

CONTRIBUTIONS FROM THE CUSHMAN
LABORATORY FOR FORAMINIFERAL RESEARCH

227. SOME FOSSIL FORAMINIFERA FROM ALASKA*

By JOSEPH A. CUSHMAN

The foraminifera in the Alaskan material noted here are of especial interest as so little is known of fossil material from this region. The specimens are from a submarine beach about a mile north 60° west of Nome, Alaska, collected by J. B. Mertie, Jr.

A number of the species are known only from Arctic regions, a few extend southward along the coast of the Eastern Pacific, and nearly all are known to occur in Arctic or Subarctic regions.

The large species of *Elphidiella* are characteristically Arctic, and are the most abundant and conspicuous foraminifera in the material.

The age of the material is probably Pleistocene or Pliocene from the known fossil occurrences of the species present. Several of the species occur in the Pleistocene or Pliocene of the Pacific or Atlantic coasts. The species are figured, and references are given for those species which are of especial interest in fixing the age of the material.

Family MILIOLIDAE

Genus QUINQUELOCULINA d'Orbigny, 1826

QUINQUELOCULINA cf. VULGARIS d'Orbigny (Pl. 9, fig. 1)

The specimen figured is the only one of this form found in the Alaskan material. This species has been recorded from off Japan and other localities in the North Pacific.

Family POLYMORPHINIDAE

Genus GLOBULINA d'Orbigny, 1826

GLOBULINA GLACIALIS Cushman and Ozawa (Pl. 9, fig. 14)

Globulina glacialis CUSHMAN and OZAWA, Proc. U. S. Nat. Mus., vol. 77, Art. 6, 1930, p. 71, pl. 15, figs. 6, 7.

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The types of this species are from Pleistocene clays of the Glen, Montreal, Canada. It also occurs in Pleistocene clays of McGill College Grounds, Montreal, and the Leda clay of Portland, Me. Recent specimens occurred in dredgings in cold water from Murray Bay, Province of Quebec, Canada. Specimens are very rare in this Alaskan material, but are identical with the types.

Genus PSEUDOPOLYMORPHINA Cushman and Ozawa, 1928

PSEUDOPOLYMORPHINA ISHIKAWAENSIS Cushman and Ozawa (Pl. 9, fig. 16)

Pseudopolymorphina ishiikawaensis CUSHMAN and OZAWA, Jap. Journ. Geol. Geogr., vol. 6, 1929, p. 70, pl. 13, fig. 5; pl. 15, fig. 5; Proc. U. S. Nat. Mus., vol. 77, Art. 6, 1930, p. 98, pl. 25, figs. 4, 6.—ASANO, Jap. Journ. Geol. Geogr., vol. 15, 1938, p. 96, pl. 11, fig. 5.

This species, described from the Pliocene of Japan, occurs in our Alaskan material. Although recorded from several localities in the Pliocene and Miocene of Japan, there are no records of it as a living species.

Family NONIONIDAE

Genus ELPHIDIUM Montfort, 1808

ELPHIDIUM BARTLETTI Cushman (Pl. 9, figs. 2, 3)

Elphidium bartletti CUSHMAN, Smithsonian Misc. Coll., vol. 89, No. 9, 1933, p. 4, pl. 1, fig. 9; U. S. Geol. Survey Prof. Paper 191, 1939, p. 64, pl. 18, fig. 10.

This species is known from a number of localities off Labrador and Greenland in 7 to 35 fathoms. It is rare in the Alaskan collection.

ELPHIDIUM sp. (Pl. 9, fig. 10)

A single incomplete specimen of a very compressed species is figured. It does not seem identical with any of the described Arctic species.

Genus ELPHIDIELLA Cushman, 1936

ELPHIDIELLA OREGONENSE (Cushman and Grant) (Pl. 9, figs. 7-9)

Elphidium oregonense CUSHMAN and GRANT, Trans. San Diego Soc. Nat. Hist., vol. 5, 1927, p. 79, pl. 8, fig. 3.—CUSHMAN, STEWART, and STEWART, l. c., vol. 6, 1930, p. 62, pl. 4, figs. 1, 2.—CUSHMAN, U. S. Geol. Survey Prof. Paper 191, 1939, p. 50, pl. 13, figs. 14-16.

This is a large species with strongly umbonate center, many chambers, and complanate test.

The species occurs at present off the coast of Oregon, in the Pleistocene of Oregon, and the Pliocene of California. There are a few specimens in the collection, one figured on our plate (Pl. 9, fig. 7) which are perhaps the young of this species. They indicate that the species may really belong to *Elphidiella*. The Alaskan specimens are larger than those from more southern regions.

ELPHIDIELLA HANNAI (Cushman and Grant) (Pl. 9, figs. 5, 6)

Elphidium hannai CUSHMAN and GRANT, Trans. San Diego Soc. Nat. Hist., vol. 5, 1927, p. 77, pl. 8, fig. 1.

Elphidiella hannai CUSHMAN (in part), U. S. Geol. Survey Prof. Paper 191, 1939, p. 66, pl. 19, fig. 1 (not fig. 2).

This species was described from Recent dredgings at 40 fathoms, 15 miles south of the Farralones, off California. It has also been recorded from the Pleistocene and Pliocene of California. There has been some confusion in regard to this species and the following as they occur together. *E. hannai* is the most common species in this Alaskan collection.

ELPHIDIELLA NITIDA Cushman, n. sp. (Pl. 9, fig. 4)

Elphidium hannai CUSHMAN and GRANT, var., Trans. San Diego Soc. Nat. Hist., vol. 5, 1927, p. 78, pl. 8, fig. 2.—CUSHMAN, STEWART, and STEWART, l. c., vol. 6, 1930, p. 62, pl. 3, figs. 16, 17.

Elphidiella hannai CUSHMAN (in part), U. S. Geol. Survey Prof. Paper 191, 1939, p. 66, pl. 19, fig. 2 (not fig. 1).—CUSHMAN and MCCULLOCH, Allan Hancock Pacific Exped., vol. 6, No. 3, 1940, p. 177, pl. 20, fig. 11.

Test of medium size, the diameter about twice the thickness, periphery subacute or slightly rounded, umbilical region flattened or slightly convex; chambers distinct, 15-18 in the last-formed coil, not inflated; sutures very distinct, limbate, flush with the surface, with a line of very fine pores, sometimes irregularly doubled, the sutures appearing as darker lines on the lighter mass of the thick wall which is highly polished; aperture consisting of a series of fine pores at the base of the apertural face. Diameter 1.00-1.50 mm.

Holotype (Cushman Coll. No. 36191) from Pliocene (?) submarine beach, about 1 mile N. 60° W. of Nome, Alaska.

This species differs from *Elphidiella hannai* (Cushman and Grant) in the very narrow sutures, with very fine pores and highly polished wall.

This species was first recorded from the Pliocene of California as a variety of the preceding, but the two seem distinct. It occurs

living along the west coast of North America from Alaska southward to California.

Family BULIMINIDAE

Genus ENTOSOLENIA Ehrenberg, 1848

ENTOSOLENIA SQUAMOSA (Montagu) (Pl. 9, fig. 13)

The single large specimen figured evidently belongs to this species which is recorded from many localities, among which are some from cold, northern waters.

ENTOSOLENIA cf. LUCIDA (Williamson) (Pl. 9, fig. 12)

A single specimen, somewhat obscure from the exterior, shows, when moistened, bands at the periphery similar to those in Williamson's species.

ENTOSOLENIA cf. MARGINATA (Walker and Boys) (Pl. 9, fig. 11)

A single specimen with a narrow keel may belong to this species which is evidently very variable.

Family ROTALIIDAE

Genus DISCORBIS Lamarck, 1804

DISCORBIS BERTHELOTI (d'Orbigny) (Pl. 9, figs. 18, 19)

From the records, this is very widely distributed both as a living and fossil species. Among other records, it is recorded from the Pleistocene of Japan.

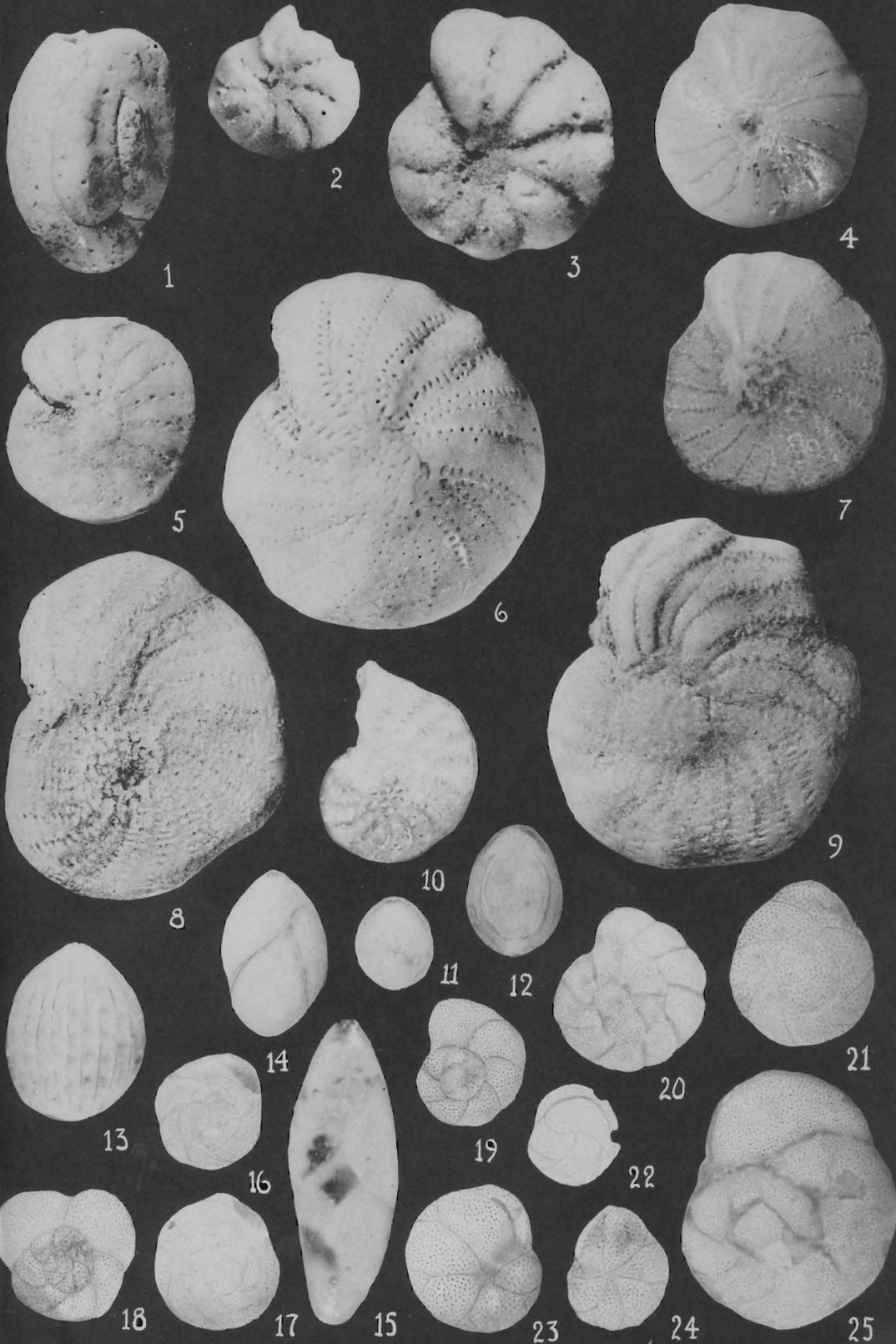
Genus ROTALIA Lamarck, 1804

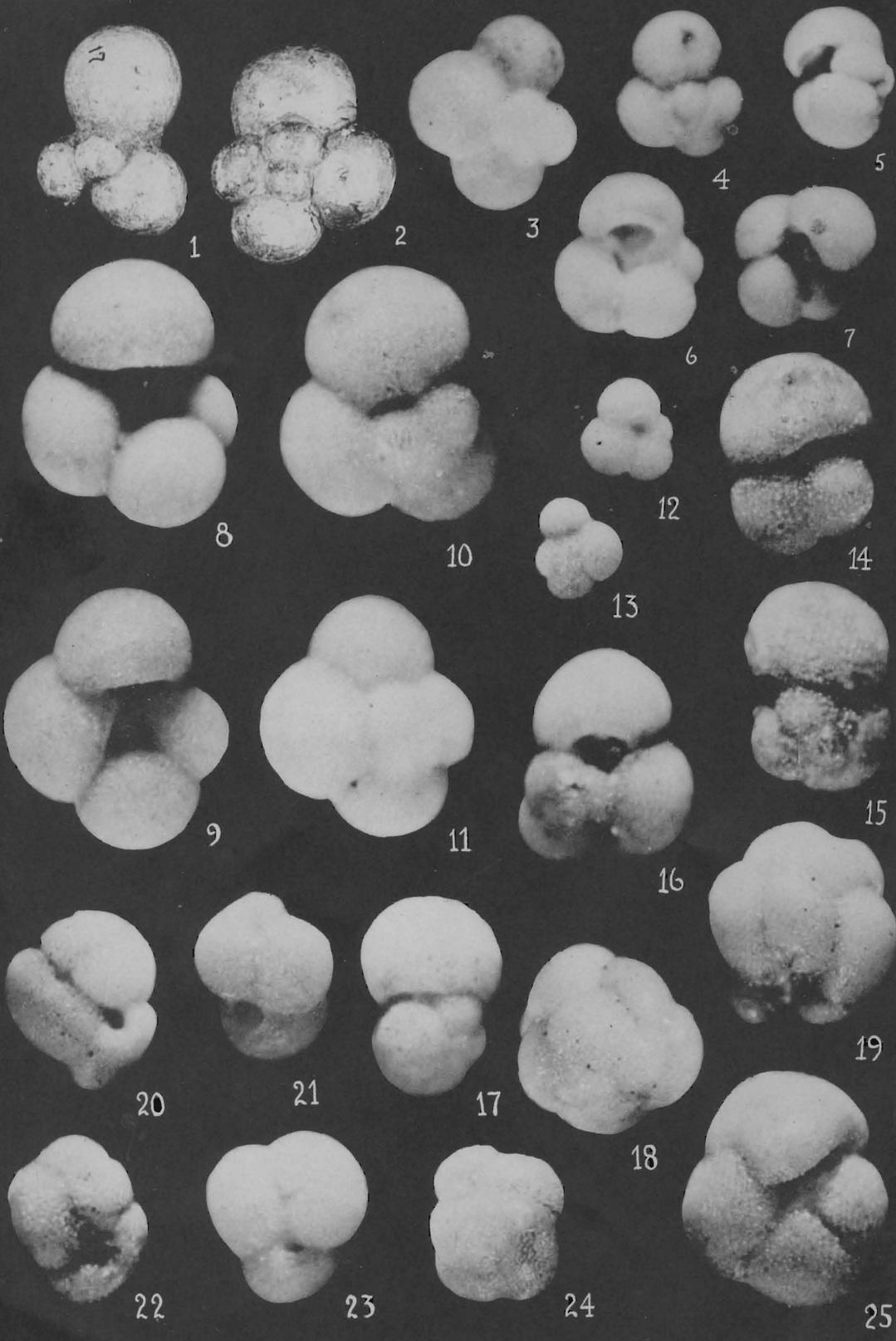
ROTALIA BECCARII (Linné) (Pl. 9, fig. 20)

Rare specimens of this species occur in our Alaskan material.

EXPLANATION OF PLATE 9

FIG. 1. *Quinqueloculina* cf. *vulgaris* d'Orbigny. × 27. 2, 3. *Elphidium bartletti* Cushman. 2, × 27. 3, × 54. 4. *Elphidiella nitida* Cushman, n. sp. × 27. 5, 6. *E. hannai* (Cushman and Grant). × 27. 7-9. *E. oregonense* (Cushman and Grant). × 27. 10. *Elphidium* sp. × 85. 11. *Entosolenia* cf. *marginata* (Walker and Boys). × 75. 12. *E.* cf. *lucida* (Williamson). × 75. 13. *E. squamosa* (Montagu). × 75. 14. *Globulina glacialis* Cushman and Ozawa. × 75. 15. *Pseudopolymorphina ishikawensis* Cushman and Ozawa. × 45. 16, 17. *Eponides frigidus* (Cushman). × 75. 18, 19. *Discorbis bertheloti* (d'Orbigny). × 75. 20. *Rotalia beccarii* (Linné). × 75. 21. *Pulvinulinella* sp. × 75. 22. *Cassidulina delicata* Cushman. × 75. 23, 24. *Cassidulina crassa* d'Orbigny. × 75. 25. *Eponides* cf. *repandus* (Fichtel and Moll). × 75.





They are similar in form to specimens from colder waters, and much smaller than the more typical specimens from the Mediterranean.

Genus EPONIDES Montfort, 1808

EPONIDES FRIGIDUS (Cushman) (Pl. 9, figs. 16, 17)

Pulvinulina karsteni H. B. BRADY (not REUSS), Trans. Linn. Soc. London, vol. 24, 1864, p. 470, pl. 48, fig. 15; Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 436, pl. 21, figs. 11 a-c.

Pulvinulina repanda (FICHTEL and MOLL), var. *karsteni* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 396, pl. 14, figs. 14, 15, 17.

Pulvinulina frigida CUSHMAN, Contr. Canadian Biology, 1921 (1922), p. 12.

Eponides frigida (CUSHMAN), Bull. 104, U. S. Nat. Mus., pt. 8, 1931, p. 45.—HADA, Zool. Mag., vol. 48, 1936, text fig. 12.

This is typically an Arctic species. It is also recorded from brackish water lakes of Japan. Several specimens were found in the Alaskan material. There seem to be no fossil records for the species, but the var. *calida* Cushman and Cole is known from the Pleistocene of Maryland and the late Tertiary of the Georges Bank.

EPONIDES cf. REPANDUS (Fichtel and Moll) (Pl. 9, fig. 25)

A single specimen with very dark, slightly limbate sutures was found in the Alaskan material. It is not entirely typical.

Family CASSIDULINIDAE

Genus CASSIDULINA d'Orbigny, 1826

CASSIDULINA CRASSA d'Orbigny (Pl. 9, figs. 23, 24)

d'Orbigny described this species from off the Falkland Islands.

EXPLANATION OF PLATE 10

(All figures except 1 and 2, $\times 55$)

FIGS. 1-13. *Globigerina bulloides* d'Orbigny. 1, 2, Photographs of d'Orbigny's original Models 17 and 76. 3-7, Topotypes from Rimini, Italy. 3, 4, dorsal views; 5, side view; 6, 7, ventral views. 8-11, Larger specimens from the Atlantic off the British Isles. 8, 9, ventral views; 10, 11, dorsal views. 12, 13, Small forms from the Gulf of Oman. 12, ventral view; 13, dorsal view. 14-17. *Globigerinoides trilocularis* (d'Orbigny). From the Miocene of Bordelais, France. 14, ventral view; 15, 16, dorsal views; 17, side view. 18, 19. *Globigerina helicina* d'Orbigny. Topotypes from Rimini, Italy. 18, dorsal view; 19, side view. 20-23. *Globigerinoides elongata* (d'Orbigny). Topotypes from Rimini, Italy. 20-22, side views; 23, ventral view. 24, 25. *Globorotalia punctulata* (d'Orbigny). Topotypes from Rimini, Italy. 24, dorsal view of young specimen; 25, ventral view of adult.

It has been widely recorded from the Antarctic, and there are numerous records also from the Arctic as well as elsewhere. There are also numerous fossil records from Pleistocene to Oligocene. The Arctic specimens usually are more coarsely perforate than specimens from warmer regions, and it may be a distinct variety.

CASSIDULINA DELICATA Cushman (Pl. 9, fig. 22)

There is a single specimen of this small species, but it seems to be typical. It was described from off the coast of California, and has been recorded from several localities in this region. There are a few records of fossil occurrences, one of these being from the Pliocene of Fiji.

Genus *PULVINULINELLA* Cushman, 1926

PULVINULINELLA sp. (Pl. 9, fig. 21)

The coarsely perforate species figured evidently belongs to this genus, but does not seem to be identical with any known species.

228. THE SPECIES DESCRIBED AS *GLOBIGERINA* BY
D'ORBIGNY IN 1826

By JOSEPH A. CUSHMAN

The family Globigerinidae while one of the most widely distributed, and having persisted since the Jurassic at least, is nevertheless a difficult one to work with as to species. With a pelagic habit for most of the species, they are wide ranging and may have changed less over periods of time than those groups which live at the bottom of the sea and are subject to greater changes. A study of the described species has been made to determine more clearly the detailed structure, and to discover their distribution and stratigraphic range.

Fornasini has published tracings of d'Orbigny's "Planches Inédites," and these are reproduced here. Topotype or other material is illustrated on our plates.

GLOBIGERINA BULLOIDES d'Orbigny (Pl. 10, figs. 1-13)

Polymorphium tuberosum et globiferum SOLDANI, Testaceographia, vol.

1, pt. 2, 1791, p. 117, pl. 123, figs. H, I, O, P.

Globigerina bulloides D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No.

1; Modèles Nos. 17, 76, 1826.

This species is described from the Adriatic, near Rimini. Photographs of the original models are given on our plate, and of topotypes from Rimini collected by the writer in 1927. This name has been used for many forms, and the distribution and geologic range would be very exceptional if all of the records were really for one species.

Brady in the *Challenger* Report gives its range as from Cretaceous to Recent, and very widely distributed.

d'Orbigny's Models show a young stage, No. 17, and the adult, No. 76. The latter is a good representation of the species as I found it at Rimini. The test is composed of numerous chambers in a very low spire, four in the adult whorl, and increasing rather rapidly in size as added. The aperture is on the ventral side at the umbilicus, is fairly large, arched, with a smoother border like a lip, but not raised. There are no supplementary apertures. The surface in the adult is difficult to describe. It does not have the regular, depressed areas usually shown in the figures, but is irregularly and finely papillate, the papillae often fused into irregular, labyrinthic, darker lines against a lighter background or vice versa. Topotypes, that seem to be adult, range from 0.63-0.70 mm. in diameter, and 0.40-0.45 mm. in height.

It will be at once apparent that most of the records for *Globigerina bulloides* are probably not this species. The figures given by Fornasini (Mem. Accad. Sci. Istit. Bologna, ser. 5, vol. 7, 1899, pl. 2, figs. 1, 3-8) are excellent to show the shape of the test and chambers, but the surface of the test is shown in conventional pattern of circular areas in lines, not at all the surface shown in our specimens. It was from directions given me by Fornasini when I called on him in Bologna that I made my collections at Rimini, and they agree in all other details except the surface. Studies already made seem to indicate that the surface pattern is of much importance in discriminating between species.

GLOBIGERINOIDES TRILOCULARIS (d'Orbigny) (Pl. 10, figs. 14-17; pl. 11, fig. 1)

Globigerina trilocularis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 2.—FORNASINI, Rend. Accad. Sci. Istit. Bologna, new series, vol. 2, p. 12, pl. 1, figs. 6, 7; text fig. 2.—SILVESTRI, Mem. Pont. Accad. Nuovi Lincei, vol. 15, 1899, p. 253, pl. 9, figs. 10 a-c, 11.

The types of this species were from the Miocene in the region of Bordeaux, France. I have abundant material from various Miocene localities in this region which may be considered topo-

types. They show that the species really belongs to *Globigerinoides*, with supplementary apertures on the dorsal side. The spire is low, and in general the species resembles *G. sacculifera* (H. B. Brady), but the supplementary apertures do not appear as early and the adult does not develop the large, irregularly shaped chambers that Brady's species does. Like other species of *Globigerinoides*, the surface is regularly cancellated with distinct pits. Three chambers made up the whorl in the adult. The references given above seem to belong here, but not the others referred to this species.

GLOBIGERINA GLOBULARIS d'Orbigny (Pl. 11, fig. 2)

Globigerina globularis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 3.—FORNASINI, Rend. Accad. Sci. Istit. Bologna, new series, vol. 7, 1903 (1904), p. 3, pl. 1, fig. 1.

The types of this species were from "Ile de France." I have no truly toptype material. There are very few references to it in the literature. The material referred to it by Roemer in 1838 from the Oligocene of Germany is not the same, nor is that referred to it by Egger in 1893. The species must be left somewhat obscure until the original types or toptype material can be studied.

GLOBIGERINOIDES ELONGATA (d'Orbigny) (Pl. 10, figs. 20-23; pl. 11, fig. 3)

Polymorphium tuberosum et *globiferum* SOLDANI, Testaceographia, vol. 1, pt. 2, 1791, p. 117, pl. 123, fig. K.

Globigerina elongata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 4.—FORNASINI, Pal. Ital., vol. 4, 1898, p. 207, text fig. 1; Mem. Accad. Sci. Istit. Bologna, ser. 5, vol. 7, 1899, p. 11, pl. 3, figs. 8-10; l. c., vol. 10, 1902, p. 55.

The types are from the Adriatic, near Rimini, and fossil at Castel Arquato, Italy. I have toptypes from both localities. The species belongs to *Globigerinoides*, although d'Orbigny's figure does not show the supplementary apertures on the dorsal side. Fornasini's figures show these definitely. The surface is regularly cancellated as is typical for this genus. Our specimens are not as elongate as the extreme ones shown by Fornasini, but are like his shorter ones, and seem to be typical. Martinotti records it without figures from Tripoli.

The original figure given by Soldani was referred by Parker, Jones and Brady to *Cassidulina* on the basis of the arrangement of the chambers and the shape and position of the aperture.

d'Orbigny's figure given by Fornasini and reproduced here is quite different.

GLOBIGERINA HELICINA d'Orbigny (Pl. 10, figs. 18, 19; pl. 11, fig. 4)

Polymorphium globuliferum SOLDANI Testaceographia, vol. 1, pt. 2, 1791, p. 118, pl. 130, figs. qq, rr, pp(?).

Globigerina helicina D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 5.—FORNASINI, Pal. Ital., vol. 4, 1898, p. 209, text fig. 4; Mem. Accad. Sci. Istit. Bologna, ser. 5, vol. 7, 1899, p. 11, pl. 3, figs. 11, 12.

The types of this species were from Rimini. The figure given by d'Orbigny and shown in Fornasini's copy reproduced here shows a quite different form from that of Soldani. The specimen from Rimini figured here seems to be very close to the form figured by d'Orbigny. Later authors have placed under this name many aberrant forms where a supplemental chamber is added on the opposite side from the last previous chamber, following the figure given by Soldani. It will be necessary to re-examine d'Orbigny's type specimens before the true characters of this species can be definitely determined. The surface of the specimen figured here is papillate and not cancellated.

GLOBIGERINA ROTUNDATA d'Orbigny (Pl. 11, fig. 5)

Globigerina rotundata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 6.—FORNASINI, Pal. Ital., vol. 4, 1898, p. 208, text fig. 3.

The types of this species were from the island of St. Helena. I have had no topotypes available, and the types should be studied. Fornasini's figures of specimens from the Adriatic (Mem. Accad. Sci. Istit. Bologna, ser. 5, vol. 7, 1899, p. 6, pl. 1, figs. 4, 5; pl. 4, fig. 1) do not seem to have the aperture nor the general arrangement of the chambers indicated by the type figure.

GLOBIGERINA (?) TRIGONULA d'Orbigny (Pl. 11, fig. 6)

Globigerina trigonula D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 7.—FORNASINI, Rend. Accad. Sci. Istit. Bologna, new series, vol. 7, 1903, p. 140, pl. 1, fig. 2.

The types of this species are also from St. Helena. From the figure given, it is probable that this is really a *Globorotalia*. There seem to be no other references to it in the literature.

GLOBOROTALIA PUNCTULATA (d'Orbigny) (Pl. 10, figs. 24, 25; pl. 12, fig. 1)

Globigerina punctulata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 8.—FORNASINI, Pal. Ital., vol. 4, 1898, p. 210, text fig. 5.

The types of this species were from the Adriatic near Rimini.

The figure indicates that this is probably a *Globorotalia*, and I have specimens in my collections from Rimini that can be referred to it and place it definitely in that genus. There seem to be no further references to the species.

GLOBIGERINA (?) DEPRESSA d'Orbigny (Pl. 11, fig. 7)

Globigerina depressa D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 9.—FORNASINI, Rend. Accad. Sci. Istit. Bologna, new series, vol. 7, 1903, p. 140, pl. 1, fig. 3.

The types of this species were from ballast, and no locality can be given, nor the age of the material. It is evidently not a *Globigerina*, nor is it the same as the form figured later by Ehrenberg under this name. It may be allowed to lapse.

GLOBIGERINA (?) GIBBA d'Orbigny (Pl. 11, fig. 8)

Globigerina gibba D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 10.—FORNASINI, Pal. Ital., vol. 4, 1898, p. 208, text fig. 2.

Like the preceding, the types of this species were from ballast material. Without further references and data as to its age or locality, it may be allowed to lapse. It is not possible to be sure of the genus from the figure given.

GLOBIGERINA (?) FRAGILIS d'Orbigny (Pl. 11, fig. 9)

Globigerina fragilis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 11.—FORNASINI, Rend. Accad. Sci. Istit. Bologna, new series, vol. 7, 1903, p. 141, pl. 1, fig. 4.

The types were from the vicinity of Dax, France, fossil, probably Miocene. It is doubtful if this is a *Globigerina*. There are no further records for it, and I have failed to find anything definitely referable to it in material from the type area.

GLOBIGERINA (?) PARISIENSIS d'Orbigny (Pl. 11, fig. 10)

Globigerina parisiensis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 12; Prod. Pal., vol. 2, 1850, p. 407, No. 1326.—FORNASINI, Rend. Accad. Sci. Istit. Bologna, new series, vol. 7, 1903, p. 141, pl. 1, fig. 5.

The types were from Eocene material in the Paris Basin, later recorded from Grignon. From the figure this appears to belong to the Rotaliidae, possibly *Cancris*.

229. SPECIES OF UVIGERINA OCCURRING IN THE
AMERICAN MIOCENE

By JOSEPH A. CUSHMAN and RUTH TODD

Continuing the studies of *Uvigerina* and related genera, we are here presenting the known American Miocene species. The earlier described Miocene species were noted in Volume 15, Part 2, of these Contributions. There are other species which probably extend into the Miocene from the Oligocene, and possibly other Recent species, than those noted here, whose early beginnings were in the Miocene. However, their Miocene representatives need further study.

UVIGERINA ALTACOSTATA Cushman and Ellisor (Pl. 13, figs. 1, 2)

Uvigerina altacostata CUSHMAN and ELLISOR, Contr. Cushman Lab. Foram. Res., vol. 15, 1939, p. 9, pl. 1, fig. 14.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 24, 1940, pl. 2, fig. 7.

"Test fusiform, about twice as long as broad, apertural end more or less pointed; chambers fairly distinct, earlier ones often obscured by the ornamentation, strongly inflated; sutures depressed, distinct in the later portion; wall ornamented throughout with very high, longitudinal costae, those of each chamber independent of those of adjacent ones, the basal end of the costae often projecting, sometimes forming short claw-like projections; aperture terminal, rounded, with a distinct, tubular neck and occasionally a slight lip. Length 0.50-0.60 mm.; diameter 0.35 mm.

"The types are from core material of probable Miocene age from Amerada Petroleum Company's No. 1 St. Charles Land Company, St. Charles Parish, Louisiana, at a depth of 9,104-14 feet."

The species most closely resembles *U. isidroensis* Cushman and Renz from the Miocene of Venezuela, but is slightly larger, the chambers are less under cut, and the costae are fewer.

UVIGERINA ANGELINA Kleinpell (Pl. 13, fig. 3)

Uvigerina angelina KLEINPELL, Miocene Stratigraphy of California, 1938, p. 292, pl. 18, fig. 12.

"Test small, triserial, higher than broad, thickest about two-thirds the distance from the initial to the apertural end; cham-

bers distinct, slightly inflated, about three or four whorls making up the test, each whorl of successively larger chambers, the vertical series of chambers twisted through about one-half turn; sutures distinct, depressed; wall covered with low but regular costae, about 11 or 12 on a chamber, the costae not continuing across the sutures; aperture terminal, broad, diameter almost half that of test, on short neck, the latter costate at its base. Length 0.41 mm.; breadth 0.20 mm."

"This is a very small and very rare species. Its strongly twisted and ornate test, broad apertural neck, and small size distinguish it from other *Uvigerinas* of the California 'Miocene'."

Kleinpell records it from the upper and lower Mohnian and lower Delmontian, Miocene, of California.

UVIGERINA AUBERIANA d'Orbigny (Pl. 13, figs. 4, 5)

Although the types of this species are from the Recent and will be taken up in the discussion of the Recent *Uvigerinas*, it may be noted here that specimens close to this species occur in the Choctawhatchee formation, Miocene, of Florida and the Miocene from Chesapeake Beach, Maryland. Two are figured for reference on our plate.

UVIGERINA AUBERIANA d'Orbigny, var. *ATTENUATA* Cushman and Renz
(Pl. 13, figs. 6-9)

Uvigerina auberiana D'ORBIGNY, var. *attenuata* CUSHMAN and RENZ,
Contr. Cushman Lab. Foram. Res., vol. 17, 1941, p. 21, pl. 3, fig. 17.

For description see Part 1 of Volume 17 of these Contributions. Photographs of paratypes are given here. In our material specimens evidently identical occur in the Miocene from Buff Bay, Jamaica.

UVIGERINA CARMELOENSIS Cushman and Kleinpell (Pl. 13, fig. 10)

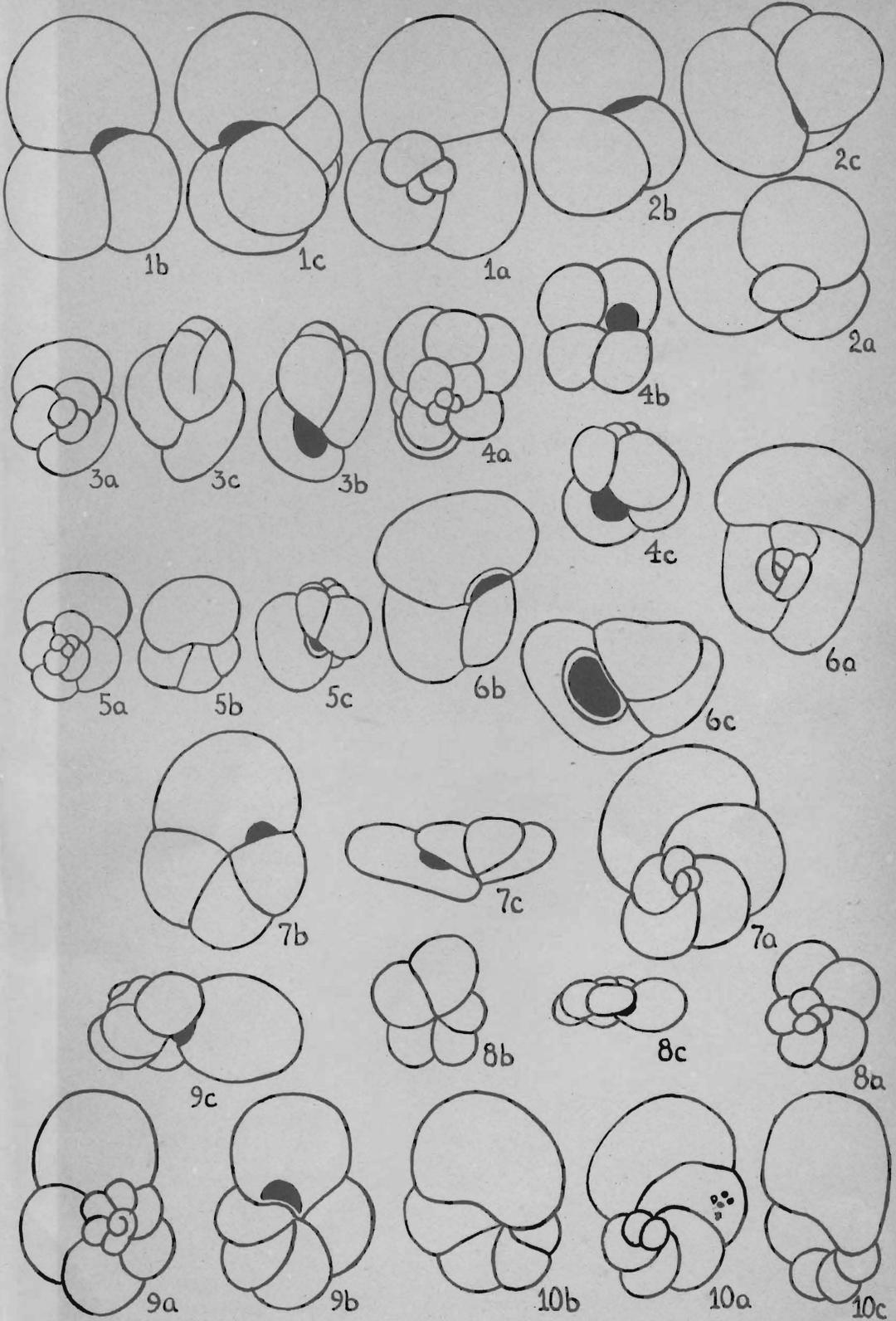
Uvigerina carmeloensis CUSHMAN and KLEINPELL, Contr. Cushman
Lab. Foram. Res., vol. 10, 1934, p. 11, pl. 2, fig. 7.—KLEINPELL, Miocene Stratigraphy of California, 1938, p. 294.

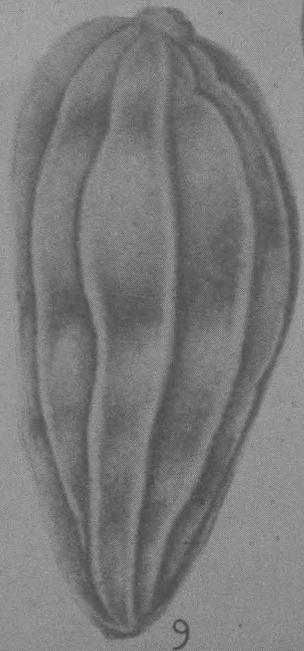
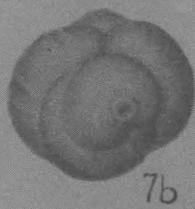
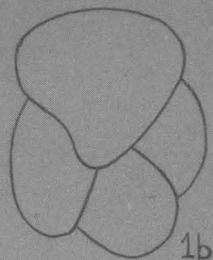
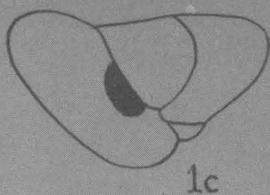
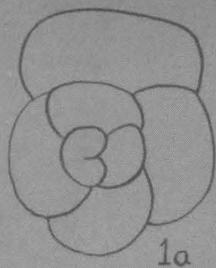
"Test elongate, slender, the sides nearly straight for most of

EXPLANATION OF PLATE 11

Figures traced from d'Orbigny's "Planches inédites" (After Fornasini).

FIG. 1. *Globigerina trilocularis* d'Orbigny. 2. *G. globularis* d'Orbigny.
3. *G. elongata* d'Orbigny. 4. *G. helicina* d'Orbigny. 5. *G. rotundata*
d'Orbigny. 6. *G. trigonula* d'Orbigny. 7. *G. depressa* d'Orbigny. 8. *G.*
gibba d'Orbigny. 9. *G. fragilis* d'Orbigny. 10. *G. parisiensis* d'Orbigny.
a, dorsal view; b, ventral view; c, peripheral view.





the length, slightly lobate; chambers distinct, inflated, of rather uniform size and shape; sutures distinct, depressed, slightly oblique; wall ornamented with numerous low costae, those of each chamber independent of the others; aperture terminal, rounded, with a short neck. Length 1.00 mm.; diameter 0.40 mm."

The species occurs in the Monterey shale of California.

UVIGERINA GALLOWAYI Cushman (Pl. 13, fig. 11)

See Contr. Cushman Lab. Foram. Res., vol. 14, 1938, p. 75, pl. 13, figs. 8, 9.

This species is described and figured in the above reference with other possibly Oligocene species. It occurs in the lower Zemorrian (Miocene) of California, recorded by Kleinpell, and it is probable that the material from Manta, Ecuador, and from Venezuela may also be of lower Miocene age.

UVIGERINA GALLOWAYI Cushman, var. *BASICORDATA* Cushman and Renz
(Pl. 13, fig. 12)

Uvigerina gallowayi CUSHMAN, var. *basicordata* CUSHMAN and RENZ,
Contr. Cushman Lab. Foram. Res., vol. 17, 1941, p. 21, pl. 3, fig. 18.

For description see Part 1 of Volume 17 of these Contributions. A photograph of a paratype is given here. The variety also occurs in the material from Manta, Ecuador, with the typical form of the species.

UVIGERINA GESTERI Barbat and von Estorff (Pl. 12, figs. 8, 9)

Uvigerina gesteri BARBAT and VON ESTORFF, Journ. Pal., vol. 7, 1933,
p. 171, pl. 23, figs. 7, 18.—KLEINPELL, Miocene Stratigraphy of
California, 1938, p. 294.

"Test rather short and bluntly terminated at the initial end in the megalospheric form, more elongate and tapering in the microspheric form; chambers numerous, inflated; sutures obscured by

EXPLANATION OF PLATE 12

FIG. 1. *Globorotalia punctulata* (d'Orbigny). Traced from d'Orbigny's "Planches inédites" (After Fornasini). a, dorsal view; b, ventral view; c, peripheral view. 2, 3. *Uvigerina howei* Garrett. × 83. 2, Paratype. 3, Holotype. (After Garrett.) 4. *U. quadrata* Coryell and Rivero. × 23. (After Coryell and Rivero.) 5. *U. laviculata* Coryell and Rivero. × 25. (After Coryell and Rivero.) 6, 7. *U. kernensis* Barbat and von Estorff. × 137. 7, Mature specimen with spines eroded. Paratype. × 120. a, side view; b, end view. (After Barbat and von Estorff.) 8, 9. *U. gesteri* Barbat and von Estorff. × 120. 8, Megalospheric form. Holotype. 9, Microspheric form. Paratype. (After Barbat and von Estorff.) 10, 11. *U. israelskiyi* Garrett. 10, Paratype, young specimen. × 62. 11, Holotype. × 66. (After Garrett.)

ornamentation; walls ornamented with 10 to 12 prominent, lamellate, longitudinal costae which usually extend from the initial end to the base of the apertural neck; costae independent of the chambers except in the megalospheric form with costae frequently becoming obsolete on the last-formed chamber and several costae not confluent on adjacent chambers; aperture terminal, with a short cylindrical neck and phialine lip. Length 1.00 mm.; maximum breadth of megalospheric form, 0.40 mm.; of microspheric form, 0.54 mm."

This is recorded only from the lower Zemorrian of California.

UVIGERINA HANNAI Kleinpell (Pl. 13, figs. 13-15)

Uvigerina californica HANNA (not CUSHMAN), Bull. Amer. Assoc. Petr. Geol., vol. 12, 1928, pl. 9, fig. 3.

Uvigerina hannaï KLEINPELL, Miocene Stratigraphy of California, 1938, p. 294.

"Test longer than broad, greatest breadth near apertural end, composed of 6 to 8 whorls; chambers distinct, inflated later ones increasing in size and degree of inflation and tending to become less regularly arranged than in earlier portion of test, wherein corresponding chambers in succeeding whorls are placed one directly above the other; sutures distinct, depressed; wall finely perforate, earlier half to two-thirds of test in some specimens more or less covered by about 16 well defined striae, later chambers smooth; aperture with short cylindrical neck and phialine lip. Length of holotype, 0.61 mm.; breadth, 0.30 mm."

"This is a more slender and elongate form than *U. hootsi* and *U. segundoensis*, to both of which it is closely related. A study of large series may show these three forms to be but varieties distinct."

Through the kindness of Dr. G. D. Hanna who supplied us with specimens, topotypes of this species are figured on our plate. Kleinpell records this species from the upper Mohnian and lower Delmontian, Miocene, of California.

UVIGERINA HOOTSI Rankin (Pl. 13, figs. 16, 17)

Uvigerina hootsi RANKIN MS, in CUSHMAN and KLEINPELL, Contr. Cushman Lab. Foram. Res., vol. 10, 1934, p. 22, pl. 3, figs. 8, 9.—KLEINPELL, Miocene Stratigraphy of California, 1938, p. 295, pl. 22, fig. 6.

"Test about twice as long as broad, greatest width above the middle; chambers very distinct, strongly inflated, of uniform

shape, gradually increasing in size as added; sutures very distinct, depressed; wall smooth, matte, or the earliest portion slightly costate; aperture very small, with a very short cylindrical neck with a thin flaring lip. Length 0.65 mm.; diameter 0.35 mm."

According to Kleinpell this species occurs in the upper and lower Mohnian and lower Delmontian, Miocene, of California.

UVIGERINA HOWEI Garrett (Pl. 12, figs. 2, 3; pl. 13, figs. 18-22)

Uvigerina howei GARRETT, Journ. Pal., vol. 13, 1939, p. 577, pl. 65, figs. 13, 17.

"Test small, elongate, fusiform; periphery slightly lobulate; chambers numerous, inflated; sutures depressed, indistinct; costae numerous, fine, low; in some specimens final chambers are somewhat hispid; aperture small, terminal, with a tapering neck and phialine lip." Length of holotype 0.42 mm.; width 0.21 mm. Length of paratype 0.64 mm.; width 0.19 mm.

The types are from a core from Stanolind Oil and Gas Company No. B-2 Pipkin, Big Hill prospect, Jefferson County, Texas.

Through the kindness of Mr. J. B. Garrett we have figured on our plate specimens from the type locality. Very similar specimens occur in the Miocene, lower *Arca* Zone of the Choctawhatchee formation, near head of Vaughan Creek, sec. 27, T. 2 N. R. 19 W., Walton County, Florida, which seem identical with the types and are here figured. The species also occurs in the upper Miocene, Yorktown formation, about 500 feet E. of Navy fuel wharf along right bank of York River, Yorktown, York County, Va.

UVIGERINA ISIDROENSIS Cushman and Renz (Pl. 14, figs. 1-6)

Uvigerina isidroensis CUSHMAN and RENZ, Contr. Cushman Lab. Foram. Res., vol. 17, 1941, p. 20, pl. 3, fig. 16.

For description see Part 1 of Volume 17 of these Contributions. Photographs of paratypes are given here. Specimens, previously recorded as *U. peregrina*, from the middle Miocene, Shoal River formation, bottom of fluor spar prospect shaft 50-55 feet deep about 4½ miles S. of Argyle, Walton County, Florida, after further comparison probably belong to *U. isidroensis*. We also have specimens from the upper Miocene, Yorktown formation, N. shore of James River, 1 mi. E. of Old King's Mill wharf, James City County, Va.

UVIGERINA ISRAELSKYI Garrett (Pl. 12, figs. 10, 11; pl. 14, fig. 7)

Uvigerina israelskyi GARRETT, Journ. Pal., vol. 13, 1939, p. 577, pl. 65, figs. 15, 16.

"Test of moderate size for the genus, elongate, fusiform; chambers indistinct; sutures irregular and deeply depressed; wall ornamented by approximately 10 very distinct, high longitudinal costae of which the majority traverse the entire length of the test; aperture small, terminal, with a short cylindrical neck and phialine lip, which is very fragile, and commonly broken." Length of holotype 0.67 mm.; width 0.32 mm. Length of paratype 0.52 mm.; width 0.33 mm.

The types are from a core from Stanolind Oil and Gas Company No. B-2 Pipkin, Big Hill prospect, Jefferson County, Texas. Through the kindness of Mr. J. B. Garrett we have a specimen from the type locality figured on our plate.

UVIGERINA JOAQUINENSIS Kleinpell (Pl. 14, figs. 8, 9)

Uvigerina joaquinensis KLEINPELL, Miocene Stratigraphy of California, 1938, p. 296, pl. 17, figs. 6, 10, 11.

"Test medium to large, length more than twice the breadth in adult specimens, greatest breadth near apertural end, composed of 5 to 7 whorls; chambers distinct, moderately inflated, somewhat irregularly arranged but sometimes in twisting longitudinal series; sutures distinct, depressed; wall rough to finely bristly throughout, with numerous fine discontinuous longitudinal costae on all chambers except those of the last one or two whorls; aperture terminal with short neck and sometimes a poorly developed lip. Length, up to 1.00 mm., but generally somewhat less; breadth, 0.40 mm."

"In shape and arrangement of the chambers this form resembles *U. modeloensis*, but it is quite distinct from this smooth species in its surface ornamentation. In its rough to bristly surface it approaches *U. proboscidea*, from which it differs in most other respects, however. It appears to be closest to *U. hootsi*, from which it differs in having a more bristly surface throughout the entire test instead of on the initial chambers only, in having stronger costae on many more chambers, and in the often more irregular arrangement of the chambers."

The only records are from the upper Luisian, Miocene, of California.

UVIGERINA KERNENSIS Barbat and von Estorff (Pl. 12, figs. 6, 7)

Uvigerina kernensis BARBAT and VON ESTORFF, Journ. Pal., vol. 7, 1933, p. 172, pl. 23, fig. 13.—KLEINPELL, Miocene Stratigraphy of California, 1938, p. 296.

"Test triserial, fusiform, greatest width near middle; periphery lobulate, chambers distinct, numerous; wall calcareous, with about 18 to 20 moderately raised longitudinal costae in complete circumference, becoming lower and less conspicuous on later chambers; last two or three chambers in adult usually without costae, but ornamented with minute spines; costae nearly confluent on adjacent chambers; aperture terminal, rounded, with a short cylindrical neck and phialine lip. Length 0.60 mm.; breadth 0.31 mm."

The species is recorded from the upper and lower Zemorrian, Miocene, of California.

UVIGERINA LAVICULATA Coryell and Rivero (Pl. 12, fig. 5)

Uvigerina laviculata CORYELL and RIVERO, Journ. Pal., vol. 14, 1940, p. 343, pl. 44, fig. 24.

"This species is ornamented only with numerous very fine longitudinal striae that cover the exposed surface of each chamber and thus differs from *U. beccari* which has larger costa intercalated between groups of smaller ones. The Haitian specimen is also more pointed on the initial end and longer than *U. beccari*. The apertural neck is set in a depression; the later chambers are distinctly inflated with depressed sutures. Length of the figured specimen, 1.25 mm."

The types are from the upper middle Miocene of Port-au-Prince, Haiti. We have not had any material that we could identify with it.

UVIGERINA LIRETTENSIS Cushman and Ellisor (Pl. 14, figs. 10, 11)

Uvigerina lirettensis CUSHMAN and ELLISOR, Contr. Cushman Lab. Foram. Res., vol. 15, 1939, p. 7, pl. 1, fig. 13.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 24, 1940, pl. 2, fig. 6.

"Test short and stout, about twice as long as broad, tending slightly to become angled, fusiform, the initial end subacute, apertural end broadly truncate; chambers distinct, somewhat inflated, increasing rapidly in size as added, the three making the last whorl in the adult forming half the surface of the test, the last-formed one in the adult often rising distinctly above the others; sutures very distinct, slightly depressed, strongly lim-

bate; wall distinctly perforate, smooth except for the initial portion which has a few, rather indistinct, longitudinal costae which soon become obsolete; aperture in a slight depression of the obliquely truncate terminal face, with a very short, cylindrical neck, the aperture small for the size of the test. Length 0.75-0.85 mm.; diameter 0.38-0.40 mm.

"The types are from core samples in the Miocene, Humble Oil and Refining Company's No. 1 Ellender, Terrebonne Parish, Louisiana, at a depth of 10,142-52 feet.

"This species in some characters resembles *U. carapitana* Hedberg from the Oligocene of Venezuela, but differs in the larger size, higher chambers in the adult, less conspicuous neck, and more truncate apertural end. Both species show faint longitudinal costae in the early chambers."

UVIGERINA MANTAENSIS Cushman and Edwards (Pl. 14, fig. 12)

Uvigerina proboscidea GALLOWAY and MORREY (not SCHWAGER), Bull. Amer. Pal., vol. 15, 1929, p. 39, pl. 6, fig. 4.

Uvigerina mantaensis CUSHMAN and EDWARDS, Contr. Cushman Lab. Foram. Res., vol. 14, 1938, p. 84, pl. 14, fig. 8.

"Test stout and broad, about $1\frac{1}{2}$ times as long as broad, fusiform; chambers comparatively few, much inflated, especially in the later portion, last-formed one tending to assume a terminal position; sutures fairly distinct in the later portion, only slightly depressed; wall very finely hispid throughout; aperture terminal, with a short, slender neck and phialine lip. Length 0.50-0.60 mm.; diameter 0.30-0.35 mm.

"This species differs from *U. proboscidea* in the much finer ornamentation of the wall, bluntly rounded instead of pointed initial end, and more inflated chambers."

This material from Manta, Ecuador, is probably lower Miocene in age.

UVIGERINA MODELOENSIS Cushman and Kleinpell (Pl. 14, fig. 13)

Uvigerina modeloensis CUSHMAN and KLEINPELL, Contr. Cushman Lab. Foram. Res., vol. 10, 1934, p. 12, pl. 2, fig. 8.—KLEINPELL, Miocene Stratigraphy of California, 1938, p. 297.

"Test elongate, slender, the sides nearly parallel, rounded in transverse section; chambers inflated, large, high, only slightly overlapping; sutures distinct, depressed; wall smooth; aperture small, terminal, rounded, with a distinct, slender neck running

down the inner face of the chamber. Length 1.10 mm.; diameter 0.40 mm."

According to Kleinpell this species occurs in the upper and lower Mohnian, Miocene, of California.

UVIGERINA QUADRATA Coryell and Rivero (Pl. 12, fig. 4)

Uvigerina quadrata CORYELL and RIVERO, Journ. Pal., vol. 14, 1940, p. 343, pl. 42, fig. 27.

"In the Haitian collection occurs a smooth uvigerine form, with the last chamber showing a tendency to become triangular, the angles very much rounded. The greatest diameter of the test is near the mid-length; the chambers very much less bulbous than those of *U. canariensis*. Length of figured specimen, 0.85 mm."

The types are from the upper middle Miocene of Port-au-Prince, Haiti. Although we have had no type material for comparison, it would seem from the rather meager description and the single figure that this is probably a synonym of *U. lirettensis*.

UVIGERINA PEREGRINA Cushman (Pl. 14, figs. 14-17)

This species, described from the Recent, will be taken up in more detail with the study of Recent Uvigerinas. Specimens close to it occur in the Miocene of Buff Bay, Jamaica, and of the Bay of Colon, Panama. The specimens from Buff Bay have previously been referred to *U. peregrina*, var. *parvula* but further examination of the material from that locality seems to show that they are not typical of the variety *parvula* but are related to it. More material is necessary for final determination. The specimens figured (Pl. 14, figs. 16, 17) from the Miocene of the Bay of Colon in some respects seem related to this species but in others are more like *U. auberiana*.

UVIGERINA SEGUNDOENSIS Cushman and Galliher (Pl. 14, fig. 18)

Uvigerina segundoensis CUSHMAN and GALLIHER, Contr. Cushman Lab. Foram. Res., vol. 10, 1934, p. 26, pl. 4, fig. 11.—KLEINPELL, Miocene Stratigraphy of California, 1938, p. 297.

"Test stout, fusiform, rounded in section, greatest thickness just above the middle, periphery somewhat lobulate; chambers numerous, distinctly inflated, especially in the adult, increasing rather regularly in size as added, last whorl of chambers tending to become somewhat more loosely spiral; sutures distinct, depressed; wall ornamented by numerous, low, longitudinal costae, earlier ones continuous over adjacent chambers, later those of

each chamber independent; aperture broadly elliptical with a short neck and thickened rim forming a very slight lip. Length 0.85 mm.; breadth 0.40 mm."

According to Kleinpell this species occurs in the upper and lower Mohnian and lower Delmontian, Miocene, of California.

UVIGERINA SUBPEREGRINA Cushman and Kleinpell (Pl. 14, figs. 19-23)

Uvigerina subperegrina CUSHMAN and KLEINPELL, Contr. Cushman Lab. Foram. Res., vol. 10, 1934, p. 12, pl. 2, figs. 9-11.—KLEINPELL, Miocene Stratigraphy of California, 1938, p. 298.

"Test small, fusiform, often slightly compressed; chambers distinct, inflated; sutures distinct, depressed, slightly oblique; wall ornamented by numerous fine costae, as many as ten to a chamber, those of each chamber independent of adjacent ones, last-formed chambers somewhat smooth; aperture terminal, small, with a short neck. Length 0.60-0.70 mm.; diameter 0.30-0.40 mm."

Kleinpell records this species from the upper and lower Mohnian and upper and lower Delmontian, Miocene, of California. We have specimens from the Miocene, *Yoldia* Zone, Choctawhatchee formation, upper bed, Chester Spence's farm, sec. 17, T. 2 N., R. 19 W., Walton County, Florida, and from the upper Miocene, Yorktown formation, about 500 feet E. of Navy fuel wharf along right bank of York River, Yorktown, York County, Va.

(Since the above notes have been completed, a paper by Galloway and Heminway has been received, which includes several species of *Uvigerina* from Porto Rico, but too late for inclusion here.)

EXPLANATION OF PLATE 13

FIGS. 1, 2. *Uvigerina altacostata* Cushman and Ellisor. 1, Holotype. × 40. 2, Paratype. × 60. 3. *U. angelina* Kleinpell. Holotype. × 87. (After Kleinpell.) 4, 5. *U. auberiana* d'Orbigny. × 60. 4, Miocene, Chesapeake Beach, Md. 5, Miocene, ½ mi. NW. of Clarksville, Fla. 6-9. *U. auberiana* d'Orbigny, var. *attenuata* Cushman and Renz. Paratypes. × 60. 10. *U. carmeloensis* Cushman and Kleinpell. Holotype. × 40. (After Cushman and Kleinpell.) 11. *U. gallowayi* Cushman. Topotype. × 60. 12. *U. gallowayi* Cushman, var. *basicordata* Cushman and Renz. Paratype. × 60. 13-15. *U. hannai* Kleinpell. 14, (After Hanna). 13, 15, Topotypes. × 60. 16, 17. *U. hootsi* Rankin. × 42. (After Rankin.) 16, Holotype. 17, Paratype. 18-22. *U. howei* Garrett. × 60. 18-20, Metatypes. 21, 22, Miocene, near head of Vaughan Creek, Walton Co., Fla.
a, front view; b, apertural view.



1b



2



3



4



5



6



1a



7



8



9



10b



10a



11



12



13



14



15



16



17



18



19



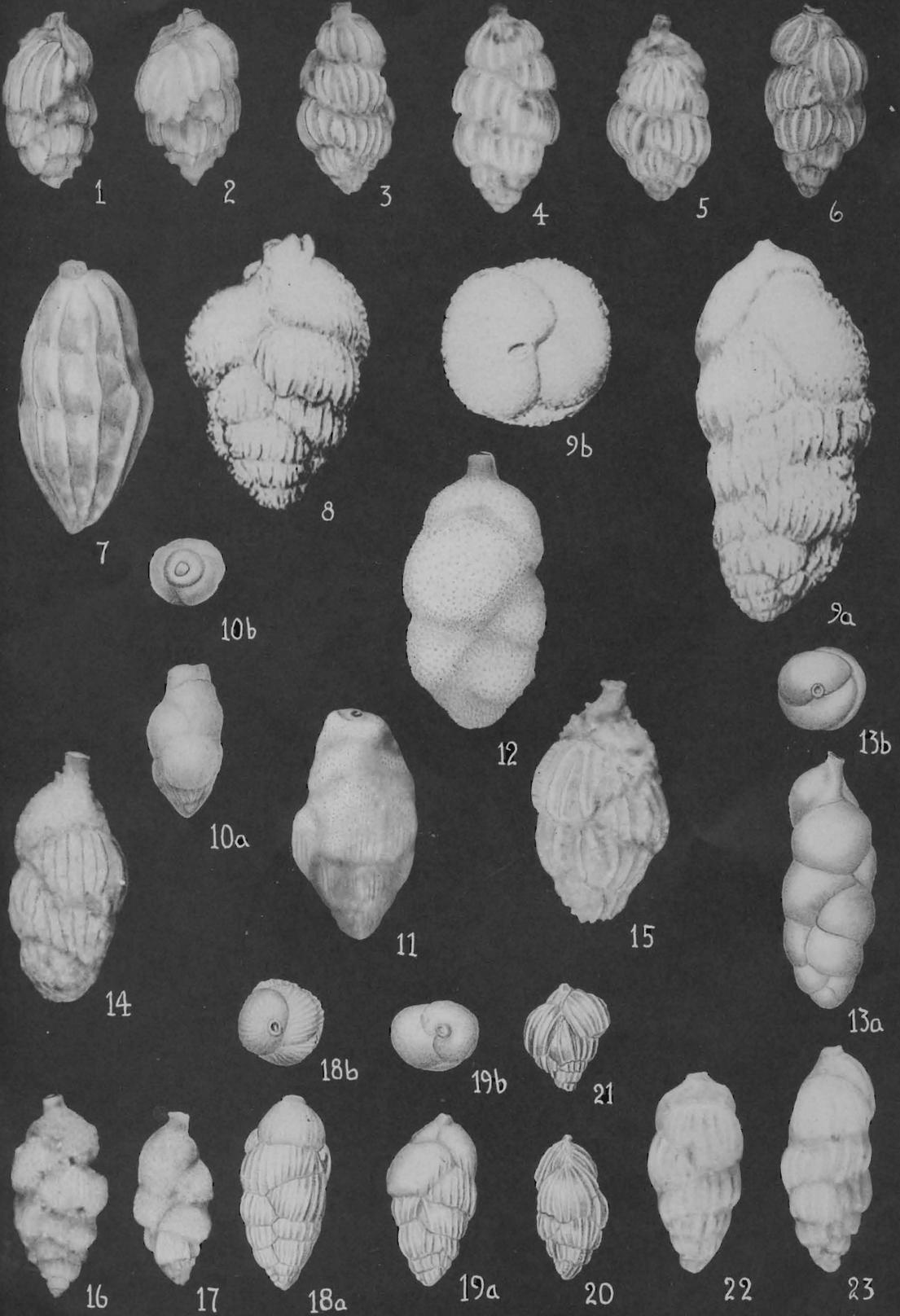
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21



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RECENT LITERATURE ON THE FORAMINIFERA

Below are given some of the more recent works on foraminifera that have come to hand.

Cushman, Joseph A. and Lloyd G. Henbest. Geology and Biology of North Atlantic Deep-Sea Cores between Newfoundland and Ireland. Part 2, Foraminifera.—U. S. Geol. Survey Prof. Paper 196-A, 1940, pp. 35-56, pls. 8-10, text figs. (charts) 11-21.—Numerous species figured and their distribution in the cores noted, none new.

Palmer, Dorothy K. Foraminifera of the Upper Oligocene Cojimar Formation of Cuba. Part 3.—Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, Dec. 31, 1940, pp. 277-304, pls. 51-53.—This part includes 63 species and varieties, the following new: *Planularia torrei*, *Marginulina cubana*, *Nodosaria hadleyi*, *Frondicularia sagittula* van den Broeck, var. *cojimarensis*, and var. *yumuriana*, *Palmula caribbeana*, *P. cubana*, *Polymorphina frondea* (Cushman), var. *yumuriana*, *Plectofrondicularia* (?) *yumuriana*, *Virgulina fusiformis* Cushman, var. *yumuriana*, *Bolivina alazanensis* Cushman, var. *hadleyi*, *Reussella yumuriana*.

Bermudez, Pedro J. Barbourinella, Nuevo Nombre para Barbourina, Foraminifero.—Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, Dec. 31, 1940, p. 410.—A new name for that already preoccupied.

Davis, Flavy E. *Textularia* from the Texas Tertiary.—Journ. Pal., vol. 15, No. 2, March, 1941, pp. 144-152, pls. 24, 25.—There are 22 species and varieties described and figured, the following new: *Textularia cuyleri*, *T. gertrudeana*, *T. hannai*, *T. isabelensis*, *T. israeli*, *T. mississippiensis* Cushman, var. *crockettensis*, and var. *elongata*, *T. strapperi*.

Garrett, J. B. New Middle Eocene Foraminifera from Southern Alabama and Mississippi.—L. c., pp. 153-156, pl. 26.—The following are described as new: *Hemicristellaria brantlyi*, *H. hatchetigbeensis*, and var. *harrisi*, *Discorbis washburni*, *Gyroidina lottensis*, *Eponides lowei*, *Cibicides hilgardi*, *C. williamsoni*.

EXPLANATION OF PLATE 14

FIGS. 1-6. *Uvigerina isidroensis* Cushman and Renz. $\times 60$. 1, 2, Paratypes. 3-6, Miocene, from bottom of shaft 50-55 feet deep, $4\frac{1}{2}$ miles S. of Argyle, Fla. 7, *U. israeli* Garrett. Metatype. $\times 60$. 8, 9, *U. joaquinensis* Kleinpell. $\times 72$. (After Kleinpell.) 10, 11, *U. liretensis* Cushman and Ellisor. 10, Holotype. $\times 30$. (After Cushman and Ellisor.) 11, Paratype. $\times 60$. 12, *U. mantaensis* Cushman and Edwards. Paratype. $\times 60$. 13, *U. modeloensis* Cushman and Kleinpell. Holotype. $\times 40$. (After Cushman and Kleinpell.) 14-17, *U. peregrina* Cushman ? $\times 60$. 14, 15, Miocene, Buff Bay, Jamaica. 16, 17, Miocene, Bay of Colon, Panama. 18, *U. segundoensis* Cushman and Galliher. Holotype. $\times 40$. (After Cushman and Galliher.) 19-23, *U. subperegrina* Cushman and Kleinpell. 19, Holotype. $\times 40$. 20, 21, Paratypes. $\times 40$. 22, 23, Miocene, Chester Spence's farm, Walton Co., Fla. $\times 60$.

a, front view; b, apertural view.

- Feray, Dan E.** Siphonides, a New Genus of Foraminifera.—L. c., pp. 174, 175, text figs. 1-4.—A genus related to *Siphonina*, but biserial in the adult, *S. biserialis* Feray as the genotype, from the Middle Eocene, Weches formation, Smithville, Texas.
- Vaughan, Thomas Wayland and W. Storrs Cole.** Preliminary Report on the Cretaceous and Tertiary Larger Foraminifera of Trinidad, British West Indies (with an appendix on new species of *Helicostegina* from Soldado Rock by Thomas F. Grimsdale).—Geol. Soc. Amer., Special Papers, No. 30, Feb. 25, 1941, pp. 1-137, pls. 1-36.—Numerous species and varieties are described and figured, the following new: *Miscellanea tobleri*, *M. soldadensis*, *Operculinoides soldadensis*, *O. kugleri*, *O. tamanensis*, *O. bullbrooki*, *O. semmesi* Vaughan and Cole, var. *ciperensis*, *Spiroclypeus bullbrooki*, *Discocyclina barkeri*, *D. grimsdalei*, *D. bullbrooki*, *Pseudophragmina tobleri*, *P. soldadensis*, *Lepidocyclina sanfernandensis*, and *Helicostegina soldadensis* Grimsdale, n. sp.
- Loeblich, Alfred R. and Helen Tappan.** Some Palmate Lagenidae from the Lower Cretaceous Washita Group.—Bull. Amer. Pal., No. 99, March 16, 1941, pp. 327-356 (1-30), pls. 47-49 (1-3).—The following are described as new: *Palmula acuta*, *P. decorata*, *P. dentonensis*, *P. howei*, *P. leai*, *P. leptata*, *P. limbata*, *P. lozoi*, *P. tarrantensis*, *Frondicularia cushmani*, *F. hilli*, *Flabellinella delicata*, *F. plana*, var. *striata*.
- Murray, Grover, Jr.** Midway Microfauna of Northwestern Louisiana.—Bull. Amer. Assoc. Petr. Geol., vol. 25, No. 4, April, 1941, pp. 738-742.—Lists and distribution of various foraminifera are given.
- Crespin, Irene and W. J. Parr.** Arenaceous Foraminifera from the Permian Rocks of New South Wales.—Journ. Proc. Roy. Soc. New South Wales, vol. 74, 1940, pp. 300-311, pls. XII, XIII.—There are 6 species described and figured, the following new: *Ammodiscus multinctus*, *Ammobaculites woolnoughi*, *Trochammina pulvillus*, and a new genus *Digitina* (genotype *D. recurvata* n. sp.), probably related to *Gaudryina*.
- Silvestri, Alfredo.** Particolari impronte fossili in un calcare di Bu-Ngém (Sirtica).—Boll. Soc. Geol. Ital., vol. 59, fasc. 1, 1940, pp. 114-120, pl. 6.—Specimens of *Orbitolites complanata* Lamarck figured.
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