	D2078....	41 11 30 N.; 66 12 20 W..	499	40.0	gy. m., s....	Abundant.
17549	U.S.N.M.	2	D2084....	40 16 50 N.; 67 05 15 W..	1,290	40.0	bu. m., s....	Rare.
17550	U.S.N.M.	1	D2244....	40 05 15 N.; 70 23 00 W..	67	52.9	gn. m.....	Rare.
17551	U.S.N.M.	2	D2247....	40 03 00 N.; 69 57 00 W..	67	52.4	gn. m., bk. sp.	Rare.
17552	U.S.N.M.	10+	D2262....	30 43 34 N.; 69 29 45 W..	250	41.6	gn. m., s....	Abundant.
17553	U.S.N.M.	2	D2265....	37 07 40 N.; 74 35 40 W..	70	57.9	gn. m., g....	Rare.
17554	U.S.N.M.	1	D2335....	23 10 39 N.; 82 20 21 W..	204	.....	.....	Rare.
17555	U.S.N.M.	1	D2425....	36 20 24 N.; 76 46 30 W..	119	51.5	dk. gy. m., fine. s.	Rare.
17556	U.S.N.M.	9	D2525....	41 49 00 N.; 65 49 30 W..	72	43.6	s., g., brk. sh.	Common.
17557	U.S.N.M.	10+	D2528....	41 47 00 N.; 65 37 30 W..	677	38.7	br. s.....	Abundant.
17558	U.S.N.M.	10+	D2534....	40 01 00 N.; 67 29 15 W..	1,234	37.8	gy. oz.....	Abundant.
17559	U.S.N.M.	1	D2535....	40 03 30 N.; 67 27 15 W..	1,149	37.8	gy. oz.....	Rare.
17560	U.S.N.M.	10	D2539....	39 59 45 N.; 70 53 00 W..	133	47.7	gn. s.....	Common.
17561	U.S.N.M.	10+	D2542....	40 00 15 N.; 70 42 20 W..	129	47.2	s., brk. sh...	Abundant.
17562	U.S.N.M.	10	D2552....	39 47 07 N.; 70 35 00 W..	721	39.6	gy. oz.....	Common.
17563	U.S.N.M.	1	D2555....	39 53 00 N.; 71 32 00 W..	136	47.7	gn. m., s....	Rare.
17564	U.S.N.M.	1	D2570....	39 54 00 N.; 67 05 30 W..	1,813	36.8	glob. oz.....	Rare.
17565	U.S.N.M.	6	D2572....	40 29 00 N.; 66 04 00 W..	1,769	37.8	gy. oz.....	Few.
17566	U.S.N.M.	10+	D2696....	46 50 30 N.; 45 05 30 W..	98	.....	gy. s., bk. sp.	Abundant.
17567	U.S.N.M.	3	D2705....	42 47 00 N.; 61 04 00 W..	1,255	.....	lt. br. oz.....	Few.
17568	U.S.N.M.	10+	D2706....	41 28 30 N.; 65 35 30 W..	1,188	.....	gy. oz.. for...	Abundant.
17569	U.S.N.M.	1	*Fish Hawk* 1108.	.....	.....	.....	.....	Rare.
17570	U.S.N.M.	3	*Fish Hawk* 1110.	.....	.....	.....	.....	Few.
17543	U.S.N.M.	4	.....	10 miles northwest of Peel, Isle of Man.	60	.....	.....	Few.
.....	J.A.C....	5	.....	Coast of Iceland.....	.....	.....	.....	Frequent.

UVIGERINA ASPERULA Czjzek.

There are numerous records for the Atlantic under this name. Those from the western Pacific as far as I have seen material, should be referred to *U. auberiana* D'Orbigny.

Genus SIPHOGENERINA Schlumberger, 1883.

Saarina Parker and Jones (not D'Orbigny), Philos. Trans., vol. 155, 1865, p. 363.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 580.—Chapman, The Foraminifera, 1902, p. 201.

Dimorphina Schwager (not D'Orbigny), *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 251.

Siphogenerina Schlumberger (type, *S. raphanus* (Parker and Jones)), Feuille des Jeunes Naturalistes, ann. 13, 1883, p. 117.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 104.

Description.—Test elongate, composed at least in the microspheric form of a series of chambers arranged tri- or bi-serially, followed by a later uniserial development; walls hyaline and perforate; aperture in the uniserial portion central and terminal, usually with an elongated neck and flaring lip; interior of the chamber with a tubular connection running from the base of the apertural neck to the lip of the aperture below; wall smooth or ornamented by costae, pits, etc.

Both microspheric and megalospheric forms occur in the various species of this genus. In the microspheric form the early chambers are biserial or triserial, and there is usually a considerable number of them before the adult uniserial development takes place. In the megalospheric form the uniserial condition is taken on much earlier, after only a few of the triserial or biserial chambers are developed.

The genus seems to be limited to the Tertiary, and in the present oceans is best developed in tropical waters under 500 fathoms (914 meters) in depth.

SIPHOGENERINA ADVENA Cushman.

Plate 42, fig. 15.

Siphogenerina advena CUSHMAN, Publ. 311, Carnegie Inst. Washington, 1922, p. 35, pl. 5, fig. 2.

Description.—Test elongate, somewhat compressed, early portion either triserial or biserial, later portion, which makes up the larger portion of the test, uniserial; chambers numerous, distinct, inflated; sutures somewhat depressed, the early portion and a part of the uniserial portion with fine, longitudinal costae, more or less broken, followed by two or three chambers slightly spinose, after which the remaining chambers are smooth and very finely punctate; aperture elliptical, each one connecting with the preceding by an internal funnel-shaped tube.

Length up to 0.65 mm.

Distribution.—This species which was found to be common in the Tortugas region of southern Florida has occurred at two stations in the *Albatross* Atlantic collections. One of them is in the western part of the Caribbean off Central America, the other off the Carolina coast. This is the general distribution of many species that extend throughout the West Indian region and along the coast of South America so that this species probably occurs widely distributed in this general region.

Goës in 1896 [83] gave a new name *Sagrina pygmaea* Goës to a small species recorded by him from the Caribbean in 300 fathoms (549 meters). This was originally figured as "*Textularia Pennatula*, var. *aculeata* forma *Bigenerina*." [84] Goës's figure does not show the

[83] Bull. Mus. Comp. Zoöl., vol. 29, p. 51.

[84] Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, no. 4, 1882, p. 79, pl. 5, figs. 165, 166.

ornamental character of this species nor does his description give an adequate opportunity to make the identity of the two certain.

Siphogenerina advena—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17453	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W...	382	45.8	wh. crs. s....	Rare.
17454	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W...	168	.....	gy. s., bk. sp.	Rare.

SIPHOGENERINA RAPHANUS (Parker and Jones).

Plate 42, fig. 14.

Uvigerina (*Sagrina*) *raphanus* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 364, pl. 18, figs. 16, 17.

Sagrina raphanus H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 585, pl. 75, figs. 21–24.—CHAPMAN, Journ. Linn. Soc., vol. 28, 1900, p. 187; The Foraminifera, 1902, p. 403.—MILLETT, Journ. Roy. Micr. Soc., 1903, p. 272.—DAKIN, Rep. Ceylon Pearl Oyster Fish., vol. 5, 1906, p. 236, pl., fig. 11.—CHAPMAN, Journ. Linn. Soc. Zoology, vol. 30, 1910, p. 415.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 677.—SIDEBOTTOM, Jour. Roy. Micr. Soc., 1918, p. 148.

Siphogenerina (*Sagrina*) *raphanus* EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 317, pl. 9, fig. 36.

Siphogenerina raphanus CUSHMAN, Bull. 71, U.S. Nat. Mus., pt. 3, 1913, p. 108, pl. 46, figs. 1–5; Bull. 100, U.S. Nat. Mus., vol. 4, 1921, p. 280, pl. 56, fig. 7; Publ. 311, Carnegie Inst. Washington, 1922, p. 35, pl. 5, fig. 5.

Siphogenerina costata SCHLUMBERGER, Feuille des Jeunes Naturalists, ann. 13, 1883, p. 118, fig. 13.

Description.—Test elongate, cylindrical, or tapering; chambers of the uniserial portion broader than long; surface marked by several rather widely separated, well-developed costae, each extending nearly the length of the test and not affected by the sutures; aperture typically with a short tubular neck and well-developed flaring lip.

Length up to 1 mm.

Distribution.—There are published Atlantic records for this species as follows: "shore sands, Bermuda, West Indies, Panama" (H. B. Brady); Tortugas region (Cushman). There is a single specimen in the *Albatross* collections from D2150, in the Carribbean off Central America. The species is much more common in the Indo-Pacific.

It is one of the species which occurs as far westward as the Kerimba Archipelago off southeastern Africa; Ceylon, as far north as Southern Japan, thence across to Hawaii and Samoa, finally appearing in the tropical western Atlantic.

Siphogenerina raphanus—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
17455	U.S.N.M.	1	D2150....	° ′ ″ ° ′ ″ 13 34 45 N.; 81 21 10 W...	382	°F. 45.8	wh. crs. s....	Rare.

SIPHOGENERINA DIMORPHA (Parker and Jones).

Plate 42, figs. 16–18.

Uvigerina (*Sagrina*) *dimorpha* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 420, pl. 18, fig. 18.

Sagrina dimorpha H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 582, pl. 76, figs. 1–3; Journ. Roy. Micr. Soc., 1887, p. 915.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc. London, vol. 12, 1888, p. 225, pl. 45, fig. 6.—GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 52, pl. 9, figs. 510, 511.—BAGG, Bull. U. S. Nat. Mus., vol. 34, 1908, p. 152.—HERON-ALLEN and EARLAND, Trans. Linn. Soc. London, ser. 2, vol. 11, 1916, p. 266.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 148.

Siphogenerina dimorpha EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 317, pl. 9, fig. 30.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 106, pl. 45, figs. 3, 4; Bull. 100, U. S. Nat. Mus., vol. 4, 1921, p. 279, pl. 56, fig. 8.

Description.—Test either somewhat compressed or nearly cylindrical, very slightly tapering from the somewhat rounded initial end to the greatest width near the apertural end; chambers comparatively few, rather broader than high, slightly inflated; sutures distinct, the basal portion of the last few chambers somewhat excavated and tending to bridge the sutures between the excavations at regular intervals; wall with a coarsely pitted surface; aperture circular, terminal, at the end of a short neck, usually with a distinctly phialine lip.

Length of Atlantic specimens not over 0.60 mm.

Distribution.—This is a widely distributed species, although, as will be noted later, there may be more than one variety. The original stations given by Parker and Jones are Red Sea (near the Isle of Shadwan) at 372 fathoms (681 meters); Abrohlos Bank, 260 fathoms (476 meters); Australian Coral-reefs, 17 fathoms (31 meters). Brady gives the following notes as to its distribution, in the *Challenger* report:

The geographical area inhabited by *Sagrina dimorpha* is wider than that of any other species of the same genus. It extends as far north as Bukken and Oster Fiords, near Bergen, Norway (Norman); and a single specimen from the Scottish coast is reported by Mr. Robertson. It has been further noticed in the North Atlantic, off Gomera, Canaries, 620 fathoms (1,134 meters); and off Culebra Island, West Indies, 390 fathoms (713 meters); in the South Atlantic, off Ascension, 420 fathoms (768 meters); and on the

Abrohlos Bank, 260 fathoms (476 meters) (Parker and Jones), in the Red Sea, 580 fathoms (1,061 meters); in the Southern Ocean, off Prince Edward Island, 50 to 150 fathoms (91 to 274 meters); and in the South Pacific, off Tahiti, 420 fathoms and 620 fathoms (768 meters and 1,134 meters); off Ki Islands, 580 fathoms (1,061 meters); and off Kandavu, Fiji, 255 fathoms (460 meters).

He later in 1887 records it from shallow water off the coast of the British Isles. It is also recorded in the Atlantic from the Norwegian Sea (Goës) and off the west of Scotland (Heron-Allen and Earland). Sidebottom records it from the east coast of Australia in 465 fathoms (850 meters), Bagg from off the Hawaiian Islands, and I have recorded several stations in the Western Pacific. The *Albatross* collections show it to be present at five stations, one off the coast of Georgia, one between Cuba and Yucatan, and three in the Caribbean. These, as the table shows, are in considerable depths.

This shows a very wide distribution for this species. A study of the Atlantic specimens and a comparison of them with the other material available shows the following results. Our *Albatross* specimens from the Atlantic seem to be more compressed, the uniserial portion smaller in comparison and of fewer chambers, and the reëntrants of the basal portion of the chambers reduced or wanting. The original figures of Parker and Jones show this character and not that of the Pacific specimens. One of the original stations of Parker and Jones was the Abrohlos Bank and it is to be suspected that the figured type specimen came from this locality. This is more strongly indicated by a comparison of this type figure with that given in 1888 from the Abrohlos Bank. The two strongly suggest that both figures may have been drawn from the same specimen. The figure given by Goës in 1894 from the Atlantic is also of this form. Brady's figures and mine from the Pacific have the cylindrical form, the greater proportion of the uniserial development, and the deeply incised ventral border to the chambers. This suggests, therefore, that there is a varietal form in the Pacific.

Siphogenerina dimorpha—material examined.

Cat. No.	Coll. of—	No. of specimens.	Station.	Locality.	Depth in fathoms.	Bottom temperature.	Character of bottom.	Abundance.
				° ′ ″ ° ′ ″		°F.		
17437	U.S.N.M.	1	D2150....	13 34 45 N.; 81 21 10 W...	382	45.8	wh. crs. s....	Rare.
17438	U.S.N.M.	1	D2355....	20 56 48 N.; 86 27 00 W...	399	.....	yl. oz.....	Rare.
17439	U.S.N.M.	1	D2614....	34 09 00 N.; 76 02 00 W...	168	.....	gy. s., bk. sp.	Rare.
17440	U.S.N.M.	1	H59.....	17 42 10 N.; 65 39 40 W...	789	.....	oz. for.....	Rare.
17441	U.S.N.M.	1	H79.....	14 20 30 N.; 63 10 00 W...	821	.....	co. s., sh. for.	Rare.

Subfamily 5. RAMULININAE.

Test composed of branching tubular masses with rounded chamber-like portions at irregular intervals.

Genus RAMULINA Rupert-Jones, 1875.

Ramulina RUPERT-JONES (type, *R. laevis* Rupert-Jones) in Wright, Rep. Proc. Belfast Nat. Field Club, 1873–1874, App. III, 1875, p. 88 (90).—CHAPMAN, The Foraminifera, 1902, p. 201.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 110.

Description.—Test free, branching, consisting of more or less rounded chambers connected by long stoloniferous tubes; wall hyaline.

This genus includes rather ill-defined forms, suggesting the so-called "wild growth" seen in the final chambers of certain species of *Polymorphina*. Just what its relations are to the rest of the Lagenidae is not really determined. It seems to occur in the Jurassic and there are one or two recent species.

RAMULINA PROTEIFORMIS Flint.

Ramulina proteiformis FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 321, pl. 68, fig. 7.

Description.—Test calcareous, extremely thin and fragile, very finely perforated; surface smooth; in form very irregular and variable, sometimes branching, sometimes with more or less numerous short digital processes, imperfectly segmented, the segments inflated into a great variety of shapes.

Distribution.—I have seen the specimens which Flint had of this species from the Gulf of Mexico, but have no additional stations for the species.

RAMULINA GLOBULIFERA H. B. Brady.

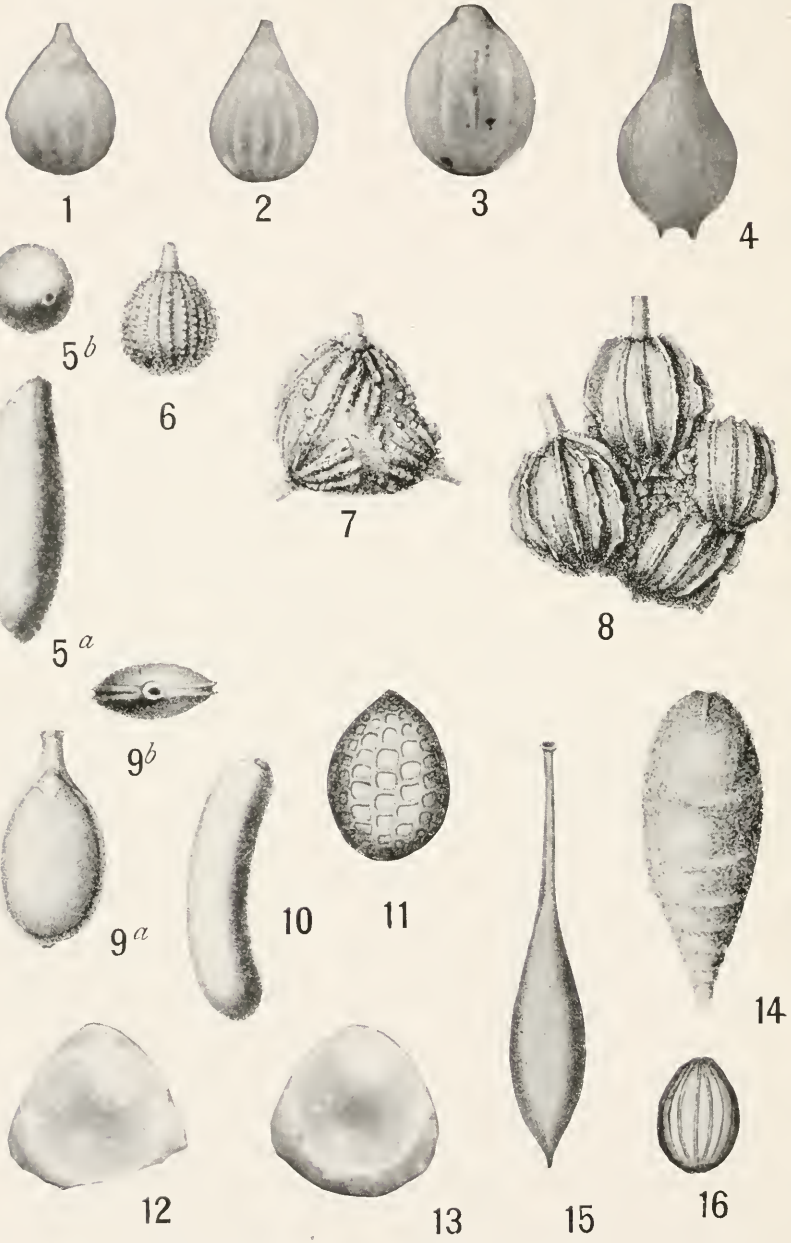
Ramulina globulifera H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 58, pl. 8, figs. 32, 33; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 587, pl. 76, figs. 22–28; Journ. Roy. Micr. Soc., 1887, p. 915.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 310, pl. 9, fig. 62.—DE AMICIS, Naturalista Siciliano, ann. 14, 1895, p. 112, pl. 1, fig. 14.—CHAPMAN, Proc. Zool. Soc. London, 1895, p. 36; Journ. Roy. Micr. Soc., 1896, p. 582, pl. 12, figs. 3–6.—JONES and CHAPMAN, Journ. Linn. Soc. Zool., vol. 26, 1897, p. 340, figs. 5–22.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 21, 1899, p. 135, pl. 2, fig. 2; pl. 22, fig. 33.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 321, pl. 68, fig. 6.—MILLETT, Journ. Roy. Micr. Soc., 1903, p. 274.—BENHAM, Trans. New Zealand Inst., vol. 37, 1904 (1905), p. 300.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905 (1906), p. 99.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 110, pl. 39, fig. 1.—MESTAYER, Trans. New Zealand Inst., vol. 48, 1916, p. 129.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 149.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 620.

Description.—Test free, branching, composed of nearly globular chambers connected by stolon-like tubes; wall hyaline, usually hispid; apertures tubular, often several to a single chamber.

Length up to nearly 2 mm.

Distribution.—There are several records for this species in the Atlantic, but I have not found any material which I could refer to it.

56148—23——14



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 179.

EXPLANATION OF PLATES.

Plate 1.

Figs. 1, 2. *Lagena acuticosta*. ×50. Front views. D2395.

3. *Lagena acuticosta*. ×50. Front view. In 8 fathoms, off Cape Porpoise, Maine.

4. *Lagena adrena*. ×50. Front views. D2150.

5. *Lagena apiculata*. ×75. *a*, front view; *b*, apertural view. After H. B. Brady.

6–8. *Lagena aspera*. ×100. Figures 7 and 8, abnormal specimens. After Balkwill and Wright.

9. *Lagena bicarinata*. ×100. *a*, front view; *b*, apertural view. After Balkwill and Wright.

10. *Lagena botelliformis*. ×75. After H. B. Brady.

11. *Lagena catenulata*. After Williamson.

12, 13. *Lagena castanea*. ×50. Front views. D2144.

14. *Lagena chrysalis*. ×120. After Heron-Allen and Earland.

15. *Lagena clavata*. After Williamson.

16. *Lagena costata*. After Williamson.

Plate 2.

Fig. 1. *Lagena costata*. ×100. *a*, front view; *b*, apertural view. After Balkwill and Wright.

2. *Lagena costata*. ×100. Bilocular specimen. After Balkwill and Wright.

3, 4. *Lagena crenata*. ×100. "Typical form." Figure 3, "specimen with very few crenations." After Balkwill and Wright.

5–7. *Lagena curvilineata*. ×100. After Balkwill and Wright.

8. *Lagena curvilineata*. ×100. *a* and *b*, opposite sides of same specimen. After Balkwill and Wright.

9. *Lagena curvilineata*. ×75. After Heron-Allen and Earland.

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1*a*

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8*b*

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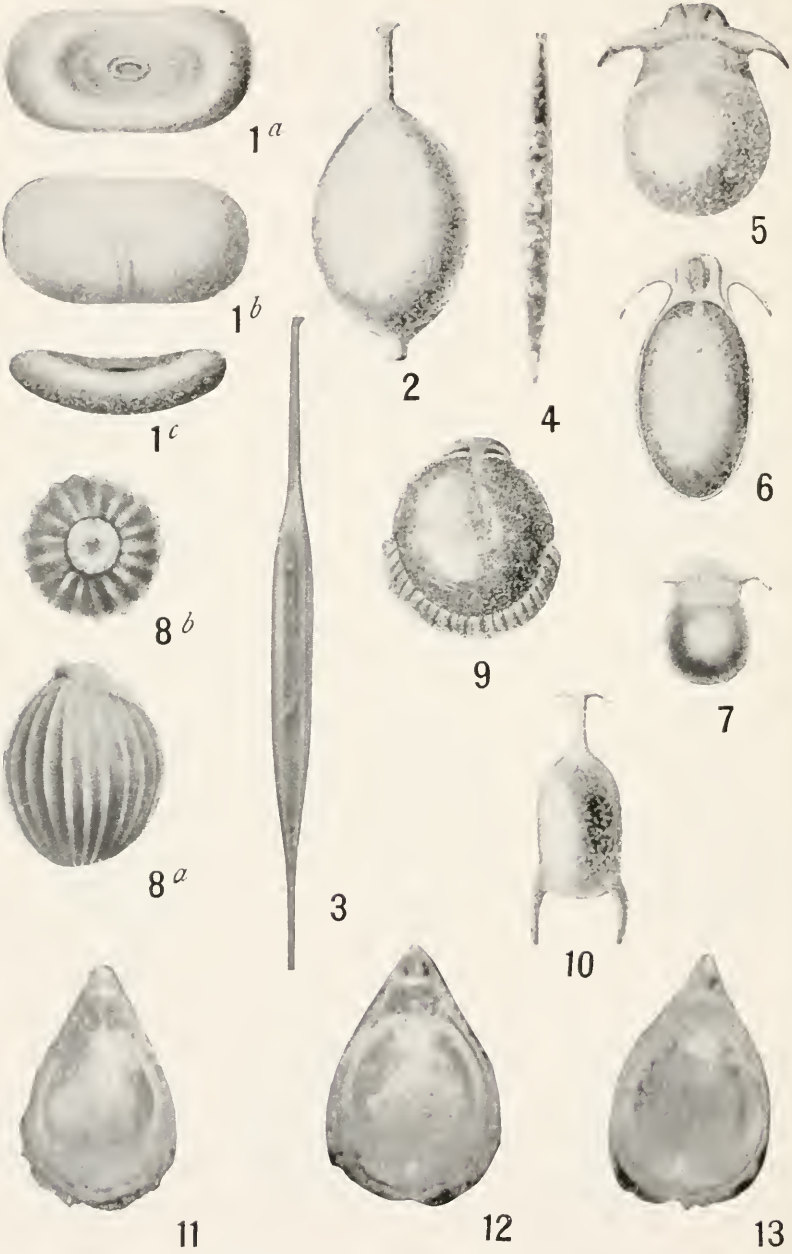
LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 180.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 181.

PLATE 3.

FIG. 1. *Lagena cymbula*. ×200. *a*, apertural view; *b*, viewed from below; *c*, side view. After Heron-Allen and Earland.

2. *Lagena distoma*. ×75. After Heron-Allen and Earland.

3. *Lagena distoma*. ×40. D2112.

4. *Lagena elongata*. ×40. D2754.

5. *Lagena falcata*. ×120. "Globosa type." After Heron-Allen and Earland.

6. *Lagena falcata*. ×200. "Oval type." After Heron-Allen and Earland.

7. *Lagena falcata*. ×160. "Short form." After Heron-Allen and Earland.

8. *Lagena costata*. ×150. *a*, front view; *b*, apertural view. After Heron-Allen and Earland.

9. *Lagena fimbriata*. ×120. After Heron-Allen and Earland.

10. *Lagena forficula*. ×200. After Heron-Allen and Earland.

11–13. *Lagena flintiana*. ×50. Front views. D2144.

Plate 4.

Fig. 1. *Lagena globosa*. *a*, front view; *b*, apertural view. After Williamson.

2. *Lagena globosa*. Viewed by transmitted light. After Williamson.

3, 4. *Lagena gracilis*. After Williamson.

5. *Lagena gracillima*. ×40. D2555.

6. *Lagena hexagona*. After Williamson.

7. *Lagena hispida*. ×50. D2150.

8. *Lagena hispida*. ×170. After Heron-Allen and Earland.

9–11. *Lagena iota*. ×50. Figures 9 and 10, front views. Figure 11, side view. D2041.

12, 13. *Lagena lacunata*. ×113. After Heron-Allen and Earland.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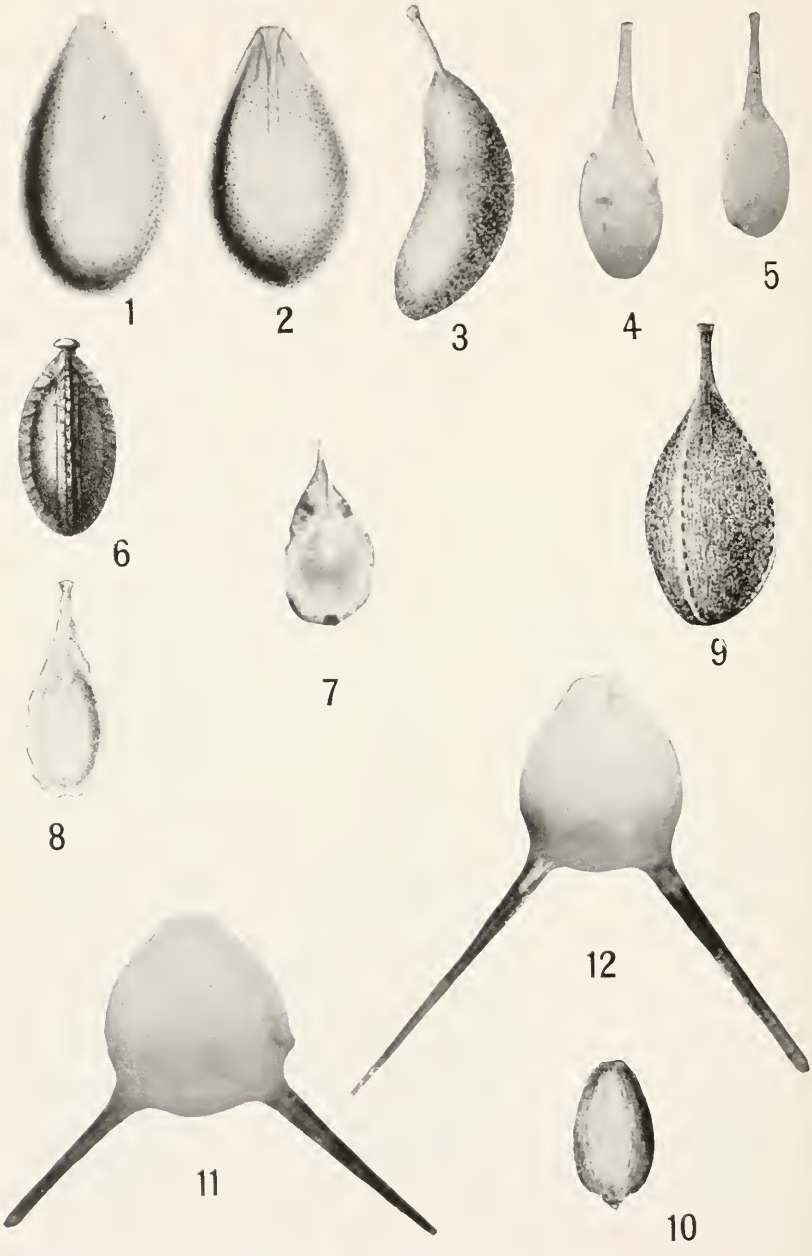
LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 182.



LAGENIDAE OF THE ATLANTIC OCEAN.

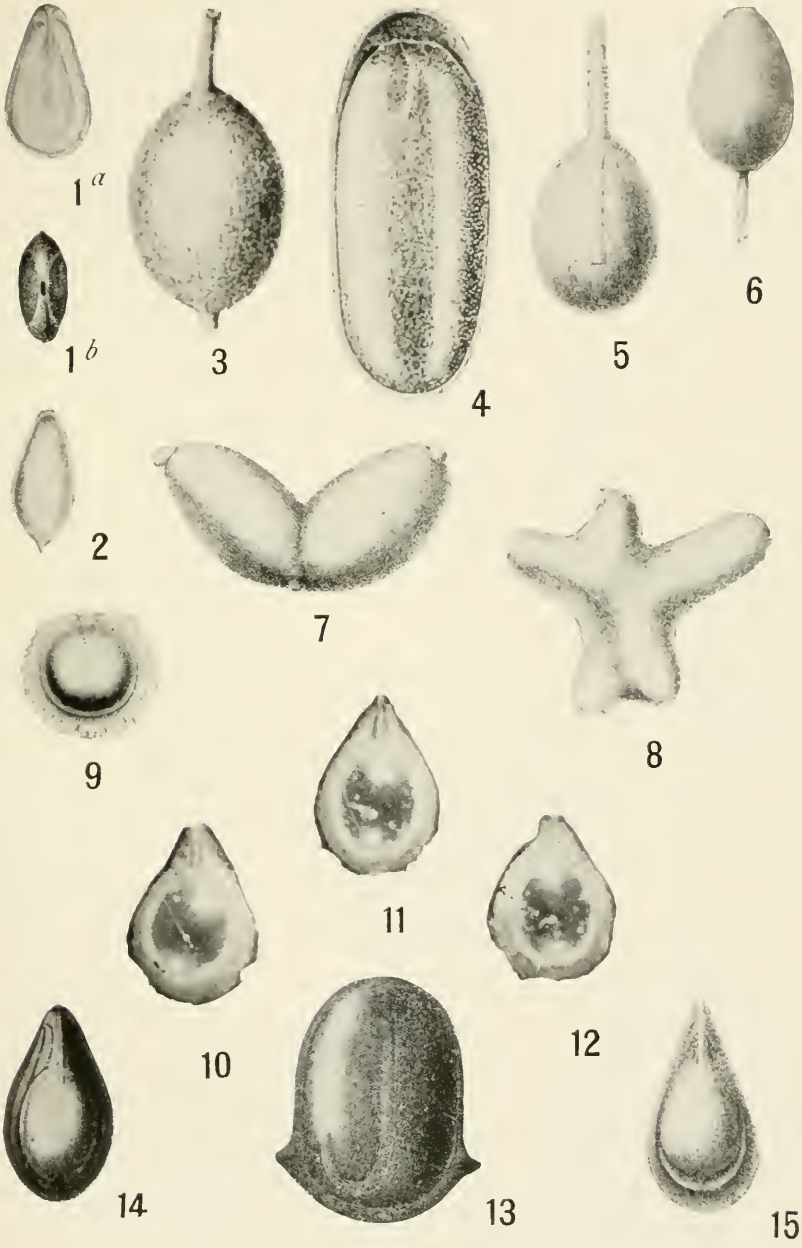
FOR EXPLANATION OF PLATE SEE PAGE 183.

Plate 5.

Figs. 1, 2. *Lagena lacrigata*. ×150. After Heron-Allen and Earland.
3. *Lagena laevis*. ×75. "Curved type." After Heron-Allen and Earland.
4. *Lagena laevis*, var. *nebulosa*. ×50. D2144.
5. *Lagena laevis*, var. *nebulosa*. ×50. D2713.
6. *Lagena lagenoides*. ×100. "Trigonal." After Balkwill and Wright.
7. *Lagena lagenoides*. ×40. D2150.
8. *Lagena lagenoides*. After Williamson.
9. *Lagena lagenoides*, var. *tenuistriata*. ×120. "Trigonal specimen." After Heron-Allen and Earland.
10. *Lagena lineata*. After Williamson.
11. *Lagena longispina*. ×40. D2394.
12. *Lagena longispina*. ×40. D2097.

PLATE 6.

FIG. 1. *Lagena lucida*. *a*, front view; *b*, apertural view. After Williamson.
2. *Lagena lucida*, var. After Williamson.
3. *Lagena lyelli*. ×75. After Heron-Allen and Earland.
4. *Lagena malcomsonii*. ×120. After Heron-Allen and Earland.
5. *Lagena lineata*. ×100. After Balkwill and Wright.
6. *Lagena lineata*. ×100. With basal spine. After Balkwill and Wright.
7, 8. *Lagena lineata*. ×100. "Abnormal." After Balkwill and Wright.
9. *Lagena marginata*. ×113. After Heron-Allen and Earland.
10–12. *Lagena orbignyana*, var. *elliptica*. ×50. Front views. D2150.
13. *Lagena marginata*, var. *semicarinata*. ×200. After Heron-Allen and Earland.
14, 15. *Lagena marginata*, var. *semimarginata*. Fig. 14, ×60; fig. 15, ×75. After H. B. Brady.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 184.

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4 *a*

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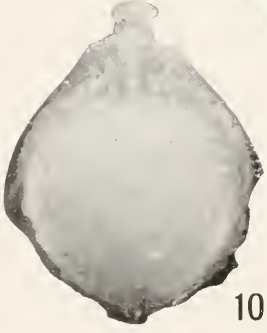

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 185

Plate 7.

Figs. 1, 2. *Lagena montagui*. ×75. "Compressed types." After Heron-Allen and Earland.

3. *Lagena montagui*. ×75. "Globose type." After Heron-Allen and Earland.

4. *Lagena marginato-perforata*. ×200. *a*, front view; *b*, side view. After Heron-Allen and Earland.

5. *Lagena millettii*. ×120. After Heron-Allen and Earland.

6, 7. *Lagena orbignyana*, var. *caribaea*. ×50. Fig. 6, front view; fig. 7, side view. D2144.

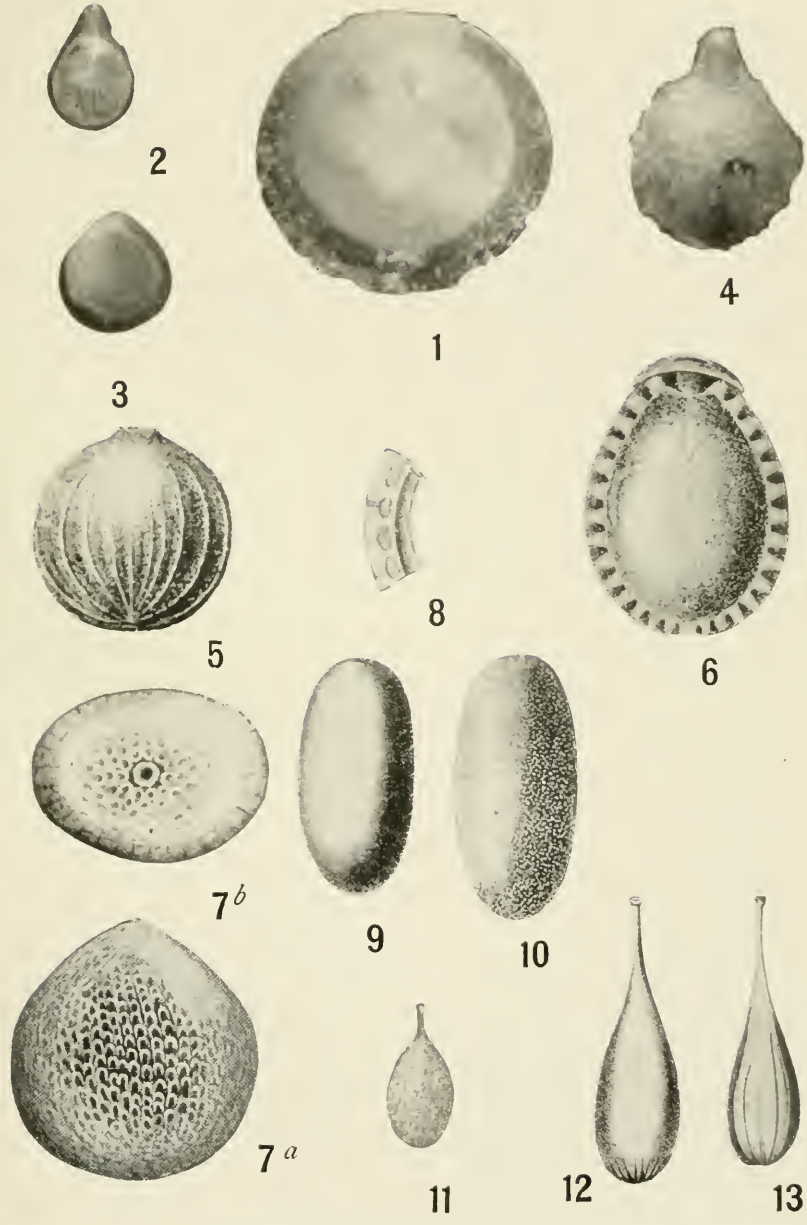
8, 9. *Lagena orbignyana*, var. *caribaea*. ×50. Fig. 8, front view; fig. 9, side view. D2144.

10. *Lagena orbignyana*, var. *antillea*. ×40. Front view. H79.

11. *Lagena orbignyana*, var. *antillea*. ×40. Front view. D2355.

PLATE 8.

FIG. 1. *Lagena marginata*, var. ×40. D2150.
2. *Lagena orbignyana*, var. *variabilis*. ×50. Front view. D2097.
3. *Lagena orbignyana*, var. ×50. Front view. D2564.
4. *Lagena orbignyana*, var. ×50. Front view. D2260.
5. *Lagena orbignyana*, var. *clathrata*. ×75. After Heron-Allen and Earland.
6. *Lagena ornata*. ×200. After Heron-Allen and Earland.
7. *Lagena montagui*. ×75. *a*, front view; *b*, apertural view. After Wright.
8. *Lagena ornata*. "Part of the peripheral carina." After Williamson.
9. *Lagena ovum*. ×75. After H. B. Brady.
10. *Lagena ovum*. ×120. After Heron-Allen and Earland.
11. *Lagena paradoxa*. ×50. D2352.
12, 13. *Lagena perlucida*. After Williamson.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 186.

56148—23——15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3 *a*


3 *b*


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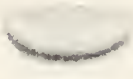
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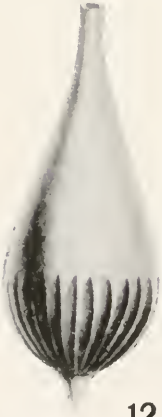
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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 187.

PLATE 9.

FIGS. 1, 2. *Lagena protea*. ×75. After Heron-Allen and Earland
3. *Lagena pulchella*. ×100. "Trigonal." *a*, front view; *b*, apertural view. After Balkwill and Wright.
4. *Lagena pulchella*, var. *hexagona*. ×113. After Heron-Allen and Earland.
5, 6. *Lagena quadrata*. After Williamson.
7–11. *Lagena reniformis*. ×113. After Heron-Allen and Earland.
12, 13. *Lagena semilineata*. ×113. After Heron-Allen and Earland.
14. *Lagena rizzae*. ×120. After Heron-Allen and Earland.
15. *Lagena semistriata*. After Williamson.

PLATE 10.

FIGS. 1, 2. *Lagena spumosa*. ×150. After Heron-Allen and Earland. Figure 2, "external shell broken away, showing internal structure."

3. *Lagena squamosa*. After Williamson.

4. *Lagena squamosa*. ×100. "Biocular." After Balkwill and Wright.

5, 6. *Lagena stelligera*. ×75. 5*a*, front view; 5*b*, apertural view; 6*a*, front view; 6*b*, apertural view. After H. B. Brady.

7. *Lagena stewartii*. ×120. *a*, front view; *b*, apertural view. After Heron-Allen and Earland.

8. *Lagena sublagenoides*. ×40. D2377.

9. *Lagena striata*. After Williamson.

10. *Lagena striato-punctata*. ×100. After Balkwill and Wright.

11. *Lagena substriata*. After Williamson.

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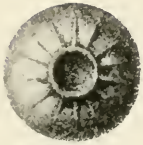
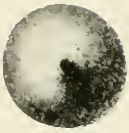
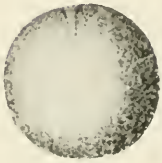


6 *b*



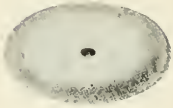
5 *b*



7 *a*

6 *a*

5 *a*



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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 139.

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6*b*

4*b*

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6*a*

4*a*

7*a*

7*b*

7*c*

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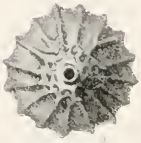
9*a*



9*b*

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 189.

PLATE 11.

FIG. 1. *Lagena sulcata*. ×100. After Balkwill and Wright.

2. *Lagena sulcata*, var. *apiculata*. ×50. D2144.

3. *Lagena trigono-marginata*. ×100. After H. B. Brady.

4. *Lagena trigono-marginata*. ×100. *a*, front view; *b*, apertural view. After H. B. Brady.

5. *Lagena truncata*. ×75. After H. B. Brady.

6. *Lagena truncata*. ×75. *a*, front view; *b*, apertural view. After H. B. Brady.

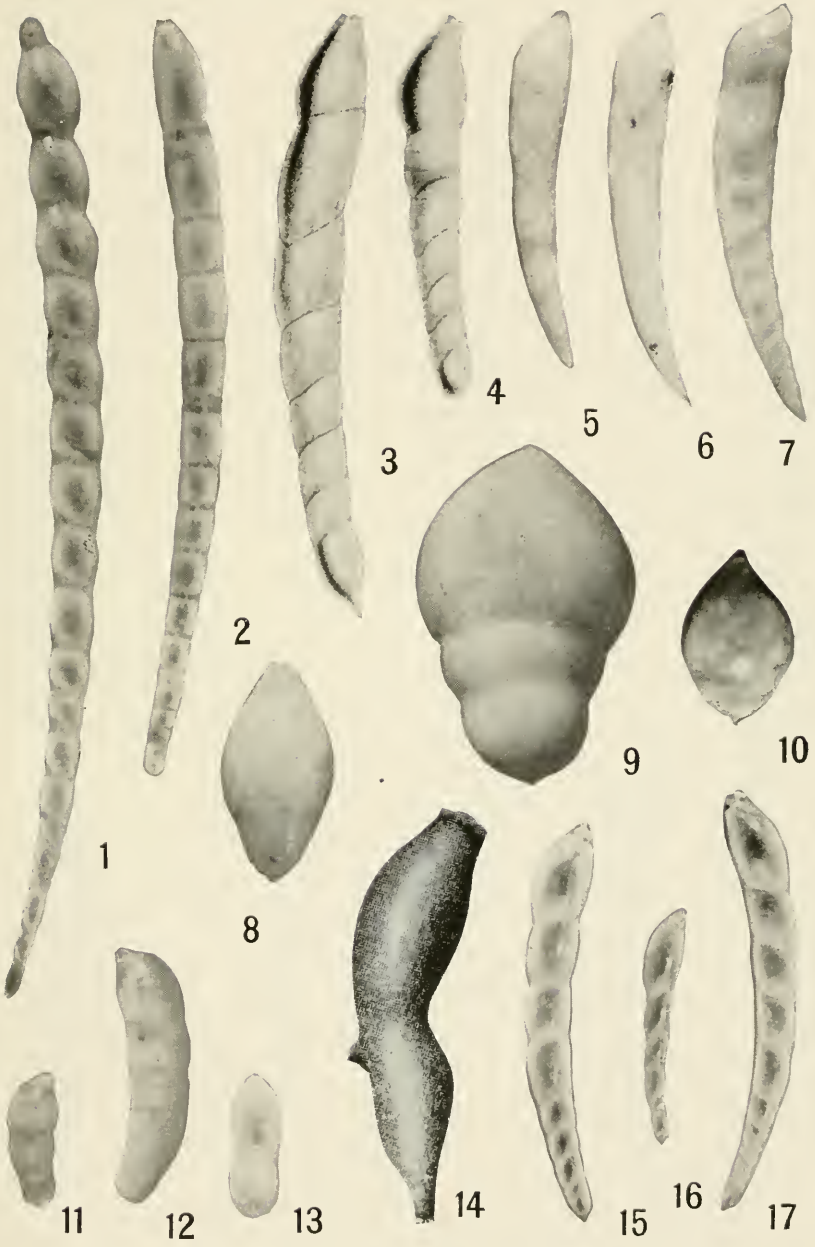
7. *Lagena unguis*. ×120. *a* and *b*, opposite sides; *c*, side view. After Heron-Allen and Earland.

8. *Lagena williamsoni*. ×100. "Bilocular." After Balkwill and Wright.

9. *Lagena williamsoni*. ×100. *a*, front view; *b*, apertural view. After Balkwill and Wright.

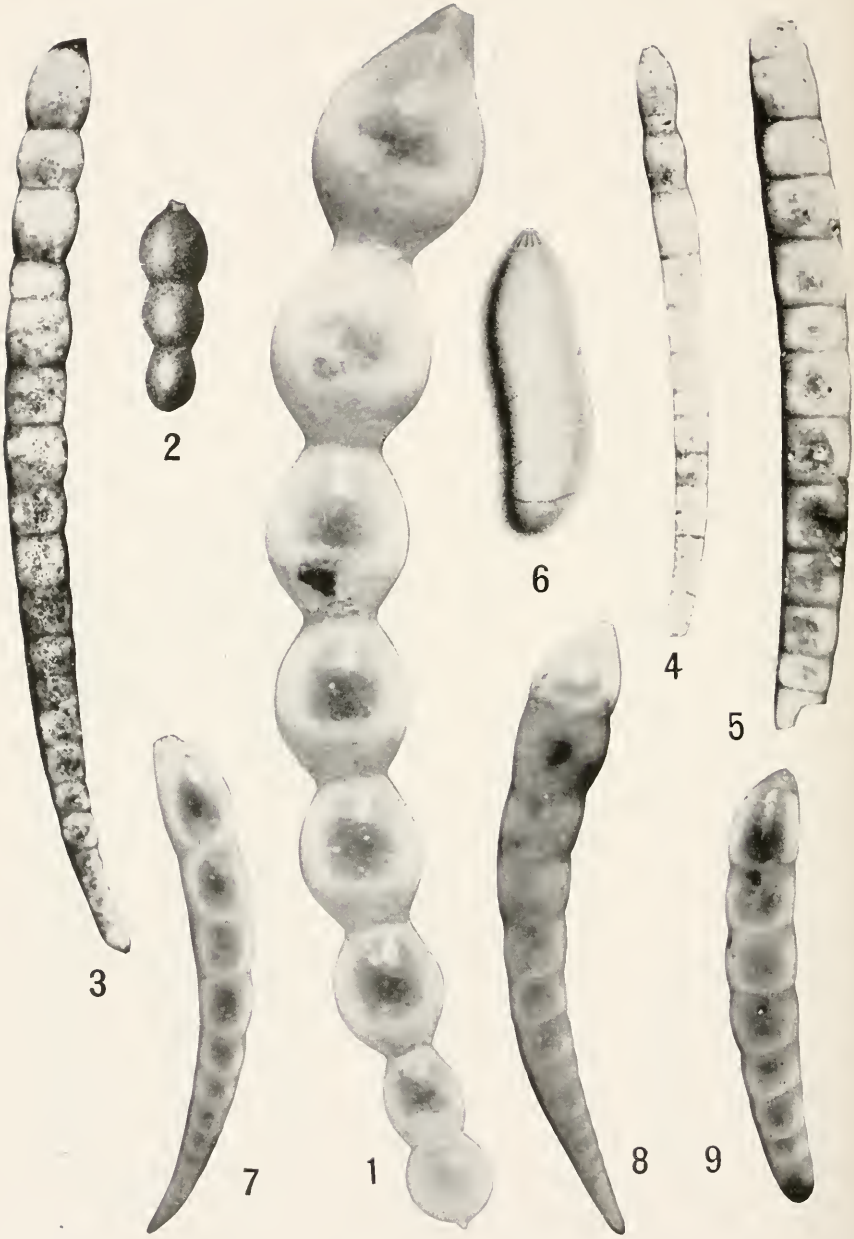
PLATE 12.

FIG. 1. *Nodosaria filiformis*. ×15. Side view. D2378.
2. *Nodosaria filiformis*. ×15. Side view. D2614.
3, 4. *Nodosaria communis*. ×113. "Compressed or vaginuline form." After Heron-Allen and Earland.
5–7. *Nodosaria mucronata*. ×15. Side view. D2041.
8. *Nodosaria* (*Glandulina*) *laevigata*, var. *occidentalis*. ×30. Side view. D2003.
9. *Nodosaria subannulata*. ×25. Side view D2682.
10. *Nodosaria* (*Glandulina*) *laevigata*, var. *torrida*. ×30. Side view. D2398.
11. *Nodosaria atlantica*. ×30. Side view. D2400.
12. *Nodosaria atlantica*. ×30. Side view of type specimen. D2756.
13. *Nodosaria calomorpha*. ×35. Side view. D2543.
14. *Nodosaria simplex*. ×120. Side view of peculiarly formed specimen. After Heron-Allen and Earland.
15–17. *Nodosaria communis*. ×25. Side views. D2377.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 190.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 191.

PLATE 13.

FIG. 1. *Nodosaria subsoluta*. ×25. Side view of type specimen. D2751.
2. *Nodosaria soluta*. ×120. Side view. After Heron-Allen and Earland.
3–5. *Nodosaria consobrina*, var. *emaciata*. ×15. Side view. D2399.
6. *Nodosaria roemeri*. ×113. Side view. After Heron-Allen and Earland.
7–9. *Nodosaria mucronata*. ×15. Figures 7 and 8, side views of microspheric specimens; figure 9, side view of megalospheric specimen.

PLATE 14.

FIG. 1. *Nodosaria flintii*. ×25. Side view. D2682.

2–4. *Nodosaria intercellularis*. ×30. Side views. Figure 3, young with only three chambers developed; figure 2, adult with four chambers; figure 4, broken specimen showing final chamber. D2756.

5. *Nodosaria comatula*. ×30. Side view. D2377.

6. *Nodosaria vertebralis*. ×25. Side view. D2400.

7. *Nodosaria*, species. ×30. Side view. D2614.

8. *Nodosaria farcimen*. ×30. Side view. D2144.

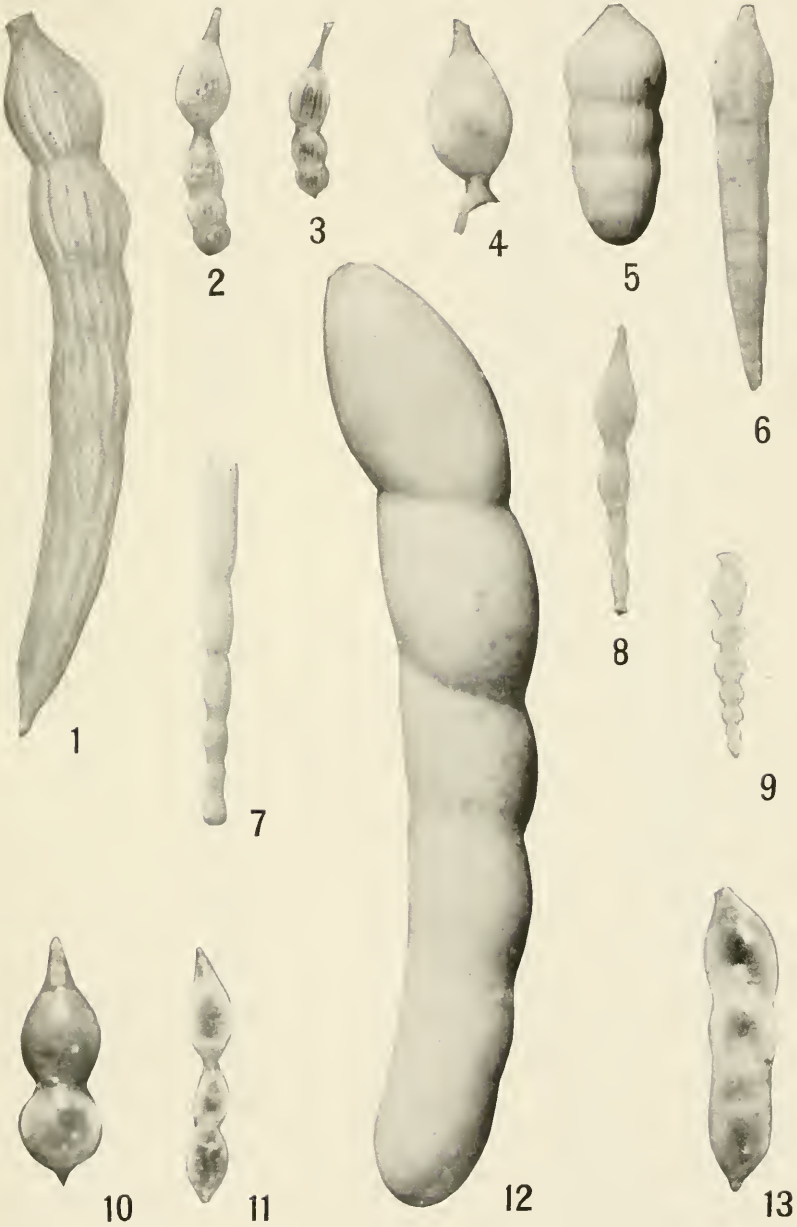
9. *Nodosaria antillea*. ×30. Side view of type specimen. D2614.

10. *Nodosaria simplex*. ×30. Side view. D2763.

11. *Nodosaria farcimen*. ×40. Side view. D2144.

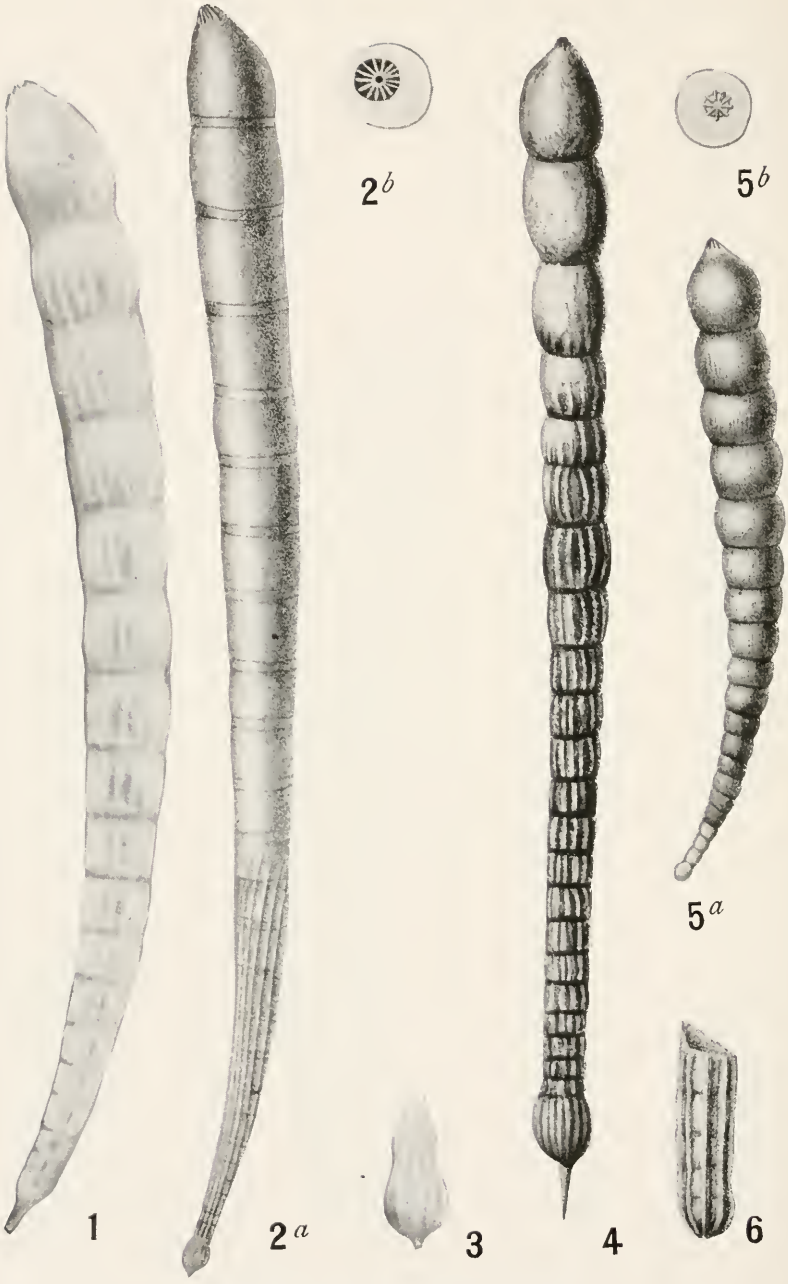
12. *Nodosaria adrcua*. ×25. Side view. D2689.

13. *Nodosaria pauperata*. ×30. Side view. D2018.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 192.



LAGENIDAE OF THE ATLANTIC OCEAN.

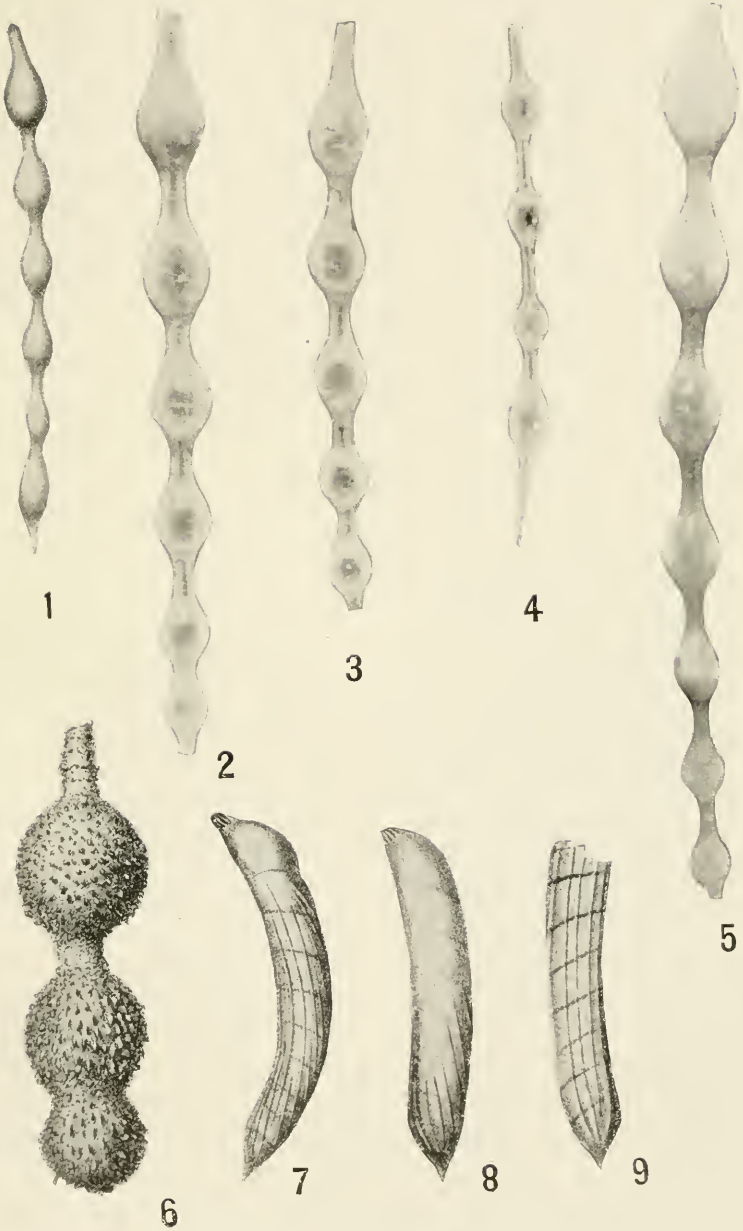
FOR EXPLANATION OF PLATE SEE PAGE 193.

PLATE 15.

FIG. 1. *Nodosaria vertebralis*, var. *albatrossi*. ×25. Side view. D2377.
2. *Nodosaria seminuda*. ×25. *a*, side view; *b*, apertural view. After Goës.
3. *Nodosaria proxima*. ×50. Side view. D2262.
4. *Nodusaria raphanistrum*, var. *obsoleta*. ×8. Side view. After Goës.
5. *Nodosaria striolata*. *a*, side view; *b*, apertural view. After Goës.
6. *Nodosaria raphanus*. ×25. Side view. After Balkwill and Wright.

Plate 16.

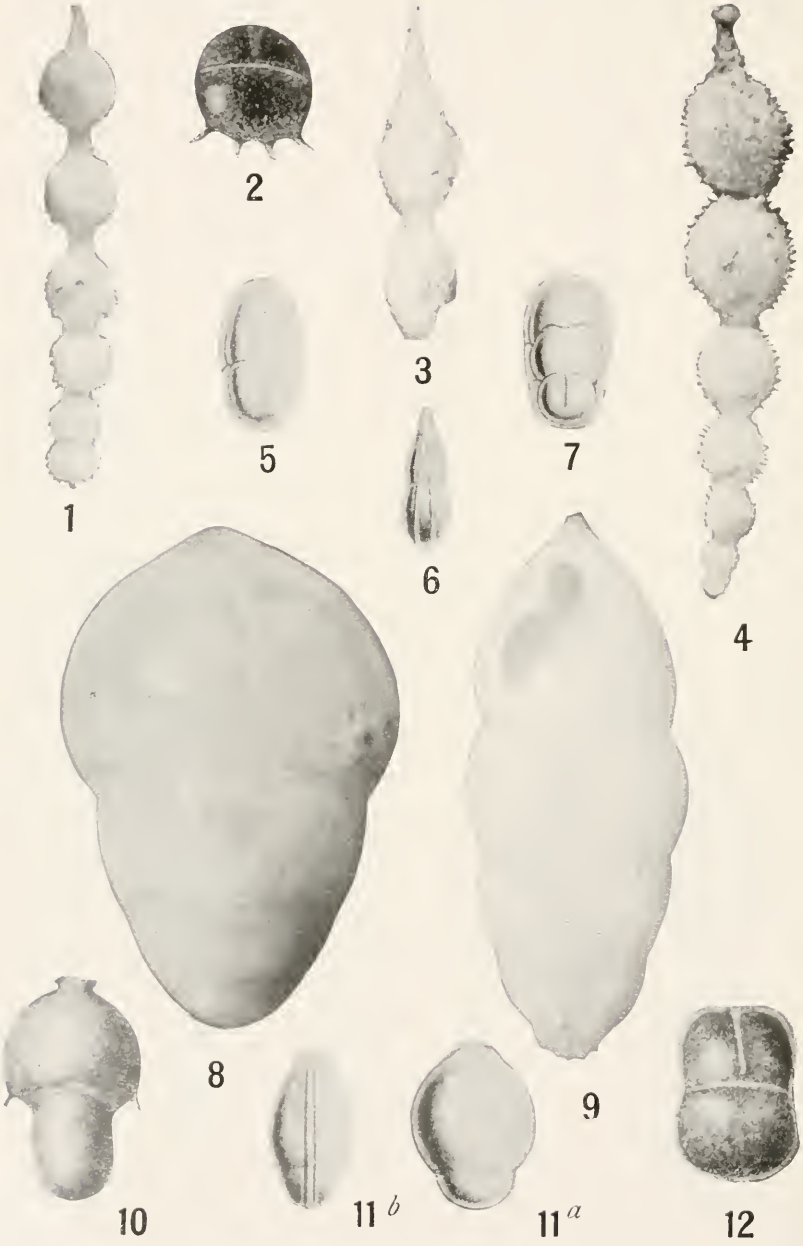
Fig. 1. *Nodosaria pyrula*. ×25. Side view. After Balkwill and Wright.
2, 3. *Nodosaria pyrula*. ×25. Side views. D2314.
4. *Nodosaria pyrula*. ×25. Side view, showing the proloculum with its long spinose tip. D2377.
5. *Nodosaria pyrula*, var. *scmirugosa*. ×25. Side view. D2378.
6. *Nodosaria hispida*. ×50. Side view. After Balkwill and Wright.
7–9. *Vaginulina linearis*. Side views. After Williamson.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 194.

56148—23——16



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 195.

Plate 17.

Fig. 1. *Nodosaria sublineata*. ×25. Side view. D2150.

2. *Lingulina armata*. ×200. Front view. After Heron-Allen and Earland.

3. *Nodosaria intercellularis*. ×30. Side view of last-formed chamber. D2150.

4. *Nodosaria hirsuta*, var. *aculeata*. ×25. Side view. D2399.

5. *Lingulina bicarinata*. ×176. Side view of specimen with three chambers. After Heron-Allen and Earland.

6. *Lingulina bicarinata*. ×176. Edge view. After Heron-Allen and Earland.

7. *Lingulina bicarinata*. ×176. Side view of normal specimen. After Heron-Allen and Earland.

8. *Lingulina seminuda*. ×25. Front view. D2760.

9. *Lingulina seminuda*. ×30. Side view of another specimen. D2399.

10. *Lingulina pellucida*. ×120. Front view. After Heron-Allen and Earland.

11. *Lingulina seminuda*. ×176. *a*, front view; *b*, side view. After Heron-Allen and Earland.

12. *Lingulina quadrata*. ×200. Front view. After Heron-Allen and Earland.

PLATE 18.

FIG. 1. *Lingulina seminuda*. ×25. Front view. D2751.
2. *Lingulina seminuda*. ×25. Front view. D2760.
3–5. *Lingulina biloculi*. ×200. Front views. After Heron-Allen and Earland.
6, 7. *Lingulina bicarinata*. ×200. Front views. Figure 6, by transmitted light. After Heron-Allen and Earland.

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 196.

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 197.

PLATE 19.

FIG. 1. *Lingulina carinata.* ×25. Front view of microspheric specimen showing early coiling. From 40 fathoms off Ajax Reef, Florida.

2. *Lingulina carinata.* ×200. Front view. After Heron-Allen and Earland.

3. *Cristellaria marginulinoides.* ×30. Side view. D2313.

4, 5. *Cristellaria albatrossi.* ×15. Side views. D2203.

PLATE 20.

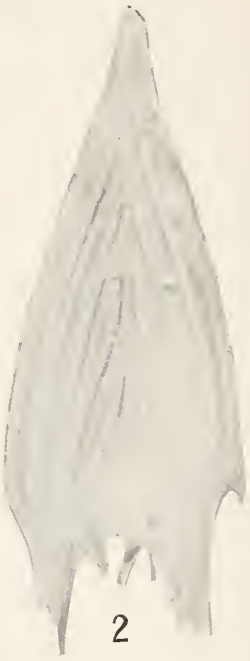
FIGS. 1, 2. *Frondicularia advena*. ×30. Figure 1, front view of microspheric specimen; figure 2, front view of megalospheric specimen. D2205.

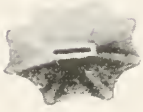
3. *Frondicularia*, species. ×30. Front view. D2192.

4. *Frondicularia sagittula*, var. *lanceolata*. ×25. Front view. D2399.

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 198.





LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 199.

PLATE 21.

FIG. 1. *Frondicularia sagittula*, var. *lanceolata*. ×30. Front view of microspheric specimen. D2400.

2. *Frondicularia sagittula*. ×30. Front view of megalospheric specimen. D2377.

3. *Frondicularia pygmaca*. ×200. Front view. After Heron-Allen and Earland.

4. *Frondicularia translucens*. ×200. Front view. After Heron-Allen and Earland.

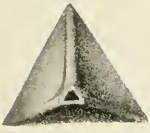
5. *Frondicularia tenera*. ×113. *a*, front view; *b*, side view; *c*, apertural view. After Heron-Allen and Earland.

6. *Frondicularia sidebottomi*. ×200. Front view. After Heron-Allen and Earland.

7. *Cristellaria orbicularis*. ×30. Side view. D2415.

PLATE 22.

FIG. 1. *Cristellaria d'orbignii*. ×25. Side view. D2682.
2. *Cristellaria rotulata*. ×25. Side view. D2377
3. *Trifarina bradyi*. *a*, side view; *b*, apertural view. After Balkwill and Wright.
4. *Trifarina bradyi*. ×75. *a*, side view; *b*, apertural view. After H. B. Brady.
5–7. *Trifarina bradyi*. ×50. Side views. D2677.
8. *Trifarina bradyi*. ×75. Side view. After H. B. Brady.
9. *Trifarina bradyi*. ×75. *a*, front view; *b*, apertural view. After H. B. Brady.



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4 *a*

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9 *b*

9 *a*

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 200

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 201.

PLATE 23.

FIG. 1. *Cristellaria occidentalis*, var. *novangliae*. ×25. Side view of paratype. D2237.

PLATE 24.

FIG. 1. *Cristellaria occidentalis*, var. *novangliae*. ×25. Side view of holotype. D2237.

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 202.

56148—23——17

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 203.

PLATE 25.

FIG. 1. *Cristellaria occidentalis*, var. *torrida*. ×25. Side view. D2377.
2. *Cristellaria occidentalis*. ×25. Side view. D2041.
3. *Cristellaria occidentalis*, var. *glabrata*. ×25. Side view. D2541.
4. *Cristellaria gibba*. ×30. Side view. D2377.

PLATE 26.

FIGS. 1, 2. *Cristellaria occidentalis*. ×25. Side views. D2041.
3. *Cristellaria d'orbignii*. ×25. Side view. D2682.

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 204.

1

2

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 205

PLATE 27.

FIG. 1. *Cristellaria septentrionalis.* ×20. Side view. D2689.
2. *Cristellaria septentrionalis.* ×20. Side view. D2202.

PLATE 28.

FIG. 1. *Cristellaria rotulata*. ×20. Side view. D2399.
2. *Cristellaria rotulata*. ×25. Side view. D2644.
3. *Cristellaria submamilligera*. ×30. Side view. D2378.

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 206

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LAGENIDAE OF THE ATLANTIC OCEAN.

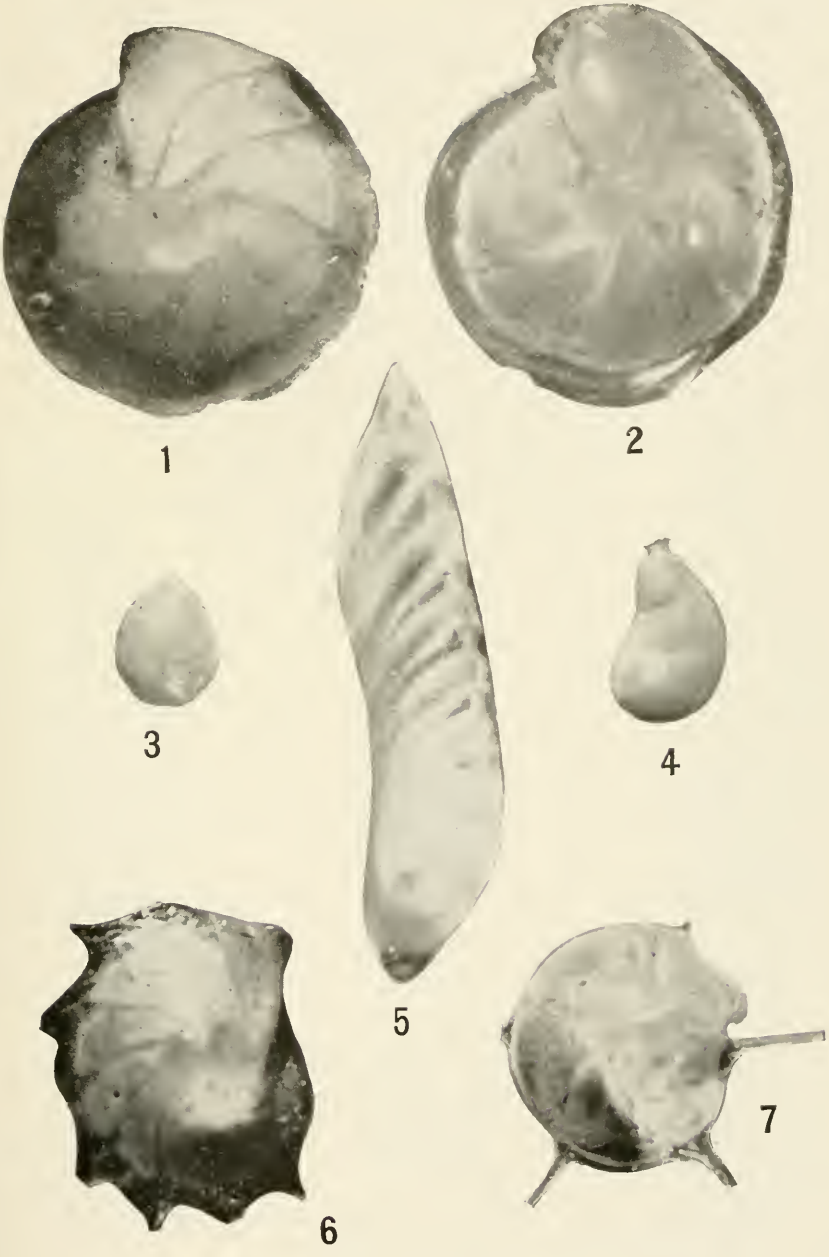
FOR EXPLANATION OF PLATE SEE PAGE 207.

PLATE 29.

FIG. 1. *Cristellaria formosa*. ×25. Side view. D2150.
2. *Cristellaria iota*. ×25. Side view. D2309.

PLATE 30.

FIG. 1. *Cristellaria iota*. ×25. Side view. D2399.
2. *Cristellaria lucida*. ×25. Side view. D2544.
3, 4. *Cristellaria peregrina*. ×30. Side views. Figure 3, young specimen; figure 4, adult specimen. D2202.
5. *Cristellaria obtusata*, var. *subalata*. ×25. Side view. H79.
6. *Cristellaria formosa*. ×25. Side view of young. D2377.
7. *Cristellaria calcar*. ×30. Side view. D2377.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 208.

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 209

PLATE 31.

FIG. 1. *Cristellaria antillea*. ×25. Side view. D2377.
2, 3. *Cristellaria obtusata*, var. *subalata*. ×20. Side views. D2678.
4, 5. *Cristellaria calcar*. ×30. Side views. Figure 4, form with inflated test and very short spines. D2377.

PLATE 32.

FIG. 1. *Cristellaria antillea*. ×25. Side view. D2377.
2. *Cristellaria limbata*. ×25. Side view. D2309.
3. *Cristellaria limbata*. ×25. Side view of younger specimen. D2314.
4. *Cristellaria subaculeata*, var. *glabrata*. ×30. Side view. D2377.

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 210.

56148—23——18

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LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 211

PLATE 33.

FIG. 1. *Cristellaria antillea.* ×25. Side view. D2377.
2. *Cristellaria subaculeata,* var. *glabrata.* ×30. Side view. D2399.
3. *Cristellaria subaculeata,* var. *glabrata.* ×30. Side view. D2377.

PLATE 34.

FIG. 1. *Cristellaria antillea*. ×25. Side view. D2377.
2. *Cristellaria subaculeata*. ×30. Side view. D2377.
3. *Cristellaria subaculeata*, var. *glabrata*. ×30. Side view. D2377.

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 212

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 213.

PLATE 35.

FIG. 1. *Cristellaria acutauricularis*. ×120. Side view. After Heron-Allen and Earland.

2. *Cristellaria italica*. ×30. Side view. D2399.

3. *Cristellaria crepidula*. ×30. Side view. D2756.

4. *Cristellaria crepidula*. ×30. Side view. D2648.

5–7. *Cristellaria italica*. ×30. Figure 5, front view; figure 6, side view; figure 7, apertural view. D2399.

8, 9. *Cristellaria schlocnbachi*. ×30. Side views. D2150.

10. *Cristellaria schlocnbachi*. ×30. Side view. D2400.

PLATE 36.

FIG. 1. *Cristellaria convergens*. ×13. Side view. After Heron-Allen and Earland.

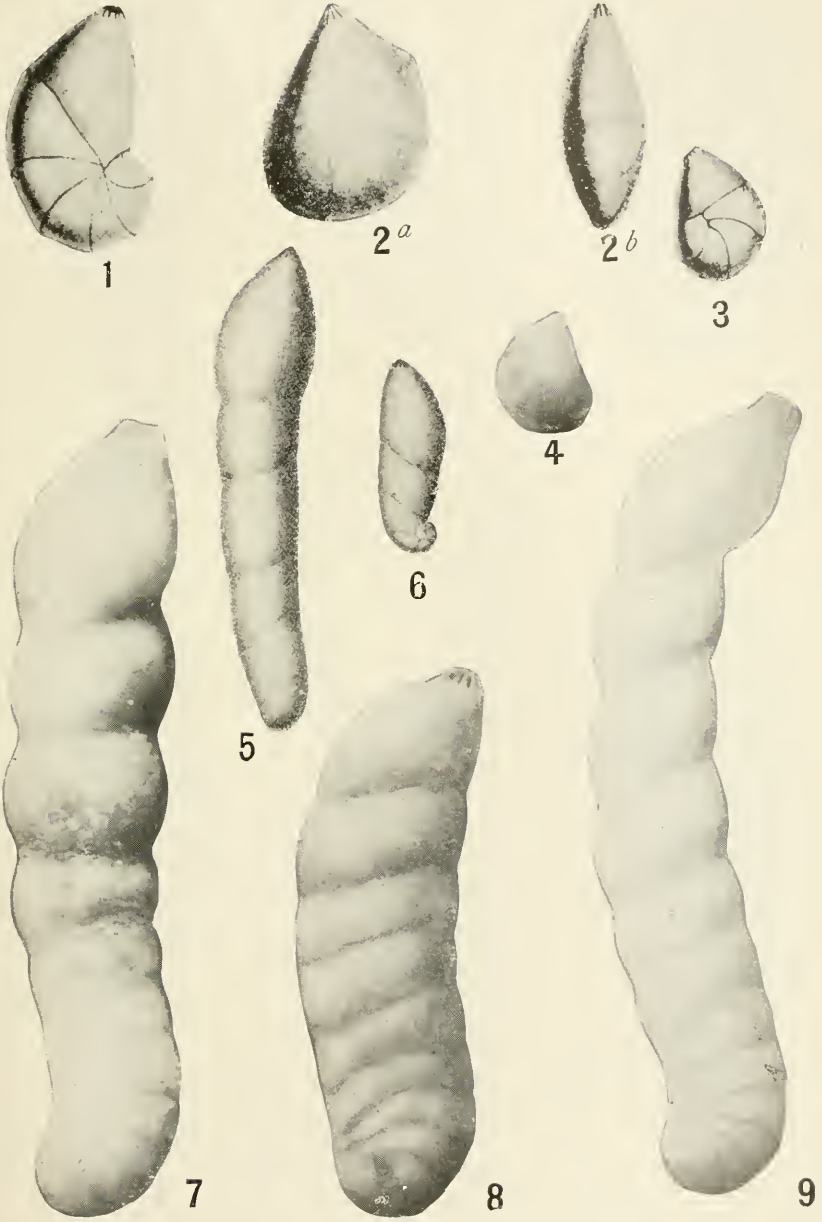
2. *Cristellaria convergens*. ×64. *a*, side view; *b*, front view. After Heron-Allen and Earland.

3. *Cristellaria convergens*. ×13. Side view. After Heron-Allen and Earland.

4. *Cristellaria convergens*. ×30. Side view. D2052.

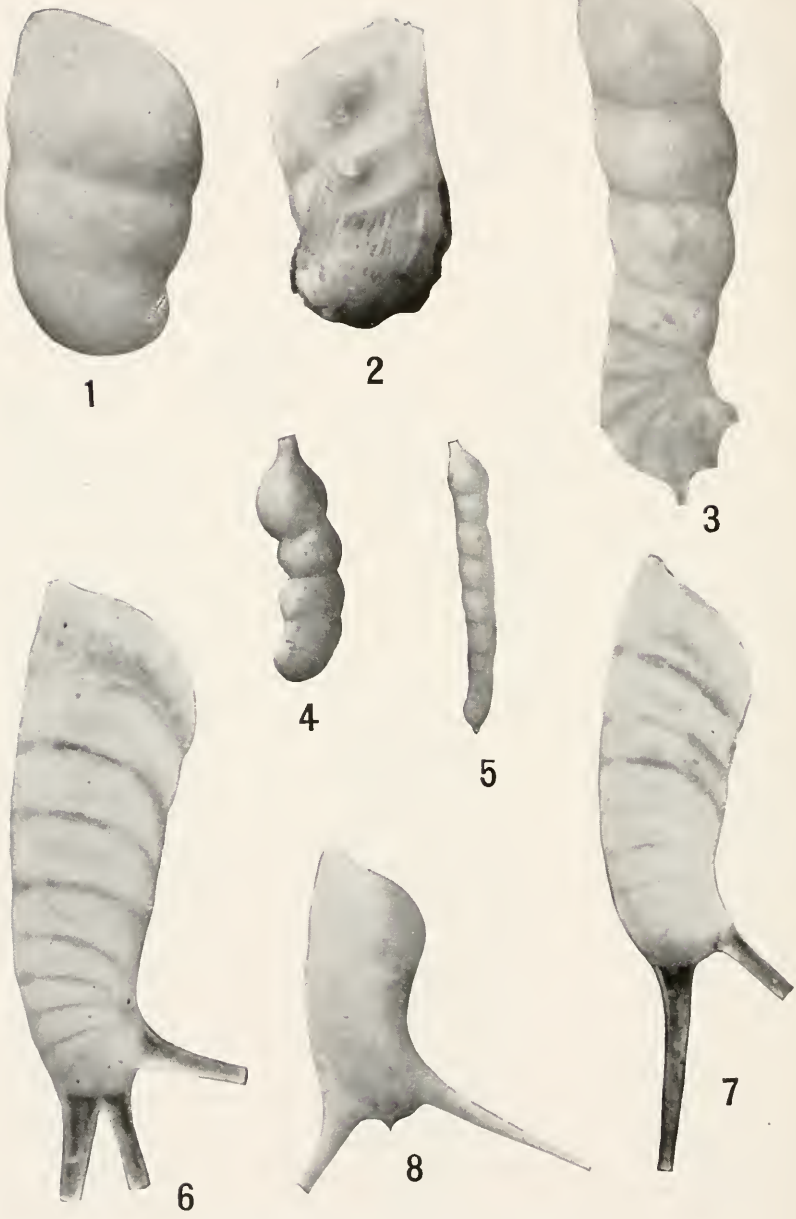
5, 6. *Marginulina glabra*. ×25. Side views. After Balkwill and Wright.

7–9. *Marginulina bacheii*. ×25. Side views. D2425.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 214.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 215.

PLATE 37.

FIG. 1. *Marginulina glabra*, var. *obesa*. ×25. Side view. D2043.
2. *Marginulina costata*. ×25. Side view. D2399.
3. *Marginulina bacheii*, var. *ensiformis*. ×25. Side view. D2648.
4. *Marginulina striatula*. ×30. Side view. D2117.
5. *Vaginulina legumen*. ×25. Side view. D2112.
6, 7. *Vaginulina spinigera*. ×20. Side views. D2115.
8. *Vaginulina spinigera*. ×25. Side view of young specimen. D2203.

PLATE 38.

FIG. 1. *Vaginulina spinigera.* ×15. Side view of old-age specimen. D2352.
2. *Vaginulina bermudensis.* ×25. Side view of type specimen. Challenger Bank, off Bermuda.
3, 4. *Vaginulina americana.* ×20. Side views. D2415.

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 216.

LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 217.

PLATE 39.

FIG. 1. *Vaginulina advena*. ×30. Side view. Off Sand Key, Florida.
2, 3. *Vaginulina advena*. ×25. Side views. D2641.
4. *Vaginulina advena*. ×25. Side view. Off Bell, Fowey, Florida.
5. *Vaginulina peregrina*. ×30. Side view. D2311.
6, 7. *Polymorphina lactea*, var. *novangliae*. ×25. Side views. Cobscook Bay, near Eastport, Maine.
8. *Polymorphina lactea*, var. *novangliae*. ×25. Side view of specimen with fistulose last-formed portion. D2097.
9. *Polymorphina lactea*. Side view of young specimen. After Williamson.
10. *Polymorphina cylindroides*. ×64. *a*, front view; *b*, side view. After Heron-Allen and Earland.
11. *Polymorphina lactea*. ×75. Side view of double specimen. After Heron-Allen and Earland.

PLATE 40.

FIG. 1. *Polymorphina communis*. ×40. Front view. D2112.

2. *Polymorphina communis*. ×40. Specimen attached to fragment of rock. D2639.

3. *Polymorphina equalis*. ×30. Front view of fistulose specimen. D2395.

4, 5. *Polymorphina lanceolata*. ×40. Side views. D2174.

6. *Polymorphina pulchella*. ×50. Front view. D2420.

7. *Polymorphina lactea*, var. *oblonga*. ×120. Side view. "depauperate." After Heron-Allen and Earland.

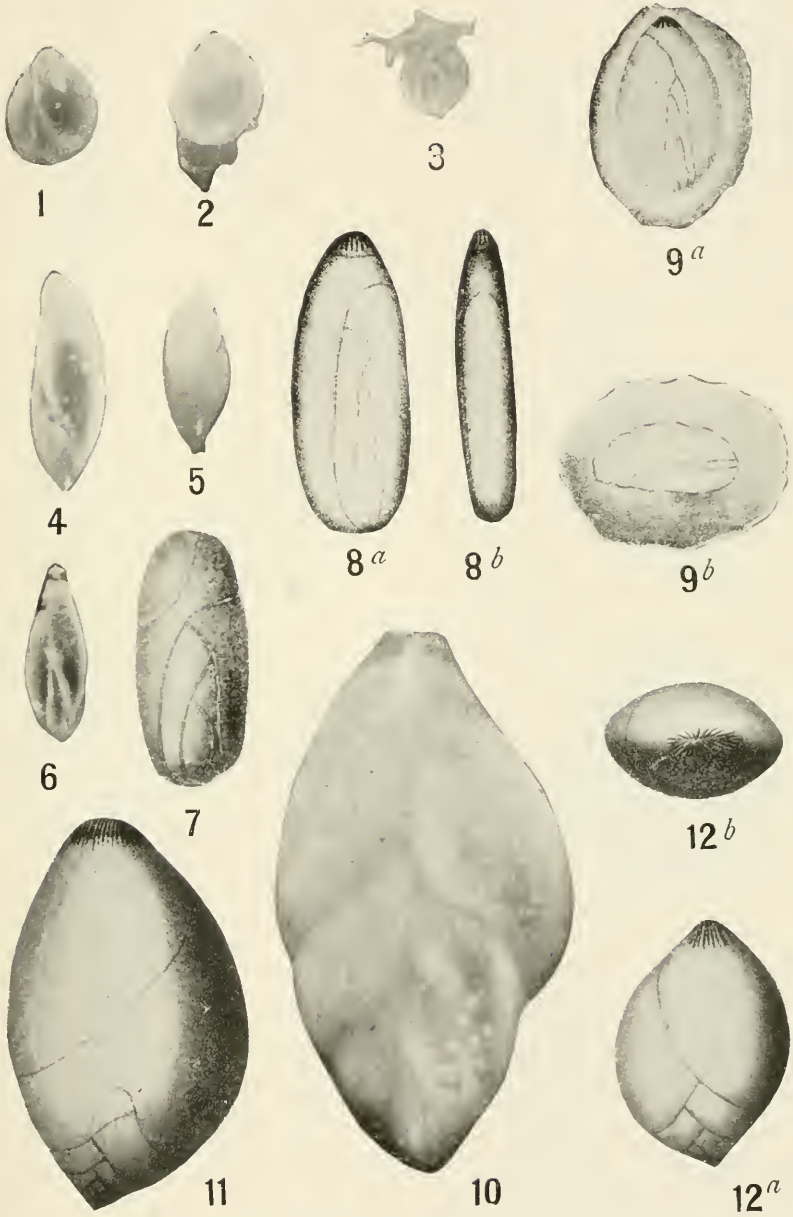
8. *Polymorphina lactea*, var. *oblonga*. *a*, front view; *b*, side view. After Williamson.

9. *Polymorphina concava*. Views of opposite sides. After Williamson.

10. *Polymorphina flintii*. ×25. Front view. D2415.

11. *Polymorphina ovata*. ×25. Front view. After H. B. Brady.

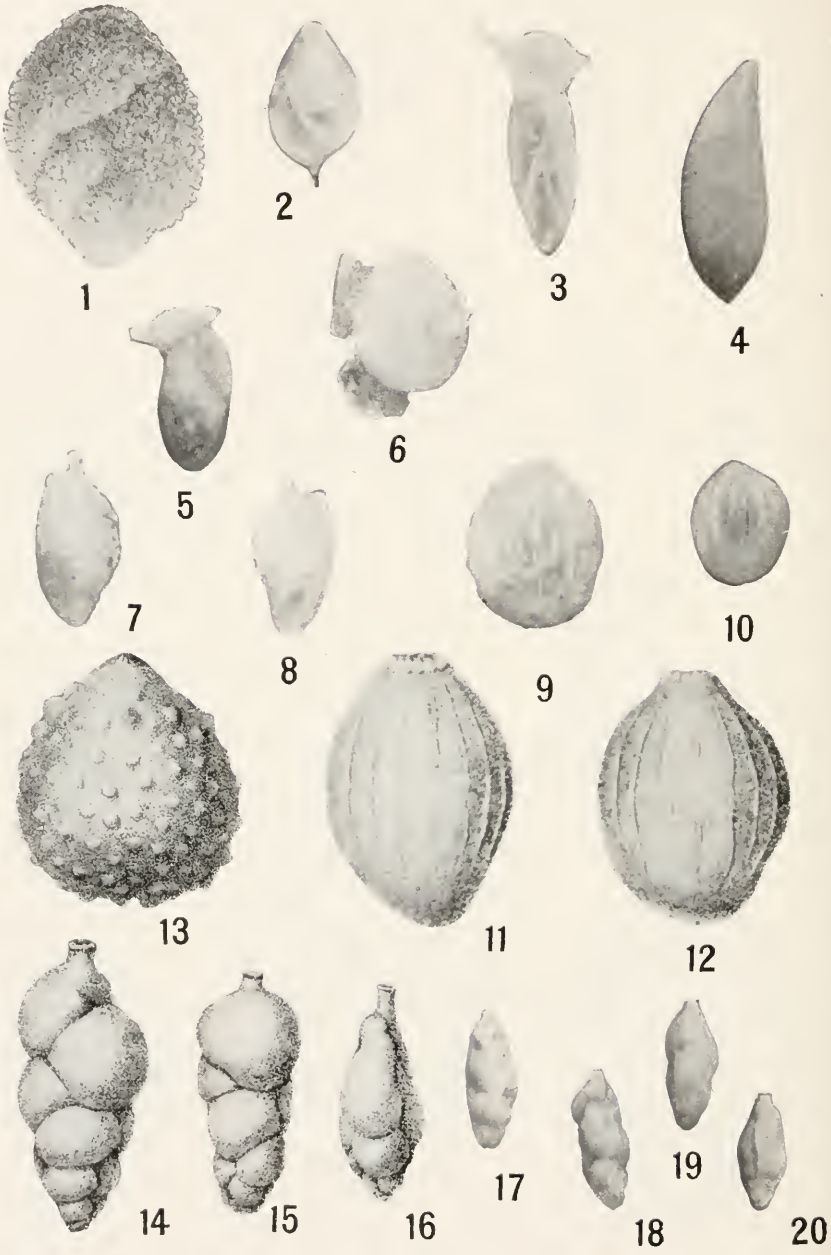
12. *Polymorphina ovata*. ×25. *a*, front view; *b*, apertural view. After H. B. Brady.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 218.

56148—23——19



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 219.

PLATE 41.

Fig. 1. *Polymorphina spinosa*. ×100. Front view. After Heron-Allen and Earland.

2. *Polymorphina sororia*, var. *cuspidata*. ×40. Front view. D2150.

3. *Polymorphina sororia*. ×40. Fistulose form. D2713

4. *Polymorphina sororia*. ×35. Front view. D2038.

5. *Polymorphina sororia*. ×40. Fistulose form. D2038.

6. *Polymorphina rugosa*. ×40. Front view of specimen attached to small pebbles. D2112.

7. *Polymorphina extensa*. ×50. Side view. D2105.

8. *Polymorphina extensa*. ×50. Side view. D2035.

9, 10. *Polymorphina myristiformis*. ×50. Front views. Off Plymouth, England.

11, 12. *Polymorphina myristiformis*. ×50. After Heron-Allen and Earland.

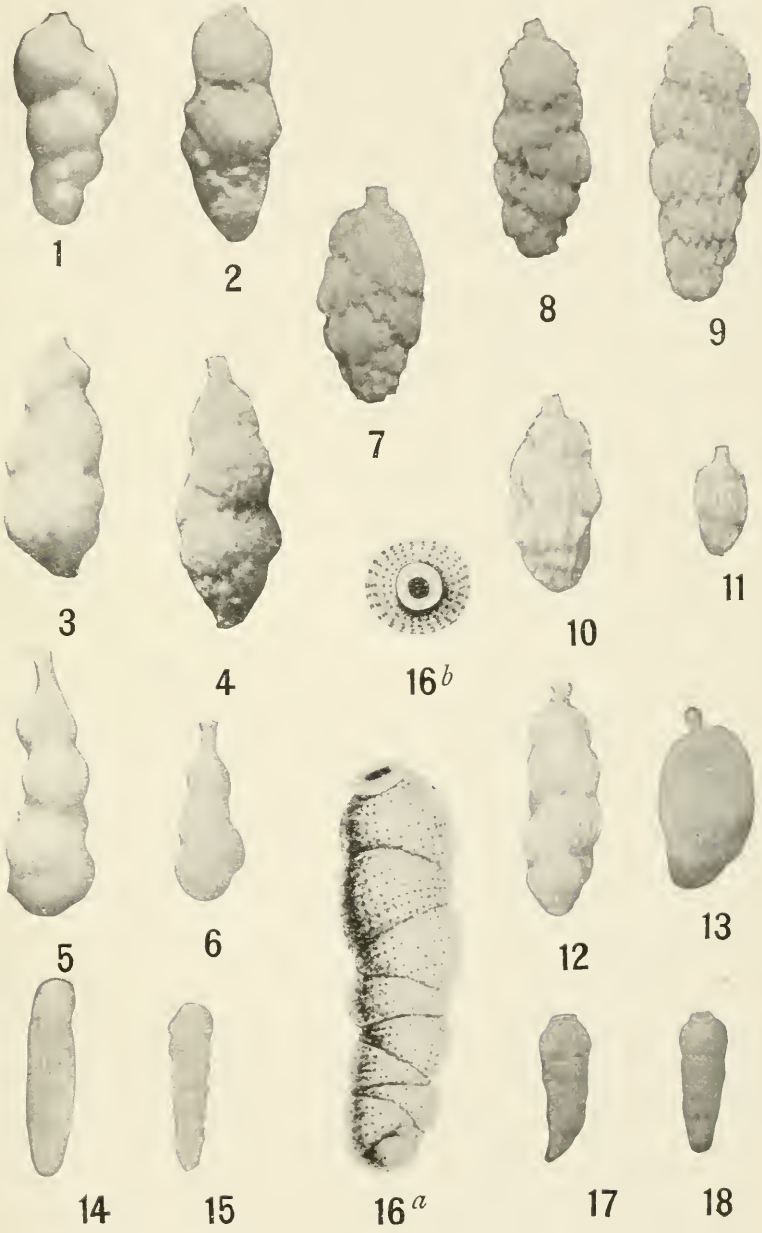
13. *Polymorphina spinosa*. ×100. Front view. After Balkwill and Wright.

14–16. *Uvigerina canariensis*. Figure 14, ×50; figure 15, ×60; figure 16, ×75. After H. B. Brady.

17–20. *Uvigerina angulosa*. ×30. D2078.

Plate 42.

Figs. 1, 2. *Uvigerina semicostata*. ×50. Side views. D2160.
3, 4. *Uvigerina auberiana*. ×40. Side views. D2754.
5. *Uvigerina ampullacea*. ×50. Side view. D2117.
6. *Uvigerina ampullacea*. ×40. Side view. H60.
7–9. *Uvigerina peregrina*. ×30. Front views. D2018.
10. *Uvigerina peregrina*. ×30. Front view. D2029
11. *Uvigerina peregrina*, var. *parvula*. ×30. Front view. D2400.
12. *Uvigerina peregrina*, var. *bradyana*. ×30. Front view. D2568.
13. *Uvigerina flintii*. ×30. Front view. D2641.
14. *Siphogenerina raphanus*. ×30. Front view. D2150.
15. *Siphogenerina advena*. ×50. Front view. D2150.
16. *Siphogenerina dimorpha*. ×113. *a*, side view; *b*, apertural view. After Heron-Allen and Earland.
17. *Siphogenerina dimorpha*. ×50. Front view of microspheric specimen. D2150.
18. *Siphogenerina dimorpha*. ×50. Front view of megalospheric specimen. D2614.



LAGENIDAE OF THE ATLANTIC OCEAN.

FOR EXPLANATION OF PLATE SEE PAGE 220.

INDEX.