

CONTRIBUTIONS FROM THE CUSHMAN
LABORATORY FOR FORAMINIFERAL RESEARCH

211. EOCENE FORAMINIFERA OF WILCOX AGE FROM
WOODS BLUFF, ALABAMA

By J. A. CUSHMAN and J. B. GARRETT

With all the publications on the foraminifera of the American Eocene, surprisingly little has been published on those of Wilcox age. A paper by Cushman and Ponton entitled "An Eocene Foraminiferal Fauna of Wilcox Age from Alabama" was published in these "Contributions" (Vol. 8, pt. 3, Sept., 1932). That material was from a R. R. cut 1 mile N. of Ozark, Alabama. The collections herein recorded are from the well known locality of Woods Bluff, Alabama, and while the two localities have numerous species in common, there are a number that occur at Woods Bluff that were not recorded from Ozark.

Woods Bluff is on the east bank of Tombigbee River in Clarke County, Alabama. Material was collected on October 13, 1938, when the river was at exceptionally low stage. Collecting was done at the upstream end of the bluff, which lies about one-quarter mile upstream from the settlement of Woods Bluff. The best exposures are found here.

The section was collected in great detail, and the best fauna, which is presented in this paper, proved to be in the basal-most five feet of beds lying just above water level. Tops of the "rounded, boulder-like masses" noted by Smith¹, whose section is given in the reference below, lay about one foot above water level.

¹ Smith, Eugene A., Johnson, L. C., and Langdon, D. W., Jr., Report on the Geology of the Coastal Plain of Alabama, Geological Survey of Alabama, 1894, pp. 156, 157.

Most of the species are figured, and additional figures given for some of those species which were previously described. There are other species represented by inadequate material that cannot be identified with certainty until more and better specimens are available. It is evident from a study of these two faunas that there are numerous species that should be good index fossils for this part of the Eocene section. As noted in the earlier paper, many of the species have affinities with those described by Schwager from the Eocene of Libya and Egypt.

SPIROPLECTAMMINA WILCOXENSIS Cushman and Ponton (Pl. 13, figs. 1, 2)
Spiroplectammina wilcoxensis CUSHMAN and PONTON, Contr. Cushman
 Lab. Foram. Res., vol. 8, 1932, p. 51, pl. 7, figs. 1 a, b.

This species was originally described from Ozark, Ala., and is common in the collections from Woods Bluff. Specimens as a rule are not as broad as in the type figure. Both microspheric and megalospheric forms are shown on our plate.

GAUDRYINA sp. (Pl. 13, fig. 3)

The figured specimen gives some of the details of a species that is evidently rare at Woods Bluff, yet does not seem to be easily identified with any known species. It somewhat remotely resembles the smoother and broader forms of *Gaudryina trinitatensis* Nuttall from the Eocene of Trinidad, but is evidently not that species. It also resembles more closely the forms described by Schwager as *Plecanium niloticum* from the Eocene of Libya.

GAUDRYINA sp.

There are a few very poorly preserved specimens that somewhat resemble *Gaudryina* (*Siphogaudryina*) *youngi* Howe described from the Oligocene. None of our specimens is complete, but the species may prove to be a distinctive one.

QUINQUELOCULINA sp. (Pl. 13, fig. 4)

Miliolidae are rare in the Wilcox material. The figured specimen somewhat resembles *Quinqueloculina lucens* (Schwager) from the Eocene of Libya, but there are not enough specimens to warrant specific determination.

SPIROLOCULINA WILCOXENSIS Cushman and Garrett, n. sp. (Pl. 13, figs. 5, 6)

Test compressed, mostly planispiral, except for the very earliest chambers which may be quinqueloculine, periphery subacute, not keeled; chambers a half coil in length, somewhat more compressed toward the periphery, slightly overlapping, numerous, in the adult with six or more pairs; sutures distinct, depressed; wall smooth and polished; aperture at the end of the last-formed chamber, compressed. Length 0.42-0.52 mm.; breadth 0.30-0.38 mm.

Holotype (Cushman Coll. No. 28815) from Wilcox Eocene, Woods Bluff, Ala.

This species differs from *S. planulata* (Lamarck) in the more compressed test, more acute periphery and larger number of chambers.

SPIROLOCULINA sp. (Pl. 13, fig. 7)

The single specimen figured is incomplete, but has a surface very similar to that of *S. imprimata* Cushman from the Oligocene of Mississippi.

CORNUSPIRA cf. *BYRAMENSIS* Cushman (Pl. 13, fig. 8)

Our figure shows a smooth species which is rare in our material, but seems to be very close to the species described from the Byram marl member of the Oligocene.

ROBULUS sp. (Pl. 13, figs. 9, 10)

There are numerous specimens of *Robulus* that are very variable in their characters, especially in the strength of the ornamentation. Rather remotely they resemble *R. pseudo-mammilligera* (Plummer) from the Midway Eocene of Texas, but the ornamentation in our form is not as marked, although of a similar character.

DARBYELLA WILCOXENSIS Cushman and Garrett, n. sp. (Pl. 13, figs. 11, 12)

Test somewhat trochoid in the adult, the earlier coils visible from one side but covered on the opposite side, umbonate, periphery acute, slightly keeled; chambers numerous, 9 to 11 in the adult whorl, of rather uniform shape, increasing very gradually in size as added; sutures distinct, limbate, somewhat raised above the general surface, slightly curved; wall smooth except for the sutures, distinctly perforate, translucent; aperture at the peripheral angle, radiate. Diameter 0.65-0.90 mm.; thickness 0.35-0.45 mm.

Holotype (Cushman Coll. No. 28820) from Wilcox Eocene, Woods Bluff, Ala.

This species differs from *Darbyella danvillensis* Howe and Wallace in the ornamented surface, slightly larger number of chambers, and more open dorsal side.

PLANULARIA sp. (Pl. 13, fig. 13)

There is a single, fine specimen in our material here figured. In its superficial characters it somewhat resembles *P. cooperensis* Cushman, but is a very much smaller species and less compressed. It probably represents a new species, but more specimens are necessary to make this certain.

DENTALINA COMMUNIS (7) d'Orbigny (Pl. 14, figs. 1-3)

There are several specimens in our material similar to those referred questionably to this species from Ozark, Ala. There is considerable variation in the early portion, particularly in the obliquity of the sutures, as shown in our figures.

NODOSARIA LATEJUGATA Gmbel, var. (Pl. 14, fig. 4)

There are numerous specimens which may be referred to Gmbel's species. They show some variation. The proloculum typically has a basal spine. Frequently there are short, intermediate costae over the proloculum, especially in the extreme megalospheric forms. It was also recorded from Ozark, Ala.

PSEUDOGLANDULINA LAEVIGATA (d'Orbigny), var. OVATA (Cushman and Applin)
(Pl. 14, fig. 5)

There are a very few specimens from Woods Bluff which are close to this variety known from the Jackson Eocene.

LAGENA COSTATA (Williamson) (Pl. 14, fig. 7)

Specimens are rare in our material from Woods Bluff, but seem identical with those recorded from Ozark, Ala.

LAGENA ACUTICOSTA Reuss (Pl. 14, fig. 6)

This species also was recorded from Ozark, Ala., and occurs in our material.

GUTTULINA WILCOXENSIS Cushman and Ponton (Pl. 14, figs. 8, 9)

Guttulina wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 60, pl. 8, figs. 1, 2.

The figures given show both young and adult specimens of this species which was originally described from Ozark, Ala. It is rather common in our material from Woods Bluff. The species is a variable one.

PSEUDOPOLYMORPHINA WILCOXENSIS Cushman and Ponton (Pl. 14, fig. 11)

Pseudopolymorphina wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 61, pl. 8, figs. 5, 6.

The figured specimen is one of several from our Woods Bluff material that have the same peculiar papillate surface as does that of the species described from Ozark, Ala. The few specimens from our material seem to be immature.

GLANDULINA ABBREVIATA Neugeboren (Pl. 14, fig. 10)

The single specimen figured evidently represents the microspheric form of this species. The megalospheric form was figured from Ozark, Ala. (Contr. Cushman Lab. Foram. Res., vol. 8, 1932, pl. 8, fig. 9). The species is rare at both Woods Bluff and Ozark.

NONION PLANATUM Cushman and Thomas (Pl. 14, figs. 12, 13)

Nonion planatum CUSHMAN and THOMAS, Journ. Pal., vol. 4, 1930, p. 37, pl. 3, figs. 5 a, b.—CUSHMAN and DUSENBURY, Contr. Cushman Lab. Foram. Res., vol. 10, 1934, p. 60, pl. 8, figs. 6 a, b.—CUSHMAN, U. S. Geol. Survey Prof. Paper 191, 1939, p. 4, pl. 1, fig. 15.

This is apparently a widely distributed species showing but little variation. It is common in the Claiborne Eocene of Alabama, Mississippi, and Texas. It occurs in the Eocene Poway conglomerate of California, in the Eocene Guayabal of Mexico, and rarely in the Jackson Eocene of Texas. Specimens are also recorded from the Middle Eocene of France. This seems to be the first record of the species from the Wilcox Eocene. Our specimens were compared with the types, and seem to be identical.

NONION WILCOXENSE Cushman and Ponton (Pl. 14, fig. 14)

Nonion wilcoxense CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 64, pl. 8, figs. 11 a, b.—CUSHMAN, U. S. Geol. Survey Prof. Paper 191, 1939, p. 5, pl. 1, fig. 16.

This species has been known previously only from the type locality near Ozark, Ala. It has occurred in typical form in our material from Woods Bluff.

NONIONELLA WILCOXENSIS Cushman and Ponton (Pl. 14, fig. 15)

Nonionella wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 65, pl. 8, figs. 12 *a, b*.—CUSHMAN, U. S. Geol. Survey Prof. Paper 191, 1939, p. 29, pl. 7, fig. 13.

The only previous record for this species is from the type locality near Ozark, Ala. It is very rare in our material from Woods Bluff, and our figured specimen is immature.

ROBERTINA WILCOXENSIS Cushman and Ponton (Pl. 14, fig. 16)

Robertina wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 66, pl. 8, figs. 19 *a-c*.—CUSHMAN and PARKER, l. c., vol. 12, 1936, p. 96, pl. 16, figs. 13' *a, b*.

The only other records are from the type locality near Ozark, Ala. It is very rare in the Woods Bluff material. Our figured specimen is probably a microspheric one, and is slightly more slender than the type.

VIRGULINA WILCOXENSIS Cushman and Ponton (Pl. 14, figs. 19-21)

Virgulina wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 67, pl. 8, figs. 22 *a-c*.—CUSHMAN, Special Publ. No. 9, Cushman Lab. Foram. Res., 1937, p. 6, pl. 1, fig. 17.

This species was described from the Wilcox Eocene near Ozark, Ala., where it is fairly common. Typical specimens occur in considerable numbers from the Woods Bluff locality. It seems to be a good index fossil for the Wilcox.

BIFARINA TOMBIGBEENSIS Hadley (Pl. 14, figs. 22, 23)

Bifarina tombigbeensis HADLEY, Bull. Amer. Pal., vol. 22, No. 74, 1935, p. 8, pl. 1, figs. 7 *a, b*.—CUSHMAN, Special Publ. No. 9, Cushman Lab. Foram. Res., 1937, p. 193, pl. 23, figs. 1, 2, 20.

This species was described from this Woods Bluff locality. Very typical specimens showing the numerous uniserial chambers were common. It should make a good index fossil for this part of the Eocene.

UVIGERINA WILCOXENSIS Cushman and Garrett, n. sp. (Pl. 14, figs. 17, 18)

Test minute, elongate, fusiform, greatest width toward the apertural end, tending to become slightly triangular in transverse section; chambers distinct, little if at all inflated, increasing rather regularly in size as added; sutures distinct, little if at all depressed, slightly crenulate; wall smooth except toward the base of the chambers where the crenulations of the sutures are

carried upward in slight ridges above the base of the chamber; aperture terminal, with a short neck and distinct lip. Length 0.35-0.40 mm.; breadth 0.12-0.15 mm.

Holotype (Cushman Coll. No. 28838) from Wilcox Eocene, Woods Bluff, Ala.

This species differs from *U. glabrans* Cushman in the much smaller size, more narrowly fusiform shape, and the peculiar crenulations of the margin. The ornamentation is more like that of some of the species of *Bulimina* and *Buliminella* than of *Uvigerina*, but the other characters show it to belong to the last genus.

UVIGERINA ALABAMENSIS Cushman and Garrett, n. sp. (Pl. 14, figs. 26, 27)

Test minute, slender, the early portion tapering, sides in the adult portion mostly parallel, tending to become somewhat triangular in transverse section, more strongly so toward the apertural end; chambers distinct, slightly inflated, later ones somewhat compressed laterally; sutures distinct, slightly depressed in the later portion; wall conspicuously perforate but unornamented; aperture terminal, somewhat elongate oval, with a short neck and distinct lip. Length 0.40-0.45 mm.; width 0.12-0.15 mm.

Holotype (Cushman Coll. No. 28840) from Wilcox Eocene, Woods Bluff, Ala.

This species differs from *U. glabrans* Cushman in the smaller size, more elongate test, conspicuous perforations and compressed later chambers.

Both of these species referred here to *Uvigerina* are not typical in their apertural features. There is a very short neck with a lip much more like some of the later species of *Angulogerina*. The test also tends toward a slightly triangular form in section. On the other hand, some of the characters are more like *Uvigerina* except for the apertural end. It has been difficult to place these two species generically, and they have been tentatively placed in *Uvigerina*.

These represent almost the earliest records for this group, and it may be that we are here dealing with primitive forms that are intermediate between the *Bulimina* and *Uvigerina* groups. The peculiar basal crenulations are more characteristic of some of the Eocene species of the *Bulimina* group such as *Buliminella grata* Parker and Bermudez from the Eocene of Cuba. The

apertures of our species however are terminal, and have a decided lip.

ANGULOGERINA WILCOXENSIS (Cushman and Ponton) (Pl. 14, figs. 24, 25)

Pseudowigerina wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 66, pl. 8, figs. 18 *a*, *b*.

A few typical specimens of this species described from near Ozark, Ala., occur in our material from Woods Bluff. An examination of the early stages of both the type and our other material indicates that the species really belongs in the genus *Angulogerina*.

SPIRILLINA SELSEYENSIS Heron-Allen and Earland (Pl. 14, figs. 28, 29)

Spirillina selseyensis HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909, p. 440, pl. 18, figs. 6, 7.—HALKYARD, Mem. Proc. Manchester Lit. Philos. Soc., vol. 62, pt. 2, 1918 (1919), p. 105, pl. 6, figs. 6 *a-c*; pl. 7, figs. 8 *a*, *b*.

There are several specimens of a highly ornamented species of *Spirillina* from Woods Bluff. After comparing these with the figures and descriptions of the numerous described species of this genus, and with the available specimens, it seems that our species is identical with that described by Heron-Allen and Earland from the Eocene of Selsey, England. Both dorsal and ventral sides of our specimens agree with theirs in their unique ornamentation. The species is also recorded from the Eocene of Biarritz, France. It is interesting to find this species in typical form so far from its original locality.

LAMARCKINA WILCOXENSIS Cushman (Pl. 14, figs. 30, 31)

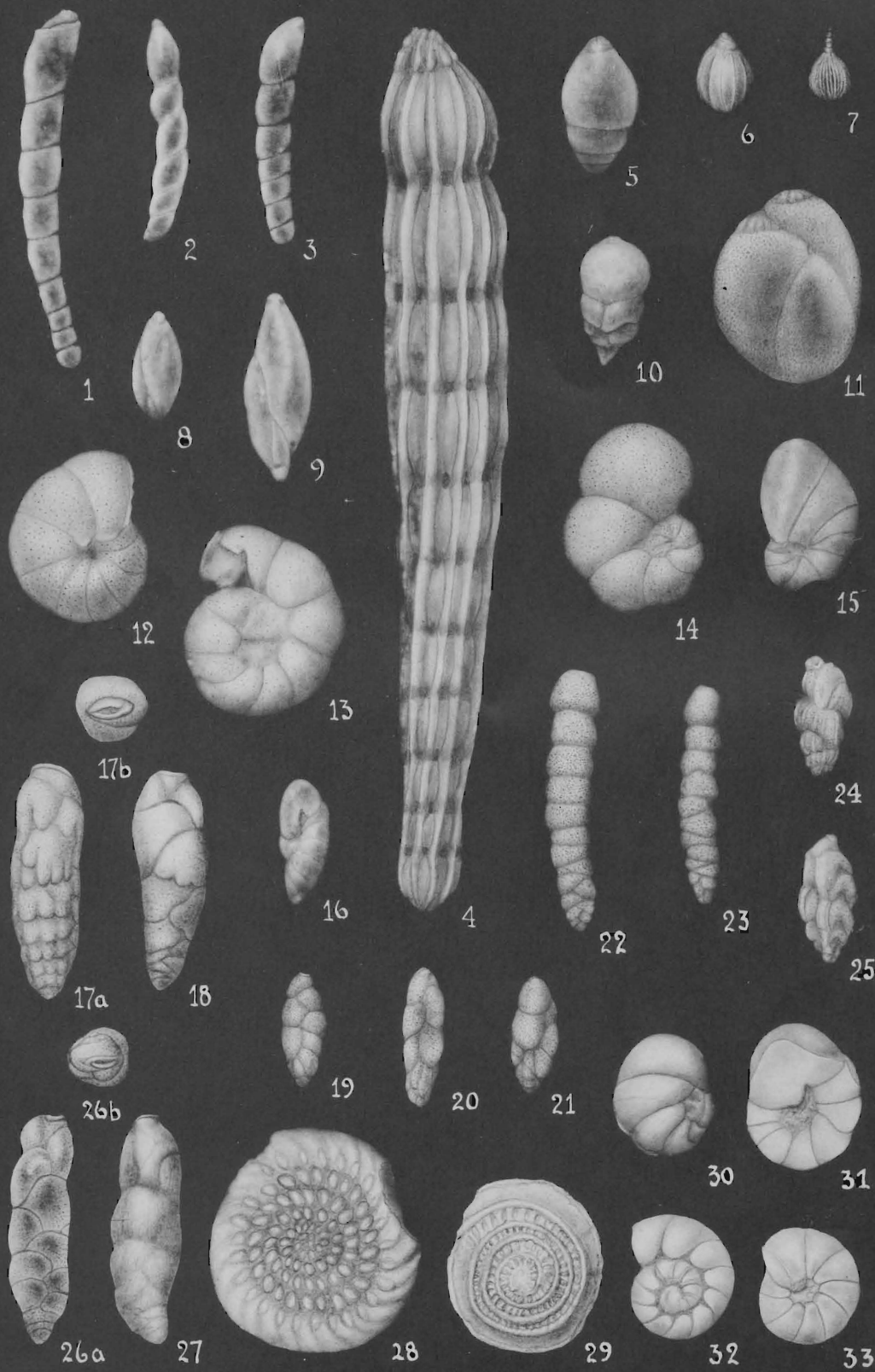
Lamarckina wilcoxensis CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 2, pt. 1, 1926, p. 9, pl. 1, figs. 3 *a-c*.—CUSHMAN and PONTON, l. c.,

EXPLANATION OF PLATE 13

FIGS. 1, 2. *Spiroplectammina wilcoxensis* Cushman and Ponton. × 60. 1, Megalospheric. 2, Microspheric. 3. *Gaudryina* sp. × 80. 4. *Quinqueloculina* sp. × 60. 5, 6. *Spiroloculina wilcoxensis* Cushman and Garrett, n. sp. × 90. 6, Holotype. 7. *Spiroloculina* sp. × 90. 8. *Cornuspira* cf. *byramensis* Cushman. × 90. 9, 10. *Robulus* sp. × 45. 11, 12. *Darbyella wilcoxensis* Cushman and Garrett, n. sp. × 45. 11, 12. Paratype. *a*, *a*, dorsal views; *b*, *b*, ventral views; *c*, peripheral view. 13. *Planularia* sp. × 60.

From drawings and photographs retouched by Patricia G. Edwards.





vol. 8, 1932, p. 70, pl. 9, figs. 4 *a-c*.—GLAESSNER, Problems of Paleontology, Moscow Univ., vols. 2-3, 1937, p. 381, pl., figs. 29 *a-c*.

This species was originally described from Woods Bluff, and occurs also at the locality near Ozark, Ala. It has been recorded by Glaessner from the Tertiary of the Caucasus region.

VALVULINERIA SCROBICULATA (Schwager) (Pl. 14, figs. 32, 33)

Anomalina scrobiculata SCHWAGER, Palaeontographica, vol. 30, 1883, Pal. Theil. p. 129, pl. 29 (6), figs. 18 *a-d*.—CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 70, pl. 9, figs. 5 *a-c*.

The types of this species are from the Middle Eocene of northern Africa. It was also found at the Wilcox locality near Ozark, Ala. The material from Woods Bluff is very similar.

VALVULINERIA WILCOXENSIS Cushman and Ponton (Pl. 15, figs. 1, 2)

Valvulineria wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 70, pl. 9, figs. 6 *a-c*.

The only other record for this species is the type locality near Ozark, Ala. Our specimens from Woods Bluff are typical, and it should be a good index fossil for the Wilcox.

EPONIDES LOTUS (Schwager) (Pl. 15, figs. 3-6)

Pulvinulina lota SCHWAGER, Palaeontographica, vol. 30, 1883, Pal. Theil, p. 132, pl. 28 (5), figs. 9 *a-d*.

Eponides lotus CUSHMAN and PONTON, Contr. Cushman Lab. Foram.

EXPLANATION OF PLATE 14

FIGS. 1-3. *Dentalina communis* (?) d'Orbigny. × 60. 4. *Nodosaria latejugata* Gümbel, var. × 45. 5. *Pseudoglandulina laevigata* (d'Orbigny), var. *ovata* (Cushman and Applin). × 45. 6. *Lagena acuticosta* Reuss. × 45. 7. *Lagena costata* (Williamson). × 45. 8, 9. *Guttulina wilcoxensis* Cushman and Ponton. × 45. 8, Young stage. 9, Adult. 10. *Glandulina abbreviata* Neugeboren. × 45. 11. *Pseudopolymorphina wilcoxensis* Cushman and Ponton. × 90. 12, 13. *Nonion planatum* Cushman and Thomas. × 90. 14. *Nonion wilcoxense* Cushman and Ponton. × 90. 15. *Nonionella wilcoxensis* Cushman and Ponton. × 90. 16. *Robertina wilcoxensis* Cushman and Ponton. × 45. 17, 18. *Uvigerina wilcoxensis* Cushman and Garrett, n. sp. × 90. 17, Holotype. 18, Paratype. *a*, front view; *b*, apertural view. 19-21. *Virgulina wilcoxensis* Cushman and Ponton. × 45. 22, 23. *Bifarina tombigbeensis* Hadley. × 60. 24, 25. *Angulogerina wilcoxensis* (Cushman and Ponton). × 45. 26, 27. *Uvigerina alabamensis* Cushman and Garrett, n. sp. × 120. 26, Holotype. 27, Paratype. *a*, front view; *b*, apertural view. 28, 29. *Spirillina seiseyensis* Heron-Allen and Earland. × 120. 28, Ventral view; 29, Dorsal view. 30, 31. *Lamarckina wilcoxensis* Cushman. × 45. 30, Dorsal view; 31, Ventral view. 32, 33. *Valvulineria scrobiculata* (Schwager). × 45. 32, Dorsal view; 33, Ventral view.

From drawings and photographs retouched by Patricia G. Edwards.

Res., vol. 8, 1932, p. 71, pl. 9, figs. 8 *a-c*.—GLAESSNER, Problems of Paleontology, Moscow Univ., vol. 2-3, 1937, p. 379, pl. 3, figs. 26 *a-c*.—BERMUDEZ, Mem. Soc. Cubana Hist. Nat., vol. 12, 1938, p. 7.

The types of this species are from the Middle Eocene of northern Africa. It has already been recorded from the Wilcox locality near Ozark, Ala. It is evidently the ancestral form of such species as *E. byramensis* (Cushman) and others of the later Tertiary. *E. lotus* has recently been recorded from the Tertiary of the Caucasus region by Glaessner and from the Eocene of Cuba by Bermudez.

SIPHONINA WILCOXENSIS Cushman (Pl. 15, figs. 7-9)

Siphonina wilcoxensis CUSHMAN, Proc. U. S. Nat. Mus., vol. 72, Art. 20, 1927, p. 3, pl. 2, figs. 1-3.—CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 70, pl. 9, figs. 7 *a-e*.

Typical specimens of this species occurred at Woods Bluff. It occurred also at the locality near Ozark, and is known from the Nanafalia and Tusahoma formations of Alabama and the Hatchetigbee formation of Mississippi.

ASTERIGERINA WILCOXENSIS Cushman and Garrett, n. sp. (Pl. 15, fig. 10)

Test trochoid, biconvex, periphery keeled; chambers distinct, about 6 in the final whorl, on the ventral side with large supplementary chambers, those of the dorsal series showing on the ventral side only close to the periphery; sutures very slightly depressed, distinct, slightly limbate; wall smooth, but very coarsely perforate; aperture an elongate, narrow opening on the ventral margin of the last-formed chamber. Diameter 0.40-0.50 mm.; thickness 0.25 mm.

Holotype (Cushman Coll. No. 28850) from Wilcox Eocene, Woods Bluff, Ala.

This species differs from *A. bracteata* Cushman of the Byram marl in its biconvex shape, less elongate chambers and very coarse perforations.

ASTERIGERINA ALABAMENSIS Cushman and Garrett, n. sp. (Pl. 15, fig. 11)

Test trochoid, much compressed, thin and scale-like, periphery acute, slightly keeled; chambers often somewhat indistinct due to the coarsely papillate surface, those of the dorsal side about 8 in the final whorl, increasing very gradually in size as added, on the ventral side with small supplementary chambers well removed

from the periphery; sutures fairly distinct, very slightly depressed on the ventral side; wall ornamented with distinct papillae over nearly the entire test; aperture narrow, elongate, on the ventral margin of the last-formed chamber. Diameter 0.50-0.60 mm.; thickness 0.10 mm.

Holotype (Cushman Coll. No. 28852) from Wilcox Eocene, Woods Bluff, Ala.

This species differs from *A. bracteata* Cushman in its very great compression, smaller supplementary chambers and papillate surface.

PULVINULINELLA OBTUSA (Burrows and Holland) (Pl. 15, figs. 12, 13)

Pulvinulina exigua H. B. BRADY, var. *obtusa* BURROWS and HOLLAND, Proc. Geol. Assoc., vol. 15, 1897, p. 49, pl. 2, fig. 25.—PLUMMER, Univ. Texas Bull. 2644, 1926 (1927), p. 151, pl. 11, fig. 2 a-c.

Pulvinulinella exigua (H. B. BRADY), var. *obtusa* CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 71, pl. 9, figs. 9 a-c.

This form described from the London clay of England and recorded from the Midway of Texas and the Wilcox near Ozark, Ala., seems to be distinct from Brady's species.

It has occurred in typical form in our Woods Bluff material.

COLEITES RETICULOSUS (Plummer) (Pl. 15, figs. 14-20)

Pulvinulina reticulosa PLUMMER, Univ. Texas Bull. 2644, 1926 (1927), p. 152, pl. 12, figs. 5 a, b.

Coleites reticulosa PLUMMER, Amer. Midland Nat., vol. XV, 1934, p. 606, pl. 24, figs. 5-9.

One of the interesting finds in the collection from Woods Bluff was this species which was originally described from the Midway Eocene of Texas. Both the young completely coiled stages and uncoiled adult specimens were fairly common. From a study of our material, it would seem that the genus is derived from *Pulvinulinella*, as the early stages might be described as belonging to that genus. The aperture in the adults is usually not well preserved, as the wall of the apertural face is very thin. In the better preserved adults the aperture is a small, elliptical opening with a slightly thickened lip. The surface of the test is similar to that of *Pulvinulinella cancellata* Cushman and Bermudez from the Eocene of Cuba.

GLOBOROTALIA WILCOXENSIS Cushman and Ponton (Pl. 15, figs. 21, 22)

Globorotalia wilcoxensis CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 71, pl. 9, figs. 10 *a-c*.

This species was described from the Wilcox locality near Ozark, Ala. It has occurred in the Woods Bluff collections in typical form.

CIBICIDES cf. *PSEUDOUNGERIANUS* (Cushman) (Pl. 15, figs. 25, 26)

A few specimens are close to this species which has been recorded with a wide range in the Tertiary.

CIBICIDES *PRÆCURSORIUS* (Schwager)

Discorbina præcursoria SCHWAGER, Palaeontographica, vol. 30, 1883, Pal. Theil, p. 125, pl. 27 (4), figs. 12 *a-d*, 13 *a-d*; pl. 29 (6), figs. 16 *a-d*.

Cibicides præcursorius CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 72, pl. 9, figs. 14 *a-c*.

This species described by Schwager from the Middle Eocene of northern Africa was recorded from the Wilcox locality, near Ozark, Ala. It has occurred in considerable numbers in our Woods Bluff material. While it shows some variation, it has typically but 6 chambers in the adult whorl, and the chambers are consequently large.

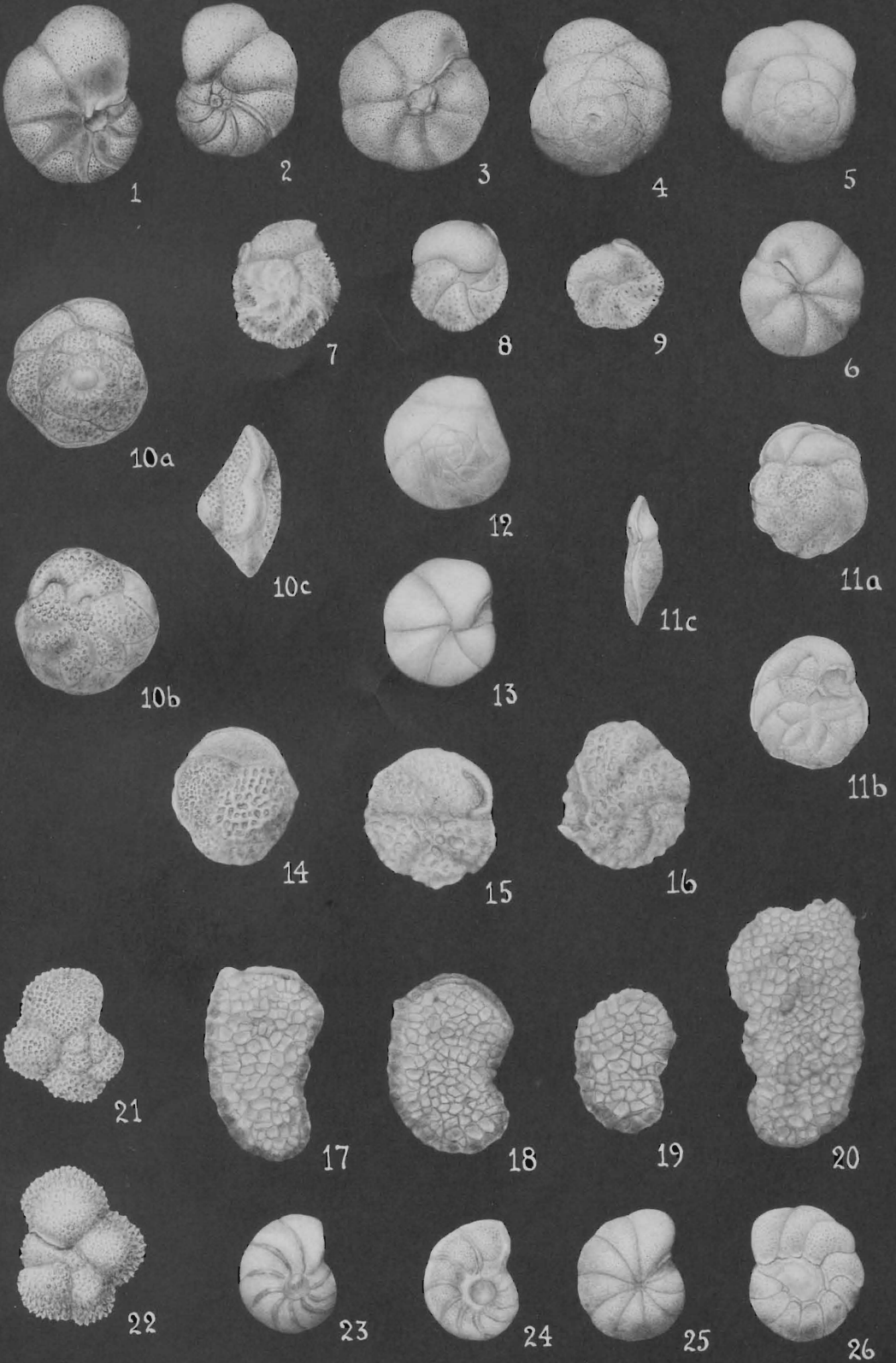
CIBICIDES sp. (Pl. 15, figs. 23, 24)

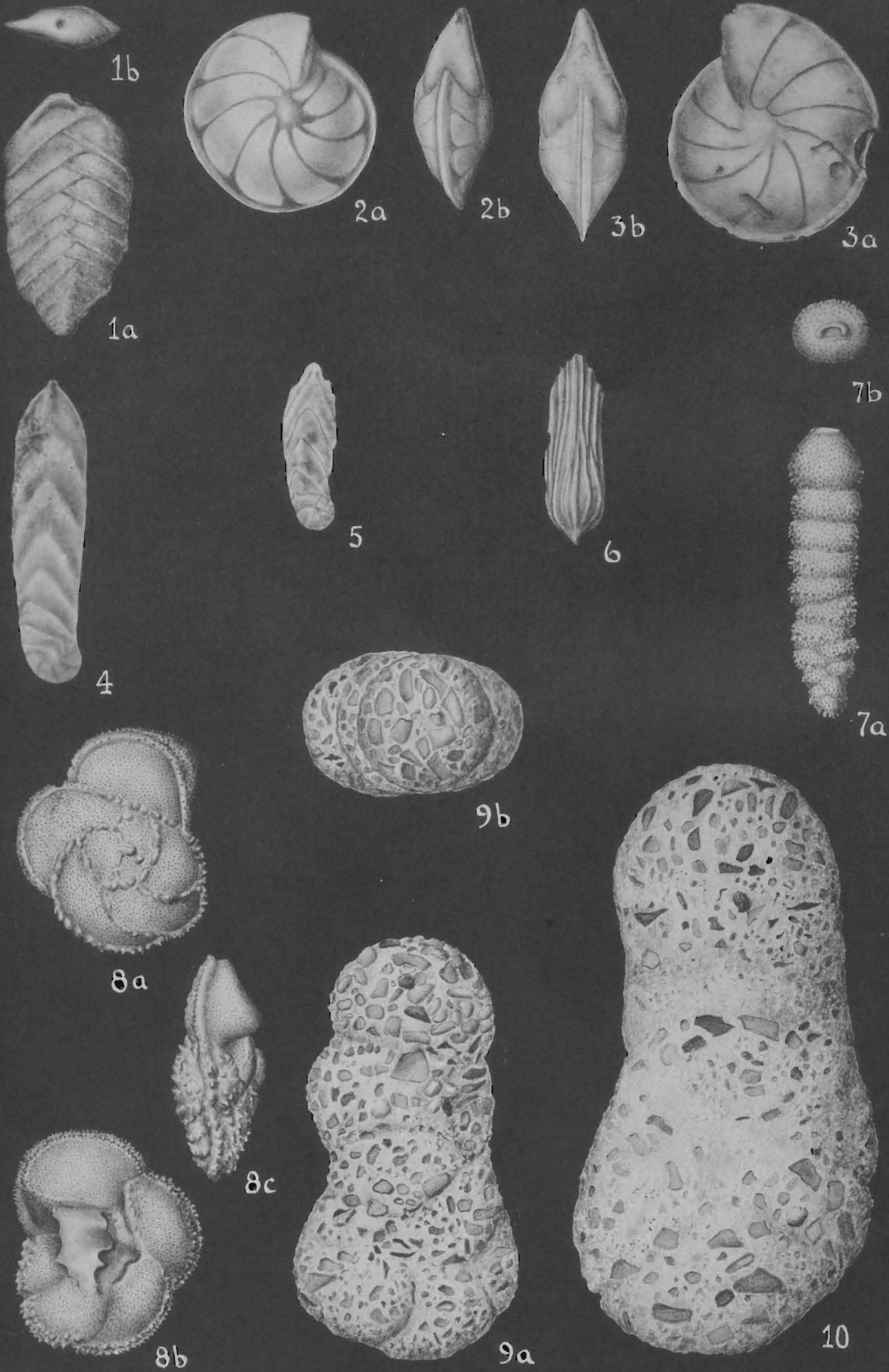
The figured specimens show a peculiar species, umbonate on both sides, and with very strongly limbate sutures. It has not occurred in sufficient number to warrant full description.

EXPLANATION OF PLATE 15

FIGS. 1, 2. *Valvulineria wilcoxensis* Cushman and Ponton. $\times 45$. 1, Ventral view; 2, Dorsal view. 3-6. *Eponides lotus* (Schwager). $\times 45$. 3, 6, Ventral views; 4, 5, Dorsal views. 7-9. *Siphonina wilcoxensis* Cushman. $\times 45$. 7, Dorsal view; 8, 9, Ventral views. 10 *a-c*. *Asterigerina wilcoxensis* Cushman and Garrett, n. sp. $\times 52$. *a*, dorsal view; *b*, ventral view; *c*, peripheral view. 11 *a-c*. *Asterigerina alabamensis* Cushman and Garrett, n. sp. $\times 52$. *a*, dorsal view; *b*, ventral view; *c*, peripheral view. 12, 13. *Pulvinulinella obtusa* (Burrows and Holland). $\times 45$. 12, Dorsal view; 13, Ventral view. 14-20. *Coleites reticulosus* (Plummer). $\times 45$. 14-16. Early coiled stages. 14, Dorsal view; 15, 16, Ventral views. 17-20, Adult uncoiled stages. 21, 22. *Globorotalia wilcoxensis* Cushman and Ponton. $\times 52$. 21, Dorsal view; 22, Ventral view. 23, 24. *Cibicides* sp. $\times 45$. 23, Ventral view; 24, Dorsal view. 25, 26. *Cibicides* cf. *pseudoungerianus* (Cushman). $\times 45$. 25, Ventral view; 26, Dorsal view.

From drawings and photographs retouched by Patricia G. Edwards.





AMMOCIBICIDES PONTONI Earland

Cibicides semiplectus CUSHMAN and PONTON (not SCHWAGER), Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 72, pl. 9, figs. 12, 13(?).

Ammocibicides pontoni EARLAND, *Discovery* Rep'ts, vol. 10, 1934, p. 107, pl. 4, figs. 8-12.

While this peculiar form was not found in our Woods Bluff material, attention is called to the fact that it has been restudied by Earland from more abundant material, and redescribed under the above name. The wall is smooth and polished, but is apparently made of gray cement with some mud or very fine sand incorporated in the wall. As the description occurred in a work primarily on Recent Antarctic material, it may easily be overlooked by workers on our American Eocene.

212. NEW AMERICAN CRETACEOUS FORAMINIFERA*

By JOSEPH A. CUSHMAN

The following species are here placed on record that they may be available to workers on the Cretaceous pending the publication of the work on the American Cretaceous Foraminifera.

LITUOLA IRREGULARITER Cushman, n. sp. (Pl. 16, figs. 9, 10)

Test large, the early portion close-coiled and broadly rounded, later becoming uncoiled, uniserial; chambers fairly distinct in some specimens, very indistinct in others, the early portion close-coiled, planispiral, later uncoiled and much inflated; sutures often

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EXPLANATION OF PLATE 16

FIGS. 1 a, b. *Spiroplectammina jarvisi* Cushman, n. sp. $\times 42$. a, front view; b, apertural view. 2, 3. *Robulus stephensoni* Cushman, n. sp. a, a, side views; b, b, peripheral views. 2, Holotype. $\times 25$. 3, Paratype. $\times 25$. 4, 5. *Palmula primitiva* Cushman, n. name. $\times 30$. 4, Holotype. 5, Paratype. 6. *Frondicularia jarvisi* Cushman, n. sp. $\times 38$. 7 a, b. *Siphogenerinoides brevispinosa* Cushman, n. sp. $\times 105$. a, front view; b, apertural view. 8 a-c. *Globotruncana cretacea* Cushman, n. sp. $\times 90$. a, dorsal view; b, ventral view; c, peripheral view. 9, 10. *Lituola irregulariter* Cushman, n. sp. 9, Holotype. $\times 30$. 10, Paratype. $\times 25$. a, front view; b, apertural view.

obscure, somewhat depressed; wall coarsely arenaceous, composed of large angular fragments embedded in finer material with a considerable amount of cement, the surface fairly smoothly finished; aperture in the young simple, in the adult often with several openings. Length up to 3.00 mm. or more; diameter up to 1.50 mm.

Holotype (Cushman Coll. No. 24615) from the lower Taylor marl, 1.9 miles E. of Bristol, Ellis County, Texas.

This species is a very large one rather common in some parts of the upper Taylor especially in cores. It is larger, more rounded, and more irregular than *Lituola taylorensis* Cushman and Waters. It is apparently close to or identical with the species described by Roemer as *Spirolina irregulare*, but as the name *irregularis* has already been used under the genus *Lituola* another name must be used if it is found to be identical with Roemer's species.

SPIROPLECTAMMINA JARVISI Cushman, n. sp. (Pl. 16, fig. 1)

Spiroplectammina anceps (REUSS), var. CUSHMAN and JARVIS, U. S. Nat. Mus. Proc., vol. 80, Art. 14, 1932, p. 14, pl. 3, figs. 8 a, b.

Test about twice as long as broad, much compressed, periphery subacute, the early portion tapering, but in the adult with the sides nearly parallel, earliest portion planispiral; chambers of the biserial portion low and broad of nearly equal height and shape throughout; sutures distinct, slightly raised, straight, strongly oblique; wall finely arenaceous, smoothly finished; aperture narrow, the inner end somewhat rounded. Length 1.00 mm.; breadth 0.50 mm.; thickness 0.15 mm.

Holotype (Cushman Coll. No. 15283) from the Upper Cretaceous of Lizard Springs near Guayaguayare, Trinidad.

This species differs from *Spiroplectammina dentata* (Alth) in the straighter sutures and nearly parallel sides without the development of the strong spinose projections.

ROBULUS STEPHENSONI Cushman, n. sp. (Pl. 16, figs. 2, 3)

Robulus navarroensis CUSHMAN (not PLUMMER), Tennessee Div. Geology Bull. 41, 1931, p. 25, pl. 2, figs. 8 a, b.

Test close-coiled throughout, somewhat umbonate, thence thinning to the acute, slightly keeled periphery which has a narrow keel; chambers distinct, eight to ten in the adult coil, of rather uniform size and shape; sutures distinct, strongly limbate,

slightly curved, not depressed; wall smooth and unornamented; aperture at the peripheral angle, radiate with a distinct ventral slit. Diameter 2.00 mm. or more; thickness 0.35-0.65 mm.

Holotype (Cushman Coll. No. 15151) from Selma chalk, 1½ miles W. of Sardis, on Sardis-Henderson road, Henderson County, Tenn.

This species does not have as curved sutures, nor as well developed a keel as *R. navarroensis* (Plummer). There are fewer chambers, also. It seems to be an ancestral form of the Navarro species and occurs mostly below the Nacatoch sand.

PALMULA PRIMITIVA Cushman, new name (Pl. 16, figs. 4, 5)

Palmula simplex CUSHMAN, Contr. Cushman Lab. Foram. Research, vol. 14, 1932, p. 36, pl. 6, fig. 1.

Test elongate, much compressed, greatest thickness at the umbo, formed by the proloculum, thence thinning toward the periphery, the later portion greatly compressed, rounded at the base, sides in the adult nearly parallel, periphery acute, at the base slightly carinate, early portion close-coiled, later uncoiling, and in the adult with a few chambers chevron-shaped; chambers distinct, not inflated; sutures distinct, slightly limbate, not depressed; wall with very delicate, longitudinal striae; aperture terminal, elongate, with a slender neck. Length up to 1.60 mm.; breadth 0.30-0.35 mm.

The types are from Pecan Gap chalk member of the Taylor marl, on secondary road to Otto at crossing of "Big Creek," 3.2 miles SW. of Mart, McLennon County, Tex. The species occurs at several localities in the upper part of the Taylor marl, and should make a good index fossil for this part of the section.

P. primitiva differs from *P. rugosa* in the nearly parallel sides and very smooth surface ornamented with very numerous, very fine, longitudinal striae. Reuss already has described a *Flabellina simplex* and a new name is here given the American species.

FRONDICULARIA JARVISI Cushman, n. sp. (Pl. 16, fig. 6)

Frondicularia archiaciana CUSHMAN (not D'ORBIGNY), Contr. Cushman Lab. Foram. Res., vol. 2, 1926, p. 21, pl. 5, fig. 4.

Frondicularia sp. (?) CUSHMAN, Bull. Amer. Assoc. Petroleum Geologists, vol. 10, 1926, p. 598, pl. 20, fig. 2.

Frondicularia elongata CUSHMAN and JARVIS (not OLSZEWSKI), Contr. Cushman Lab. Foram. Res., vol. 4, 1928, p. 98, pl. 14, fig. 1; Proc. U. S. Nat. Mus., vol. 80, Art. 14, 1932, p. 39, pl. 12, fig. 3.

Test narrow, elongate, initial end with a short, stout spine, sides for the most part nearly parallel; chambers and sutures largely hidden by the ornamentation, which consists of high, longitudinal costae running from base to apex, those of the proloculum swinging toward the middle of the test with new ones coming in from the sides in the adult; aperture terminal, radiate. Length up to 1.20 mm.; breadth 0.25 mm.

Holotype (Cushman Coll. No. 9726) from the Upper Cretaceous, pit at Lizard Springs, near Guayaguayare, southeastern Trinidad.

This species differs from *F. striatula* Reuss in the character of the surface which consists of high, plate-like costae, not broken at the sutures and the nearly parallel sides instead of tapering. *F. jarvisi* also occurs in the Velasco shale of Mexico.

A somewhat similar form was figured by White (Jour. Paleontology, vol. 2, 1928, p. 205, pl. 29, fig. 3) as *F. elongata*. This is from the Mendez shale and seems to be *F. striatula* Reuss. Olszewski already had given the same name to a European species in 1875.

SIPHOGENERINOIDES BREVISPINOSA Cushman, n. sp. (Pl. 16, fig. 7)

Test elongate, the early portion biserial and tapering, later becoming uniserial, generally cylindrical or slightly compressed, with the sides nearly parallel; chambers distinct, somewhat inflated, earliest chambers obscure but later biserial, gradually becoming uniserial in the adult, inflated, somewhat overlapping; sutures distinct, depressed; wall calcareous, thickly set with short spines covering the entire surface; aperture elliptical, somewhat projecting, terminal, with a slightly raised lip, particularly on one half of the rim. Length 0.45 mm.; diameter 0.12 mm.

Holotype (Cushman Coll. No. 24664) from Arkadelphia marl (?), 5½ miles NE. of Hope, Hempstead County, Ark.

This species known only from the Arkadelphia marl (?) is a distinctive one particularly in the finely set spines which cover the entire exterior. It has not been found elsewhere although fairly common at the type locality.

There seems to be some doubt as to the exact age of this material, whether uppermost Cretaceous or lower Midway.

GLOBOTRUNCANA CRETACEA Cushman, n. sp. (Pl. 16, fig. 8)

Globotruncana arca CUSHMAN (not 1926), Tennessee Div. Geology Bull. 41, 1931, p. 59, pl. 11, figs. 6 a-c.—PLUMMER, Univ. Texas Bull. 3101,

1931, p. 195, pl. 13, figs. 7-9, 11.—CUSHMAN, Bull. Geol. Soc. America, vol. 47, 1936, p. 419, pl. 1, figs. 14 a-c.—LOETTERLE, Nebraska Geol. Survey Bull. 12, 2d ser., 1937, p. 47, pl. 7, figs. 6 a, b.

Test planoconvex, dorsal side flattened, slightly convex or even slightly concave, ventral side convex, usually strongly so, periphery usually with a single keel, somewhat lobulate; chambers distinct, in the last-formed ones almost semicircular in dorsal view, slightly overlapping, ventrally somewhat inflated, the side in the later chambers often becoming more than 45°; sutures very distinct, dorsally strongly curved, conspicuously beaded and raised, ventrally slightly depressed; wall smooth and conspicuously but finely perforate over the chambers, but the border of each chamber raised and the periphery somewhat spinose, sutures on the dorsal side beaded; aperture ventral, opening into the umbilical cavity which is often partially covered by a thin plate-like structure. Diameter 0.40-0.65 mm.; thickness 0.15-0.35 mm.

Holotype (Cushman Coll. No. 15253) from Selma chalk, 1½ miles W. of Sardis on the Sardis-Henderson road, Henderson County, Tenn.

The species differs from *G. arca* (Cushman) in the fewer chambers in the whorl, flatter dorsal side, typically more convex ventral side, more definitely oblique sides to the chambers on the ventral side and differently shaped chambers.

The species like others of the genus is very variable but is usually easily distinguished from the others of our Upper Cretaceous. It is often abundant in the Austin chalk and Taylor marl and ranges upwards into the Neylandville marl member of the lower Navarro.

213. *BULIMINA MACILENTA* CUSHMAN AND PARKER, A NEW NAME

By JOSEPH A. CUSHMAN and FRANCES L. PARKER

It has been called to our attention that the species name *Bulimina denticulata* Cushman and Parker proposed in these "Contributions" (Vol. 12, pt. 2, June, 1936, p. 42, pl. 7, figs. 7, 8) for a species from the Eocene of Ventura County, California, is preoccupied by *Bulimina truncana* Gümbel, var. *denticulata*

Protescu, 1932. According to the Rules of Nomenclature, a new name should be given to our species, and it is therefore here named *Bulimina macilenta*.

RECENT LITERATURE ON THE FORAMINIFERA

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

- Voorwijk, G. H. Geologie und Paläontologie der Umgebung von Omis (Dalmatien).—Utrecht, 1938, pp. 1-84, pls. I-IV, map, 6 text figs. (foraminifera, pp. 42-45).—Notes and figures a few foraminifera.
- Rutten, L. M. R. Bibliography of West Indian Geology.—Geog. Geol. Med., Physiografisch-geologische Reeks, No. 16, 1938, pp. 1-103.
- Paul, Bernt. Gliederung und Foraminiferen des Rheintal-tertiärs bei Bruchsal.—Mittel. Badischen Geol. Landes., Bd. 12, Heft. 1, 1938, pp. 1-52, 4 figs., 2 charts.—Notes the distribution of many species of foraminifera in this area.
- Keijzer, F. Mitteleozäne Foraminiferen aus dem Flysch der Umgegend von Omis Dalmatien.—Proc. Kon. Ned. Akad. Wetenschappen, vol. XLI, No. 9, 1938, pp. 987-991, text figs. 1-20.—Lists numerous species with ranges, and figures a few.
- ten Dam, A. Foraminiferen aus dem Oligozän und Miozän der östlichen Niederlande.—L. c., pp. 992-996, text figs. 1-8.—Lists numerous species, and figures a few.
- Hecht, Franz E. Standard-Gliederung der Nordwest-deutschen Unterkreide nach Foraminiferen.—Senckenbergischen Naturforschenden Gesellschaft, Abhandl. 443, Dec. 31, 1938, pp. 1-42, pls. 1-24, tables and charts.—Group microphotographs are given of the faunas of various zones of the section. All forms are given numbers and letters under the genus, but no specific names used.
- Parr, W. J. Foraminifera of the Pliocene of South-Eastern Australia.—Mining and Geological Journal, vol. 1, No. 4, Jan., 1939, pp. 65-71, 1 pl.—Numerous species listed, and some figured, a few new ones described, *Pseudopolymorphina victoriensis* n. sp., *Glandulina kalimnensis* n. sp., *Siphonodosaria australis* n. sp., *Rotalia hamiltonensis* n. sp., and *Planulina kalimnensis* n. sp.
- Cushman, Joseph A. Notes on Some Foraminifera Described by Schwager from the Pliocene of Kar Nicobar.—Journ. Geol. Soc. Japan, vol. XLVI, No. 546, March 20, 1939, pp. 149-154, pl. 10 (6).
- Zilch, Adolph. Die Typen und Typoide des Natur-Museums Senckenberg. 1, Protozoa mit einem Vorwort von Rudolf Richter: Kataloge als Unterschied zwischen Ausammlung und Sammlung.—Frankfurt am Main, 1939, pp. 1-184.

- Finlay, H. J.** New Zealand Foraminifera: Key Species in Stratigraphy—No. 1.—Trans. Roy. Soc. New Zealand, vol. 68, 1939, pp. 504-533, pls. 68, 69.—The following are new: *Semivulvulina*, n. subgenus; *Vulvulina* (*Semivulvulina*) *waitakia* n. sp.; *Textularia awazea* n. sp., *T. miozea* n. sp.; *Siphotextularia* n. genus, *S. wairoana* n. sp.; *Gaudryina* (*Pseudogaudryina*) *proreussi* n. sp.; *Rectobolivina bortonica* n. sp., *R. parvula* n. sp.; *Plectofrondicularia parri* n. sp., *P. pohana* n. sp.; *Notorotalia* n. gen., *N. zealandica* n. sp., *N. stachei* n. sp.; *Nuttallides* n. gen., *N. subtrumpyi* n. sp.; *Eponides lornensis* n. sp.; *Parrella* n. gen.; and *Cibicides parki* n. sp.
- New Zealand Foraminifera: The Occurrence of Rzehakina, Hantkenina, Rotaliatina, and Zeauwigerina.—L. c., pp. 534-543.—The following are new: *Hantkenina australia* n. sp.; *Asanoina* n. gen.; *Zeauwigerina* n. gen., *Z. zelandica* n. sp.
- Barker, R. Wright.** Species of the Foraminiferal Family Camerinidae in the Tertiary and Cretaceous of Mexico.—Proc. U. S. Nat. Mus., vol. 86, No. 3052, 1939, pp. 305-330, pls. 11-22.—Numerous species figured and described, the following new: *Operculinoides prenummulitiformis* n. sp., *O. muiiri* n. sp., *O. palmarealis* n. sp., *O. jennyi* n. sp., *O. ocalanus* (Cushman), var. *minor* n. var.; *Camerina jacksonensis* Gravell and Hanna, var. *globosa* n. var., *C. guayabalensis* n. sp., *C. pellatispiroides* n. sp.
- Earland, Arthur.** Chalk: Its Riddles and Some Possible Solutions.—Trans. Hertfordshire Nat. Hist. Soc., vol. XXI, pt. 1, April, 1939, pp. 6-37, pls. 1, 2.
- Some Notes on Selective Building.—L. c., pp. 106-113.
- Tan Sin Hok.** On Polylepidina, Orbitocyclina and Lepidorbitoides.—"De Ingenieur in Nederlandsch-Indie," IV, Mijnbouw Geol., Jaargang VI, No. 5, May, 1939, pp. 53-84, pls. I, II.—A new subgenus of *Lepidocyclina*, *Eolepidina*, is proposed, and discussion particularly of early stages.
- Davies, L. M.** An Early Dictyoconus, and the Genus Orbitolina: their Contemporaneity, Structural Distinction, and Respective Natural Allies.—Trans. Roy. Soc. Edinburgh, vol. LIX, pt. III (No. 29), 1939, pp. 773-790, pls. I, II.
- Ellis, A. D., Jr.** Significant Foraminifera from the Chickasawhay Beds of Wayne County, Mississippi.—Journ. Pal., vol. 13, No. 4, July, 1939, pp. 423, 424, pl. 48.—Four new species: *Nodosaria blanpiedi*, *Nonion struma*, *Elphidium rota*, and *Cibicides hazzardi*.
- Thalman, Hans E.** Bibliography and Index to New Genera, Species and Varieties of Foraminifera for the Year 1936.—L. c., pp. 425-465.
- Hayasaka, Ichiro and Keinosuke Tan.** On the Occurrence of Lepidocyclina (s. s.) in Taiwan (Formosa), with the Description of Species by Shoshiro Hanzawa.—Proc. Imp. Acad. Tokyo, vol. XV, 1939, pp. 182-185, text figs. 1-4.—A new species, *Lepidocyclina* (s. s.) *formosensis* described and figured.
- Hanzawa, Shoshiro.** Stratigraphical Distributions of the Genera *Pseudoschwagerina* and *Paraschwagerina* in Japan with Descriptions of Two

- New Species of *Pseudoschwagerina* from the Kitakami Mountainland, Northeastern Japan.—Jap. Journ. Geol. Geogr., vol. XVI, Nos. 1-2, 1938, pp. 65-73, pl. IV.—New species, *Pseudoschwagerina schellweini* and *P. (Zellia) nunosei*.
- In Hayasaka and Tan. (q. v.)
- On the Occurrence of *Acerulina*, an Encrusting Form of Foraminifera in the Jurassic Torinosu Limestone from the Kwanto Mountainland, Central Japan.—Journ. Geol. Soc. Japan, vol. XLVI, No. 547, April 20, 1939, pp. 201-203, pl. 12.—A new variety, *A. inhaerens*, var. *huzimeto* described and figured.
- Adams, Bradford C.** Distribution of Foraminifera of the Genus *Bolivina* in Canada de Aliso, Ventura County, California.—Amer. Journ. Sci., vol. 237, July, 1939, pp. 500-511.—Notes on various species with range chart.
- Tromp, S. W.** The Value of Generic Determinations in Micro-Stratigraphy.—Geologie & Mijnbouw, Jaargang No. 8, August, 1939, pp. 202-204.
- Cushman, Joseph A. and Irene McCulloch.** A Report on Some Arenaceous Foraminifera.—Univ. So. Calif. Publ., Allen Hancock Pacific Expeditions, vol. 6, No. 1, 1939, pp. 1-113, pls. 1-12.—88 species and varieties included, with the following new: *Astrorhiza hancocki* n. sp., *Proteonina compressa* n. sp., *Millettella glabrella* n. sp., *Ammofrondicularia compressa* n. sp., *Ammodiscus minutissimus* n. sp., *Haplophragmoides columbiense* Cushman, var. *evolutum* n. var., *H. hancocki* n. sp., *H. veleronis* n. sp., *H. subinvolutum* n. sp., *Ammobaculites ineptus* n. sp., *A. catenulatus* n. sp., *Gaudryina subglabrata* n. sp., *G. atlantica* (Bailey), var. *pacifica* n. var., *Rudigaudryina* n. gen., *R. inepta* n. sp., *Goëssella parva* n. sp., *Cribrogoësellä pacifica* n. sp., *Trochammina pacifica* Cushman, var. *simplex* n. var., *T. squamiformis* n. sp., *T. carinata* n. sp., and *Placopsilina bradyi* n. sp.
- Bermudez, Pedro J.** *Flintina clenchi*, un Nuevo Foraminifero de Puerto Plata, Santo Domingo.—Mem. Soc. Cubana Hist. Nat., vol. XIII, No. 3, 1939, pp. 199-200, pl. 30.
- Neuvo genero y especies nuevas de Foraminiferos.—L. c., No. 4, Sept., 1939, pp. 247-252, pl. 33.—A new genus, *Riveroina*, type species *R. caribaea* n. sp., and new species *Ellipsoglandulina antillea* n. sp., *Reussella aguayoi* n. sp., and *Anomalina atlantis* n. sp.
- Fisk, H. N.** Jackson Eocene from Borings at Greenville, Mississippi.—Bull. Amer. Assoc. Petr. Geol., vol. 23, No. 9, Sept., 1939, pp. 1393-1403, 3 text figs.—Lists numerous foraminifera.
- Silvestri, A.** Foraminiferi dell 'Eocene della Somalia.—Palaeontographia Italica, vol. XXXII, Suppl. 4, 1939, pp. 79-180 (1-102), pls. XI-XXII (I-XII).—The following are new: *Hauerina simplex*, *Alveolina periloculinoides*, *A. subpyrenaica* Leym., var. *flosculina*, *A. terebrata*, *Ammobaculites spiroloinoides*, *Coskinolina alvus*, *C. Schuberti*, *Dictyoconus Daviesi*, *D. africanus*, *D. arietinus*, *D. gracilis*, *Operculina nummulitoides*, *Miscellanea assilinoidea*, *Nummulites budensis* Hanerken, var. *crassa*, *Rotalia ? maculata*, *Lockhartia alveolata*, *Orthophragmina varians* (Kaufm.) var. *obesa*, *Linderina bihilensis*, *L. Nuttalli*.