

CONTRIBUTIONS  
FROM THE  
CUSHMAN LABORATORY  
FOR  
FORAMINIFERAL RESEARCH

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VOLUME 21, PART 3  
September, 1945

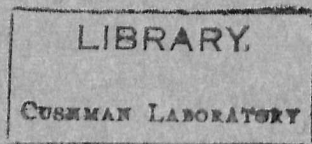
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# CUSHMAN LABORATORY FOR FORAMINIFERAL RESEARCH

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These Contributions will be issued quarterly. They will contain short papers with plates, describing new forms and other interesting notes on the general research work on the foraminifera being done on the group by the workers in this laboratory. New literature as it comes to hand will be briefly reviewed.

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## CONTRIBUTIONS FROM THE CUSHMAN LABORATORY FOR FORAMINIFERAL RESEARCH

### 268. THE FORAMINIFERA OF THE TYPE LOCALITY OF THE McBEAN FORMATION\*

By JOSEPH A. CUSHMAN and STEPHEN M. HERRICK

The foraminiferal fauna of the McBean formation has not been definitely recorded. In order to make available the species occurring in this part of the Eocene, material was collected by Stephen M. Herrick and Philip E. LaMoreaux.

*Description of type locality for McBean formation:* Just south of the town of McBean is McBean Creek, which forms the boundary between Richmond and Burke Counties, Georgia. It roughly parallels an east-west trending escarpment that is composed mostly of the McBean formation, but is capped by massive sands of Barnwell age. This escarpment is cut by several V-shaped gullies formed by small, wet-weather streams which are tributary to McBean Creek. The composite section exposed in these gullies, and along the south side of McBean Creek, from the town of McBean to the confluence of the Creek with Savannah River, has been designated as the type locality for the McBean<sup>1</sup> formation. In two of these gullies, situated 0.35 and 0.4 mile east of the highway bridge over McBean Creek, are typical<sup>2</sup> exposures of the formation. An examination of these exposures indicates that only the lower part of the McBean is fossiliferous, that is to say, Cooke's<sup>3</sup> beds 2 and 3. More specifically, at the lower end of one of these gullies, 0.4 mile east of the highway bridge over McBean Creek and about 30 feet south of the highway, is an exposure of 4 to 5 feet of light yellow, somewhat carbonaceous, fossiliferous sand, containing occasional hard nodules. Farther down this same gully, directly at the highway, is an exposure of 6 to 8 feet of calcareous, sandy marl, which is pale blue in

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1. Veatch, O., and Stephenson, L. W., *Geology of the Coastal Plain of Georgia*. Bull. 26, Geol. Survey of Ga., 1911, p. 237.

2. Cooke, C. W., *Geology of the Coastal Plain of Georgia*. Bull. 941, U. S. Geol. Survey, 1943, p. 56.

3. *Ibid.*, p. 56.

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color when wet, is fossiliferous, and contains numerous hard nodules. The foraminifera recorded below came from three stations in these two beds as follows:

*Station 1.* At ditch, along highway running east to Shell Bluff, 0.4 mile east of highway bridge over McBean Creek, Richmond Co., Ga. This is the lower 2 to 3 feet of Cooke's bed 2.

*Station 2.* Same horizon, but 6 to 8 feet above ditch exposure. This is the upper part of Cooke's bed 2.

*Station 3.* In mouth of gully which is 0.4 mile east of highway bridge over McBean Creek and about 30 feet south of highway running east to Shell Bluff, Richmond Co., Ga. This horizon is the lower part of Cooke's bed 3 and is the most fossiliferous of all the McBean material. The above stations are referred to in the text by their numbers.

There is some difference in the richness in species of the samples. Many of the specimens are somewhat chalky and therefore lacking in the finer surface details, but enough specimens are usually found in a better state of preservation so that some show the details lacking in the others.

No attempt is made here to assign the McBean formation to either the Claiborne or the Jackson subdivision of the Eocene, but the known ranges of the various species are given.

### Family TEXTULARIIDAE

#### Genus SPIROPLECTAMMINA Cushman, 1927

**SPIROPLECTAMMINA MISSISSIPPIENSIS** (Cushman), var. **ALABAMENSIS** (Cushman)  
(Pl. 9, figs. 1-3)

*Textularia mississippiensis* CUSHMAN, var. *alabamensis* CUSHMAN, U. S. Geol. Survey Prof. Paper 133, 1923, p. 17, pl. 1, fig. 4.—HOWE, Journ. Pal., vol. 2, 1928, p. 175 (list).—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 1, fig. 6.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 7, pl. 1, figs. 5, 6.—DAVIS, Journ. Pal., vol. 15, 1941, p. 150, pl. 25, figs. 2, 3.—CUSHMAN and McGLAMERY, U. S. Geol. Survey Prof. Paper 197-B, 1942, p. 66.

This variety, widely distributed in the lower Oligocene and upper Eocene, occurs in some numbers at all three stations. There is a considerable difference in the shape of the early portion of the microspheric and megalospheric forms and also in the amount of peripheral keel developed.

#### Genus TEXTULARIA Defrance, 1824

**TEXTULARIA DIBOLLENSIS** Cushman and Applin (Pl. 9, fig. 4)

*Textularia dibollensis* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 165, pl. 6, figs. 12-14.—CUSHMAN, Journ. Pal., vol. 1, 1927, p. 148, pl. 23, fig. 1.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 1, fig. 4.

—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 8, pl. 1, figs. 13-16.—  
DAVIS, Journ. Pal., vol. 15, 1941, p. 148, pl. 24, fig. 7.

This species in its typical form is characteristic of the Jackson (Eocene) of the Gulf Coastal region. Very typical specimens occur in all the samples.

**TEXTULARIA ADALTA** Cushman

*Textularia adalta* CUSHMAN, Contr. Cushman Lab. Foramin. Res., vol. 2, pt. 2, 1926, p. 29, pl. 4, fig. 2; U. S. Geol. Survey Prof. Paper 181, 1935, p. 8, pl. 1, figs. 11, 12.  
—DAVIS, Journ. Pal., vol. 15, 1941, p. 147, pl. 24, figs. 1, 2.

This is a typical species of the Jackson (Eocene). A few specimens occur in the McBean material but they are not well preserved. They are from stations 1 and 3.

**TEXTULARIA cf. SUBHAUERII** Cushman

A single specimen from station 3 probably belonging to this species was the only one found. The species is widely distributed in the Eocene and Oligocene of the Coastal Plain region and Mexico.

**TEXTULARIA HANNAI** Davis (Pl. 9, fig. 5)

*Textularia hannai* DAVIS, Journ. Pal., vol. 15, 1941, p. 149, pl. 24, figs. 11-13, 19.

Specimens closely resembling the type figures of this species described from the upper Eocene of Texas occur in the McBean material from station 3.

**TEXTULARIA CUYLERI** Davis (Pl. 9, fig. 6)

*Textularia cuyleri* DAVIS, Journ. Pal., vol. 15, 1941, p. 147, pl. 24, figs. 3, 4.

This species is much commoner than the preceding and occurs at stations 1 and 3. The types are from the Jackson (Eocene), "Whitsett beds," of Texas. The species is close to the preceding but the test is shorter and broader.

Family VERNEUILINIDAE

Genus GAUDRYINA d'Orbigny, 1839

GAUDRYINA cf. JACKSONENSIS Cushman

Rare specimens which seem to be the early stages of this characteristic Jackson (Eocene) species occur at stations 1 and 3 but no adults were found.

Family LAGENIDAE

Genus PLANULARIA Defrance, 1824

PLANULARIA GEORGIANA Cushman and Herrick, n. sp. (Pl. 9, fig. 7)

Test small, very strongly compressed, periphery rounded without a keel, early portion close coiled, tending to become slightly uncoiled in the adult stage of some specimens; chambers distinct, not inflated, of about even height but increasing gradually in length in the adult; su-

tures distinct, raised, strongly curved in the early stages, nearly straight in the last-formed ones of the adult stage; wall smooth except for the raised sutures; aperture radiate at the peripheral angle. Length 0.50-0.75 mm.; breadth 0.30-0.45 mm.; thickness 0.08-0.10 mm.

Holotype (Cushman Coll. No. 44763) from the McBean formation, (Eocene), in mouth of gully 0.4 mile east of highway bridge over McBean Creek and about 30 feet south of highway running east to Shell Bluff, Richmond Co., Ga.

This species differs from *P. ouachitaensis* Howe and Wallace in the lack of a keel, more evenly raised sutures, and much smaller size. It also resembles *P. cubensis* Bermúdez but the chambers have a quite different appearance, especially at the inner end. It occurs at all three stations.

#### Genus MARGINULINA d'Orbigny, 1826

##### MARGINULINA COCOAENSIS Cushman (Pl. 9, figs. 8-13)

*Marginulina cocoaensis* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 1, pt. 3, 1925, p. 67, pl. 10, figs. 9, 10.—HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 33, pl. 7, fig. 5.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 6, fig. 6.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 18, pl. 7, figs. 6, 7.—BERMÚDEZ, Mem. Soc. Cubana Hist. Nat., vol. 12, 1938, p. 15.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 15, 1939, p. 55, pl. 9, fig. 25.—ISRAELSKY, Proc. 6th Pac. Sci. Congress, 1939, p. 574, pl. 3, figs. 8-10.—MARTIN, Stanford Univ. Publ., Univ. Ser., Geol. Sci., vol. 3, No. 3, 1943, p. 11 (list).

An examination of the figures in the above references will show what a wide range of forms have been assigned to this species. A study of specimens from the type locality also shows that the species does have a wide range in the microspheric and megalospheric forms. Many of these resemble the forms named *M. huneri* and *M. winniana* by Howe from the Cook Mountain formation (Eocene) of Louisiana. The McBean specimens also show a wide range of form from almost nodosarian megalospheric specimens to rather typical ones. These have all been grouped under the one name until further studies of this variable group can be made. They occur at all three stations.

##### MARGINULINA KARRERIANA Cushman (Pl. 9, fig. 14)

*Marginulina karreriana* CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 18, pl. 7, figs. 1, 2.

Typical specimens of this species described from the Cooper marl of Jackson age (Eocene), of South Carolina occur at stations 1 and 3.

#### Genus DENTALINA d'Orbigny, 1826

##### DENTALINA JACKSONENSIS (Cushman and Applin) (Pl. 9, fig. 15)

*Nodosaria jacksonensis* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 170, pl. 7, figs. 14-16.—CUSHMAN, Journ. Pal., vol. 1, 1927, p. 153, pl. 24,

fig. 3.—COLE, Bull. Amer. Pal., vol. 14, No. 53, 1928, p. 208 (8), pl. 3, fig. 12.—COLE and PONTON, Bull. 5, Florida State Geol. Survey, 1930, p. 33, pl. 6, fig. 1.  
*Dentalina jacksonensis* CUSHMAN and PONTON, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 55, pl. 7, figs. 10, 11.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 20, pl. 8, figs. 7-9.—CUSHMAN and McMASTERS, Journ. Pal., vol. 10, 1936, p. 511, pl. 75, figs. 3-5.—CORYELL and EMBICH, 1. c., vol. 11, 1937, p. 298, pl. 42, fig. 8.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 44, pl. 6, fig. 2.—TOULMIN, Journ. Pal., vol. 15, 1941, p. 585, pl. 79, fig. 16.—CUSHMAN and SIEGFUS, Trans. San Diego Soc. Nat. Hist., vol. 9, 1942, p. 407, pl. 16, fig. 7.—FRANKLIN, Journ. Pal., vol. 18, 1944, p. 310, pl. 46, fig. 10.—CUSHMAN and SIMONSON, 1. c., vol. 18, 1944, p. 196, pl. 31, fig. 8.

From the records this species is widely distributed and ranges from the lower Oligocene to the Wilcox (Eocene). Specimens are fairly common in the McBean material at stations 1 and 3 but are all of much smaller size than the average for the species.

**DENTALINA HANTKENI** Cushman (Pl. 9, fig. 16)

*Dentalina hantkeni* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 9, 1933, p. 9, pl. 1, figs. 18, 19; U. S. Geol. Survey Prof. Paper 181, 1935, p. 20, pl. 8, figs. 5, 6.

The only record for this species is from the Ocala limestone of Jackson age (Eocene) of Alabama. Specimens occur rarely at all three stations.

**DENTALINA cf. COMMUNIS** d'Orbigny (Pl. 9, fig. 17)

Rare specimens from stations 1 and 2 may be referred to this species.

**Genus LAGENA** Walker and Jacob, 1798

**LAGENA COSTATA** (Williamson) (Pl. 9, fig. 18)

Specimens from stations 1 and 3 seem referable to this species.

**LAGENA ACUTICOSTA** Reuss (Pl. 9, fig. 19)

Numerous specimens with prominent costae may be referred to this species, but they show a considerable amount of variation. They are from all three stations.

**LAGENA LAEVIS** (Montagu) ? (Pl. 9, fig. 20)

A few specimens similar to that figured occur at all three stations. With these are others which have a rough surface and peculiar neck similar to the form figured by Nuttall as "*Lagena aspera* Reuss" from Trinidad (Quart. Journ. Geol. Soc., vol. 84, 1928, p. 79, pl. 4, fig. 8).

**LAGENA TETRAGONA** Parker and Jones (Pl. 9, fig. 21)

The single specimen figured is from station 1 and seems to belong to this species. It has not been recorded before from the American Eocene.

Family **POLYMORPHINIDAE**

Genus **GUTTULINA** d'Orbigny, 1839

**GUTTULINA IRREGULARIS** (d'Orbigny) (Pl. 9, fig. 22)

(For references, see these Contributions, vol. 19, 1943, p. 35.)

This widely ranging species is common in the McBean material, occurring at all three stations.

**GUTTULINA SPICAEFORMIS (Roemer)** (Pl. 9, fig. 23)

*Polymorphina spicaeformis* ROEMER, Neues Jahrb. für Min., 1838, p. 386, pl. 3, fig. 31.

*Guttulina spicaeformis* CUSHMAN and OZAWA, Jap. Journ. Geol. Geogr., vol. 6, 1929, p. 68, pl. 14, figs. 8, 9.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 7, fig. 3.

A few specimens from stations 1 and 2 may be referred to this species which has previously been recorded from the Jackson (Eocene) of Texas.

**GUTTULINA cf. CAUDATA d'Orbigny** (Pl. 9, fig. 24)

The specimen figured is very close in form to the Eocene types from the Paris Basin. Similar specimens occur rarely at all three stations.

**GUTTULINA cf. PROBLEMA d'Orbigny** (Pl. 9, fig. 25)

Numerous specimens similar to the one figured may be compared to this widely ranging species. They occur only at station 3.

**Genus GLOBULINA d'Orbigny, 1839**

**GLOBULINA GIBBA d'Orbigny**

This common species occurs in considerable numbers at all three stations.

**GLOBULINA MÜNSTERI (Reuss)** (Pl. 10, fig. 1)

(For references, see Cushman, U. S. Geol. Survey Prof. Paper 181, 1935, p. 27.)

A few specimens seem to belong to this species which has been recorded from the Ocala limestone of Jackson age (Eocene), of Georgia and Alabama. They are from stations 2 and 3.

**GLOBULINA MINUTA (Roemer)** (Pl. 10, fig. 2)

(For references, see Cushman, U. S. Geol. Survey Prof. Paper 181, 1935, p. 27.)

The single figured specimen from station 3 is the only one found in the McBean material. It has been recorded from the Ocala limestone of Alabama, and Howe records a somewhat similar form from the Cook Mountain formation (Eocene) of Louisiana.

**Genus SIGMOMORPHINA Cushman and Ozawa, 1928**

**SIGMOMORPHINA JACKSONENSIS (Cushman)** (Pl. 10, fig. 3)

*Polymorphina jacksonensis* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 2, pt. 2, 1926, p. 35, pl. 5, fig. 5.

*Sigmomorphina jacksonensis* CUSHMAN and OZAWA, Proc. U. S. Nat. Mus., vol. 77, Art. 6, 1930, p. 123, pl. 32, fig. 2.—HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 49, pl. 8, fig. 2.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 28, pl. 10, figs. 1-4.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 54, pl. 7, fig. 3.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 21, 1945, p. 4, pl. 1, fig. 12.



*Polymorphina compressa* NUTTALL (not d'ORBIGNY), Quart. Journ. Geol. Soc., vol. 84, 1928, p. 93, pl. 6, figs. 18, 19.

This is a common species in the Jackson (Eocene), and also occurs in the Claiborne (Eocene) and the Eocene of Trinidad. It occurs at all three stations.

**SIGMOMORPHINA SEMITECTA** (Reuss), var. **TERQUEMIANA** (Fornasini) (Pl. 10, fig. 4)  
(For references, see these Contributions, vol. 19, 1943, p. 37 and vol. 21, 1945, p. 15.)

This seems to be a common species in the American Eocene and has a long vertical range. It is common in the McBean material, occurring at all three stations.

**Genus POLYMORPHINA d'Orbigny, 1826**

**POLYMORPHINA ADVENA** Cushman (Pl. 10, fig. 5)

*Polymorphina advena* CUSHMAN, U. S. Geol. Survey Prof. Paper 129-F, 1922, p. 132, pl. 31, fig. 4; Contr. Cushman Lab. Foram. Res., vol. 5, 1929, p. 41, pl. 7, fig. 5.—CUSHMAN and OZAWA, Proc. U. S. Nat. Mus., vol. 77, Art. 6, 1930, p. 118, pl. 30, fig. 10.—CUSHMAN and PONTON, Bull. 9, Florida State Geol. Survey, 1932, p. 67, pl. 10, fig. 4.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 29, pl. 10, fig. 8.—CUSHMAN and McGLAMERY, 1. c., Prof. Paper 189-D, 1938, p. 106, pl. 24, fig. 21.

This species which is recorded from the Miocene, Oligocene and Jackson (Eocene) occurs very rarely in the McBean material at station 1.

**Genus RAMULINA Rupert Jones, 1875**

**RAMULINA cf. ACULEATA** (d'Orbigny) (Pl. 10, figs. 6, 7)

Specimens occurring rarely at stations 1 and 2 seem related to this species.

**Family NONIONIDAE**

**Genus NONION Montfort, 1808**

**NONION PLANATUM** Cushman and Thomas (Pl. 10, fig. 8)

(For references, see these Contributions, vol. 19, 1943, p. 37, and vol. 21, 1945, p. 15.)

This seems to be a characteristic species of the middle Eocene of America, particularly the Claiborne. It has lately been found in material definitely of Jackson age. Typical specimens are rather common in the McBean material, but were found only at stations 1 and 3.

**NONION ADVENUM** (Cushman) (Pl. 10, fig. 9)

*Nonionina advena* CUSHMAN, U. S. Geol. Survey Prof. Paper 129-F, 1922, p. 139, pl. 32, fig. 8; Prof. Paper 133, 1923, p. 50.—CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 181, pl. 10, figs. 16, 17.

*Nonion advena* HOWE, Journ. Pal., vol. 2, 1928, p. 175 (list).—COLE and GILLESPIE, Bull. Amer. Pal., vol. 15, No. 57b, 1930, p. 132, pl. 2, fig. 15.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 30, pl. 11, figs. 1-4.—CUSHMAN and McGLAMERY, 1. c., Prof. Paper 189-D, 1938, p. 106, pl. 24, figs. 22, 23.—CUSHMAN, 1. c., Prof. Paper 191, 1939, p. 9, pl. 20, figs. 3, 4.—CUSHMAN and McGLAMERY, 1. c., Prof. Paper 197-B, 1942, p. 69, pl. 5, fig. 8.—APPLIN and JORDAN, Journ. Pal.,

vol. 19, 1945, pp. 129, 130 (lists).—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 21, 1945, p. 5, pl. 1, fig. 15.

Very typical specimens occur in the McBean material from stations 2 and 3, but are rather rare. It is a common species of the Oligocene and upper Eocene.

**NONION INEXCAVATUM** (Cushman and Applin) (Pl. 10, fig. 10)

*Nonionina advena* CUSHMAN, var. *inexcavata* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 182, pl. 10, figs. 18, 19.

*Nonion inexcavatum* ELLISOR, l. c., vol. 17, No. 11, 1933, pl. 2, fig. 7.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 30, pl. 11, figs. 5-8; Prof. Paper 191, 1939, p. 7, pl. 2, fig. 4; Contr. Cushman Lab. Foram. Res., vol. 21, 1945, p. 5, pl. 1, fig. 16.

This species described from the Jackson (Eocene) of Texas has a wide range in the Gulf and Eastern Coastal Plain regions in both the Jackson and Claiborne (Eocene). Specimens occur at all three stations in the McBean material.

**NONION MICRUM** Cole (Pl. 10, fig. 11)

*Nonion micrus* COLE, Bull. Amer. Pal., vol. 14, No. 51, 1927, p. 22, pl. 5, fig. 12; vol. 14, No. 53, 1928, p. 211.—WEINZIERL and APPLIN, Journ. Pal., vol. 3, 1929, p. 400, pl. 43, fig. 6.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 30, pl. 11, figs. 14, 15.—BERMÚDEZ, Mem. Soc. Cubana Hist. Nat., vol. 12, 1938, p. 17.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 58, pl. 7, figs. 22, 23.—CUSHMAN, U. S. Geol. Survey Prof. Paper 191, 1939, p. 5, pl. 1, figs. 20-22; Contr. Cushman Lab. Foram. Res., vol. 15, 1939, p. 61, pl. 10, figs. 44-46.

This species described from the Guayabal formation (Eocene), of Mexico is rather common in the Claiborne (Eocene) of the Gulf Coastal region but also occurs in the Jackson (Eocene) and in the Eocene of Cuba and the Chapapote formation of Mexico. It is rather rare in the McBean material, occurring at all three stations.

**NONION WHITSETTENSE** (Cushman and Applin)

*Nonionina whitsettensis* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 183, pl. 10, figs. 4-6.

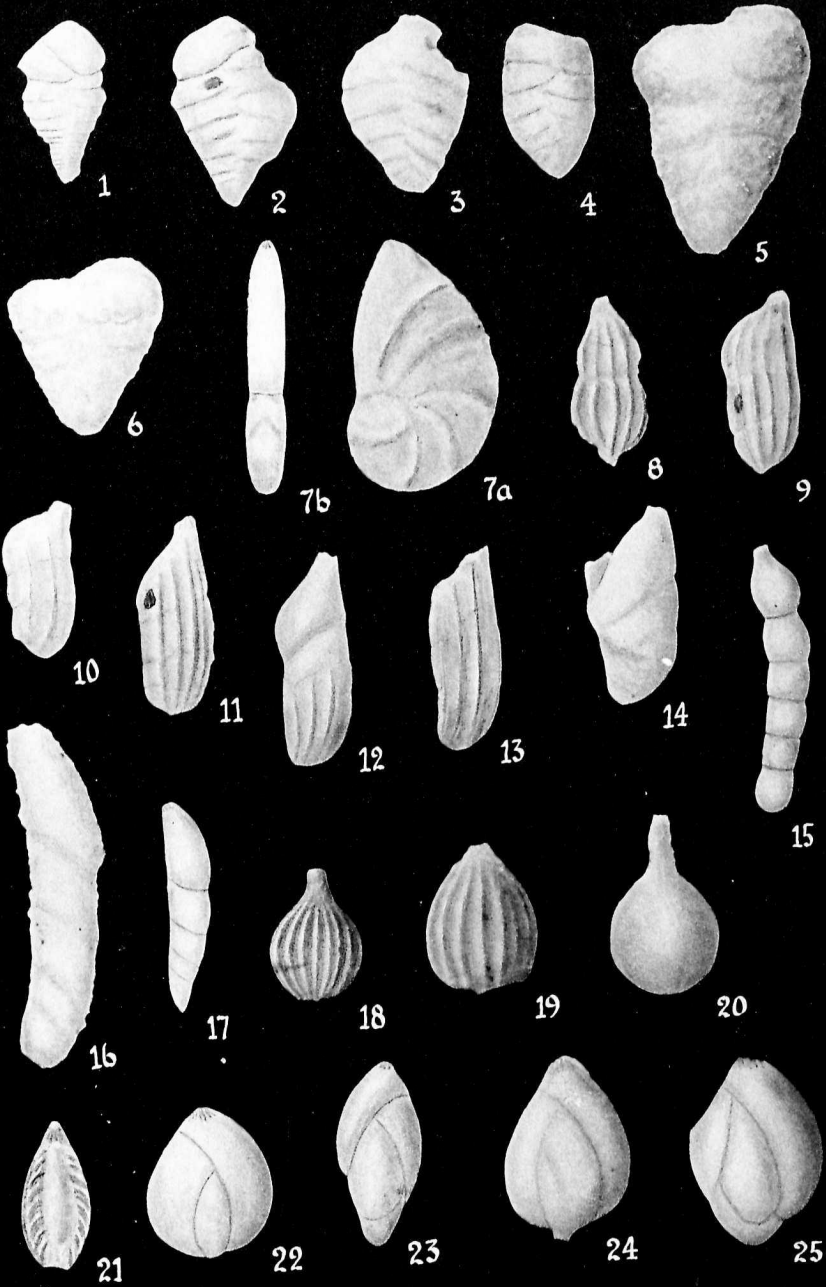
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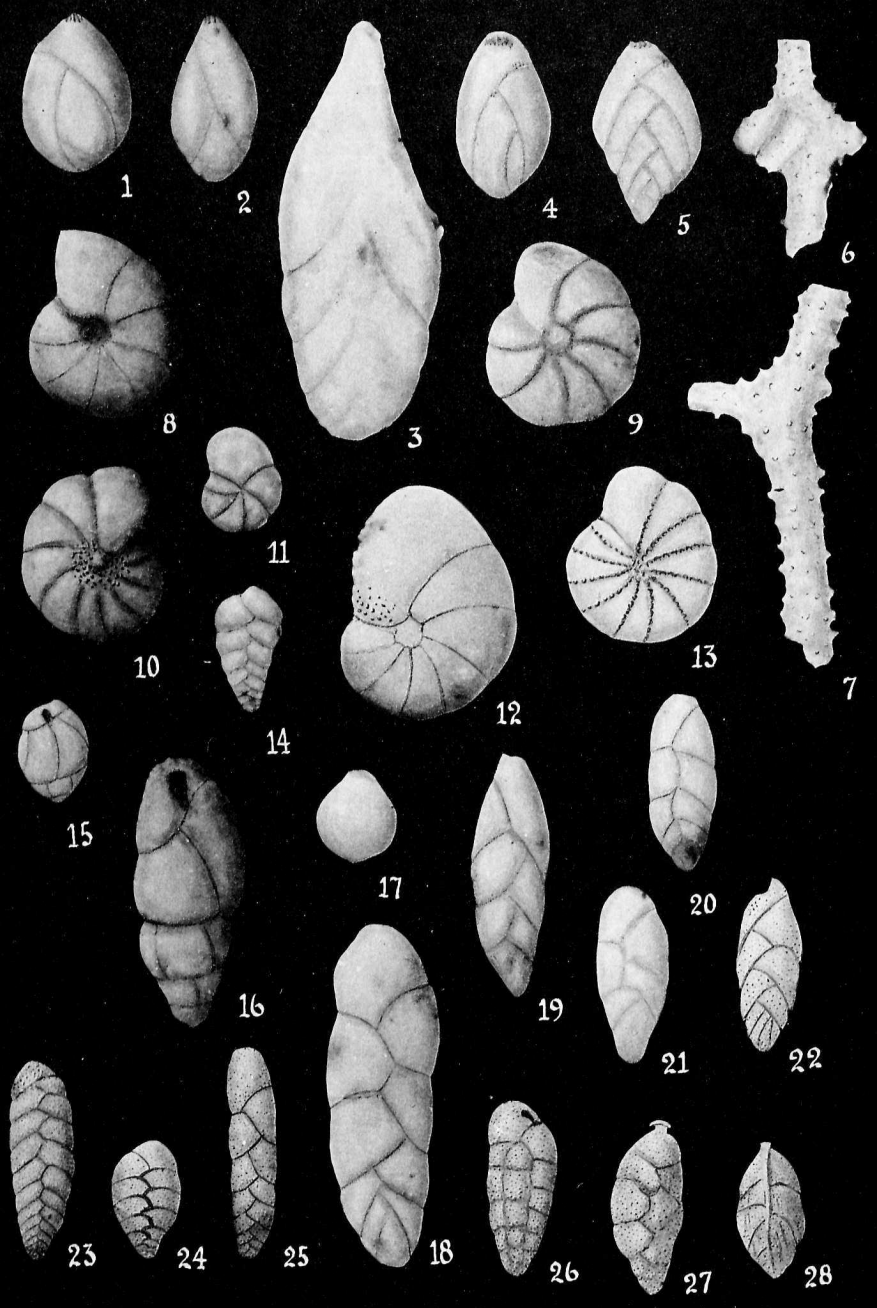
All figures  $\times 90$  unless otherwise noted.

Figs. 1-3. *Spiroplectammina mississippiensis* (Cushman), var. *alabamensis* (Cushman).  $\times 60$ . Showing differences in shape of early portion and peripheral keel. 4. *Textularia dibollensis* Cushman and Applin.  $\times 60$ . 5. *T. hannai* Davis.  $\times 60$ . 6. *T. cuyleri* Davis.  $\times 60$ . 7. *Planularia georgiana* Cushman and Herrick, n. sp.  $\times 60$ . Holotype. a, side view; b, peripheral view. 8-13. *Marginulina cocoaensis* Cushman.  $\times 60$ . Series showing differences in shape and amount of coiling. 8, Extreme megalospheric form. 12, 13, Compressed microspheric forms. 14. *M. karreriana* Cushman.  $\times 60$ . 15. *Dentalina jacksonensis* (Cushman and Applin).  $\times 60$ . 16. *D. hantkeni* Cushman.  $\times 60$ . 17. *D. cf. communis* d'Orbigny.  $\times 60$ . 18. *Lagena costata* (Williamson). 19. *L. acuticosta* Reuss. 20. *L. laevis* (Montagu) ?  $\times 60$ . 21. *L. tetragona* Parker and Jones. 22. *Guttulina irregularis* (d'Orbigny).  $\times 60$ . 23. *G. spicaeformis* (Roemer).  $\times 60$ . 24. *G. cf. caudata* d'Orbigny. 25. *G. cf. problema* d'Orbigny.

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*Nonion whitsettensis* ELLISOR, 1. c., vol. 17, No. 11, 1933, pl. 2, fig. 14.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 31, pl. 11, figs. 16-18; Prof. Paper 191, 1939, p. 7, pl. 1, fig. 27.

Rare specimens of this species occur at station 3.

#### Genus NONIONELLA Cushman, 1926

**NONIONELLA HANTKENI** (Cushman and Applin), var. **SPISSA** Cushman (Pl. 10, fig. 12)  
*Nonionella hantkeni* (CUSHMAN and APPLIN), var. *spissa* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 7, 1931, p. 58, pl. 7, fig. 13.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 2, figs. 10, 12.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 31, pl. 12, fig. 6.—CUSHMAN and McGLAMERY, 1. c., Prof. Paper 189-D, 1938, p. 106, pl. 25, fig. 2.—CUSHMAN, 1. c., Prof. Paper 191, 1939, p. 30, pl. 8, fig. 5.

This variety seems to be characteristic of the Jackson (Eocene) with rare occurrences in the lower Oligocene. It occurs at stations 1 and 3.

#### Genus ELPHIDIUM Montfort, 1808

**ELPHIDIUM TEXANUM** (Cushman and Applin) (Pl. 10, fig. 13)

*Polystomella texana* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 184, pl. 10, figs. 7-9.

*Elphidium texanum* CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 32, pl. 12, fig. 5; 1. c., Prof. Paper 191, 1939, p. 39, pl. 10, fig. 17.

The only previous records for this species are from beds of Jackson age (upper Eocene) in Texas. Typical specimens occur in the McBean material only at station 3. In America *Elphidium* has not been found in formations older than the upper Eocene and the occurrence here would seem to help in fixing the age of the McBean.

### Family HETEROHELICIDAE

#### Genus GÜMBELINA Egger, 1899

**GÜMBELINA CUBENSIS** Palmer (Pl. 10, fig. 14)

*Gümbelina cubensis* PALMER, Mem. Soc. Cubana Hist. Nat., vol. 8, 1934, p. 74, text figs. 1-6.—PALMER and BERMÚDEZ, 1. c., vol. 10, 1936, p. 284.—BERMÚDEZ, 1. c.,

#### EXPLANATION OF PLATE 10

All figures  $\times 90$  unless otherwise noted.

FIG. 1. *Globulina münsteri* (Reuss).  $\times 60$ . 2. *G. minuta* (Roemer). 3. *Sigmomorphina jacksonensis* (Cushman).  $\times 60$ . 4. *S. semitecta* (Reuss), var. *terquemiana* (Fornasini).  $\times 60$ . 5. *Polymorphina advena* Cushman.  $\times 60$ . 6, 7. *Ramulina* cf. *aculeata* (d'Orbigny). 8. *Nonion planatum* Cushman and Thomas. 9. *N. advenum* (Cushman). 10. *N. inexcavatum* (Cushman and Applin). 11. *N. micrum* Cole. 12. *Nonionella hantkeni* (Cushman and Applin), var. *spissa* Cushman.  $\times 52$ . 13. *Elphidium texanum* (Cushman and Applin).  $\times 60$ . 14. *Gümbelina cubensis* Palmer. 15. *Buliminella robertsi* (Howe and Ellis). 16. *Bulimina* cf. *elongata* d'Orbigny, var. *tenera* Reuss. 17. *Entosolenia laevigata* (Reuss). 18. *Virgulina recta* Cushman. 19. *V. dibollensis* Cushman and Applin. 20, 21. *V. zetina* Cole. 22. *V. mcgurti* Howe and Roberts. 23. *Bolivina gracilis* Cushman and Applin. 24. *B. broussardi* Howe and Roberts. 25. *Loxostomum* cf. *claibornense* Cushman. 26. *Reussella subrotundata* (Cushman and Thomas). 27. *Angulogerina vicksburgensis* Cushman. 28. *A. cooperensis* Cushman.

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vol. 12, 1938, p. 11.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 15, 1939, p. 63, pl. 10, fig. 54.—PALMER, Mem. Soc. Cubana Hist. Nat., vol. 14, 1940, p. 292.

The records for this species are from the upper Eocene and lower Oligocene of Cuba and from the upper Eocene of cores from the Atlantic. A few specimens from the McBean material occur at all three stations.

Genus **GÜMBELITRIA** Cushman, 1933

**GÜMBELITRIA COLUMBIANA** Howe

*Gümbelitra columbiana* HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 62, pl. 8, figs. 12, 13.—CUSHMAN and TODD, Contr. Cushman Lab. Foram. Res., vol. 21, 1945, p. 16, pl. 4, fig. 3.

This species described from the Cook Mountain formation of the Claiborne group of Louisiana, and recorded from the Lisbon formation of Alabama, occurs in material from station 1.

Family **BULIMINIDAE**

Genus **BULIMINELLA** Cushman, 1911

**BULIMINELLA ROBERTSI** (Howe and Ellis) (Pl. 10, fig. 15)

*Bulimina robertsi* HOWE and ELLIS, in HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 63, pl. 8, figs. 32, 33.

*Buliminella robertsi* MARTIN, Stanford Univ. Publ., Univ. Ser., Geol. Sci., vol. 3, No. 3, 1943, p. 9 (list).

This species was described from the Cook Mountain formation of the Claiborne group (Eocene), of Louisiana where it was recorded as common. Specimens apparently identical occur in considerable numbers at all three stations in the McBean material. The arrangement of the chambers would seem to place this species in *Buliminella*.

Genus **BULIMINA** d'Orbigny, 1826

**BULIMINA** cf. **ELONGATA** d'Orbigny, var. **TENERA** Reuss (Pl. 10, fig. 16)

Specimens are rare at stations 2 and 3 in the McBean material. They are very close in their characters to this variety which is recorded from the Miocene. More specimens are needed to make a positive identification.

Genus **ENTOSOLENIA** Ehrenberg, 1848

**ENTOSOLENIA** cf. **GLOBOSA** (Montagu)

Very rare specimens of a globular form showing considerable variation may be referred questionably to this species. They are from station 1.

**ENTOSOLENIA LAEVIGATA** (Reuss) (Pl. 10, fig. 17)

A few, somewhat compressed, smooth specimens may belong to this common species. They occur at stations 1 and 3.

Genus *VIRGULINA* d'Orbigny, 1826*VIRGULINA RECTA* Cushman (Pl. 10, fig. 18)

*Virgulina recta* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 9, 1933, p. 12, pl. 1, fig. 31; U. S. Geol. Survey Prof. Paper 181, 1935, p. 36, pl. 14, fig. 4; Special Publ. No. 9, Cushman Lab. Foram. Res., 1937, p. 8, pl. 1, fig. 23.—CUSHMAN and SIMONSON, Journ. Pal., vol. 18, 1944, p. 198, pl. 32, fig. 14.

This species has been recorded both from the lower Oligocene and upper Eocene. It is very rare at station 1 of the McBean collections.

*VIRGULINA DIBOLLENSIS* Cushman and Applin (Pl. 10, fig. 19)

*Virgulina dibollensis* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 168, pl. 7, fig. 7.—HOWE, Journ. Pal., vol. 2, 1928, p. 175 (list).—HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 66, pl. 11, fig. 1.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 21, pl. 3, fig. 14; U. S. Geol. Survey Prof. Paper 181, 1935, p. 36, pl. 14, figs. 1-3; Special Publ. No. 9, Cushman Lab. Foram. Res., 1937, p. 7, pl. 1, figs. 20-22; Amer. Journ. Sci., vol. 242, 1944, p. 11, pl. 1, fig. 21.—CUSHMAN and TODD, Contr. Cushman Lab. Foram. Res., vol. 21, 1945, p. 17, pl. 4, fig. 7.

This seems to be a distinctive species of beds of Jackson age (upper Eocene). Specimens not entirely typical have been recorded from the lower Oligocene and Wilcox and Claiborne (Eocene). Specimens are very rare in the McBean material and found only at stations 1 and 2.

*VIRGULINA ZETINA* Cole (Pl. 10, figs. 20, 21)

*Virgulina mexicana* COLE (not CUSHMAN), Bull. Amer. Pal., vol. 14, No. 51, 1927, p. 25, pl. 5, fig. 14 (corrected to *V. zetina* in errata).

*Virgulina zetina* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 22, pl. 3, fig. 15.—CUSHMAN and McMASTERS, Journ. Pal., vol. 10, 1936, p. 513, pl. 75, fig. 26.—CUSHMAN, Special Publ. No. 9, Cushman Lab. Foram. Res., 1937, p. 7, pl. 1, figs. 18, 19.—BERMÚDEZ, Mem. Soc. Cubana Hist. Nat., vol. 12, 1938, p. 26.—CUSHMAN and McGLAMERY, U. S. Geol. Survey Prof. Paper 189-D, 1938, p. 107, pl. 25, fig. 8.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 65, pl. 9, fig. 2.—CUSHMAN and APPLIN, Contr. Cushman Lab. Foram. Res., vol. 19, 1943, p. 38, pl. 7, fig. 26.—CUSHMAN and TODD, l.c., vol. 21, 1945, p. 17, pl. 4, fig. 8.

This species was described from the Guayabal formation (Eocene), of Mexico. Most of the records for the species are from the middle Eocene. Less typical specimens are recorded from the Oligocene. It is rare in the McBean material, though less so than the other three species recorded here, occurring at all three stations.

*VIRGULINA MCGUIRTI* Howe and Roberts (Pl. 10, fig. 22)

*Virgulina mcguirti* HOWE and ROBERTS, in HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 65, pl. 9, fig. 1.

A single specimen from station 1 is very similar to the type figure from the Cook Mountain formation (Eocene) of Louisiana.

Genus **BOLIVINA** d'Orbigny, 1839**BOLIVINA GRACILIS** Cushman and Applin (Pl. 10, fig. 23)

*Bolivina gracilis* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 167, pl. 7, figs. 1, 2.—COLE, Bull. Amer. Pal., vol. 14, No. 51, 1927, p. 26, pl. 5, fig. 13.—HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 57.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 37, pl. 14, figs. 8-10; Special Publ. No. 9, Cushman Lab. Foram. Res., 1937, p. 59, pl. 7, figs. 22, 23.—CUSHMAN and McGLAMERY, U. S. Geol. Survey Prof. Paper 189-D, 1938, p. 108, pl. 26, figs. 1, 2; l. c., Prof. Paper 197-B, 1942, p. 71.

Most of the records for this species are from material of Jackson age (Eocene). Less typical specimens have been recorded from the lower Oligocene of Alabama and it is also recorded from the Guayabal formation of Mexico. Specimens occur at all three stations.

**BOLIVINA** cf. **ALAZANENSIS** Cushman

Rather poorly preserved specimens from stations 1 and 3 resemble this species, but more are needed to confirm the identification.

**BOLIVINA** cf. **JACKSONENSIS** Cushman and Applin

A very few specimens found in the McBean material from stations 2 and 3 resemble this common species of the Jackson (Eocene).

**BOLIVINA BROUSSARDI** Howe and Roberts (Pl. 10, fig. 24)

*Bolivina broussardi* HOWE and ROBERTS, in HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 65, pl. 9, figs. 7, 8.

Specimens that seem typical of this species described from the Cook Mountain formation (Eocene), of Louisiana are fairly common at all three stations.

Genus **LOXOSTOMUM** Ehrenberg, 1854**LOXOSTOMUM** cf. **CLAIBORNENSE** Cushman (Pl. 10, fig. 25)

A single specimen from station 1, here figured, is not entirely typical of this Claiborne species but seems at least related to it. No others were found in the McBean material.

Genus **REUSSELLA** Galloway, 1933**REUSSELLA SUBROTUNDATA** (Cushman and Thomas) (Pl. 10, fig. 26)

*Reussia subrotundata* CUSHMAN and THOMAS, Journ. Pal., vol. 4, 1930, p. 38, pl. 3, fig. 7.

*Reussella subrotundata* HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 70, pl. 8, figs. 40-42.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 21, 1945, p. 29, pl. 5, fig. 18.

This species is known only from the Cook Mountain formation of the Claiborne group (Eocene), of Texas and Louisiana. Specimens are fairly common, occurring at stations 2 and 3.

Genus **ANGULOGERINA** Cushman, 1927**ANGULOGERINA COOPERENSIS** Cushman (Pl. 10, fig. 28)

*Angulogerina cooperensis* CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 42, pl. 16, fig. 9.—BERMÚDEZ, Mem. Soc. Cubana Hist. Nat., vol. 11, 1937, p. 338.



This species seems to be characteristic of the Cooper marl of Jackson age (Eocene). It is also recorded from the Eocene of Cuba. Specimens referred to it from the Oligocene are probably *A. byramensis* (Cushman). It occurs at all three stations.

**ANGULOGERINA VICKSBURGENSIS** Cushman (Pl. 10, fig. 27)

*Angulogerina vicksburgensis* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 11, 1935, p. 33, pl. 5, figs. 3, 4.—PALMER and BERMÚDEZ, Mem. Soc. Cubana Hist. Nat., vol. 10, 1936, p. 293.—BERMÚDEZ, l. c., vol. 11, 1937, p. 339.—CUSHMAN and EDWARDS, Contr. Cushman Lab. Foram. Res., vol. 14, 1938, p. 88, pl. 15, figs. 21, 22.—CUSHMAN and McGLAMERY, U. S. Geol. Survey Prof. Paper 197-B, 1942, p. 72, pl. 6, fig. 11.

This is a common species of the lower Oligocene of Alabama and Mississippi. It has also been recorded from the Oligocene and Eocene of Cuba. Specimens that seem identical are found at all three stations.

Family ELLIPSOIDINIDAE

Genus ELLIPSONODOSARIA A. Silvestri, 1900

ELLIPSONODOSARIA cf. EWALDI (Reuss)

A number of specimens with elongate, subcylindrical chambers seem related to this species. No complete specimens were obtained although it was found at all three stations. The species has been recorded with some question from several formations of Jackson age (Eocene).

Family ROTALIIDAE

Genus SPIRILLINA Ehrenberg, 1843

SPIRILLINA cf. VIVIPARA Ehrenberg

A very few specimens from station 3 may questionably be referred to this species.

SPIRILLINA cf. VICKSBURGENSIS Cushman

Occurring with the preceding are a few specimens with narrower coils and a tendency to show some of the sculpture characteristic of this lower Oligocene species, but they are not well preserved as to details.

Genus PATELLINA Williamson, 1858

PATELLINA ADVENA Cushman (Pl. 11, fig. 1)

*Patellina advena* CUSHMAN, U. S. Geol. Survey Prof. Paper 129-F, 1922, p. 135, pl. 31, fig. 9; l. c., Prof. Paper 133, 1923, p. 37.—CUSHMAN and CAHILL, l. c., Prof. Paper 175-A, 1933, p. 29, pl. 9, fig. 11.

The records for this species include the Oligocene of Mississippi and the Miocene of North Carolina. There are but a few specimens from station 3 but these seem very typical.

Genus DISCORBIS Lamarck, 1804

DISCORBIS HEMISPHAERICA Cushman (Pl. 11, fig. 3)

*Discorbis hemisphaerica* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 7, 1931, p.

59, pl. 7, fig. 14.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 3, figs. 17, 18.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 43, pl. 16, fig. 13.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 73, pl. 10, figs. 16-19.

This species is a characteristic one of the Jackson (Eocene) and has been recorded also from the Cook Mountain formation of the Claiborne group, of Louisiana. Typical specimens occur at stations 1 and 3.

**DISCORBIS ASSULATA** Cushman (Pl. 11, fig. 2)

*Discorbis assulata* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 9, 1933, p. 15, pl. 2, fig. 2; U. S. Geol. Survey Prof. Paper 181, 1935, p. 44, pl. 17, figs. 1, 2.

The types of this species are from the Ocala limestone of Georgia and it was also recorded from the Ocala limestone of Alabama. Rather typical specimens occur in the McBean material from station 3.

**DISCORBIS YEGUAENSIS** Weinzierl and Applin (Pl. 11, fig. 4)

*Discorbis yeguaensis* WEINZIERL and APPLIN, Journ. Pal., vol. 3, 1929, p. 405, pl. 44, fig. 5.—CUSHMAN and THOMAS, l. c., vol. 4, 1930, p. 40, pl. 4, fig. 1.

A few specimens from station 3 seem to be close to this species known only from the Claiborne (Eocene) of Texas.

**DISCORBIS GEORGIANA** Cushman and Herrick, n. sp. (Pl. 11, fig. 5)

Test trochoid, slightly longer than broad, plano-convex, dorsal side very slightly convex, ventral side flattened, slightly concave in the middle, periphery acute, the later portion in the adult very slightly keeled; chambers distinct, slightly inflated on the ventral side in the last-formed portion of the adult test, typically six in the adult whorl, increasing rapidly in size as added; sutures on the dorsal side curved; slightly limbate, little if at all depressed, on the ventral side slightly curved in the earlier portion, nearly radial in the adult, slightly depressed; wall smooth, distinctly perforate; aperture ventral, extending from near the periphery to the umbilicus, low, with a slight, overhanging lip. Length 0.50-0.60 mm.; breadth 0.38-0.50 mm.; thickness 0.17-0.20 mm.

Holotype (Cushman Coll. No. 44971) from the McBean formation (Eocene), at ditch along highway running east to Shell Bluff, 0.4 mile east of highway bridge over McBean Creek, Richmond Co., Ga.

This species has probably been referred to *Discorbis subaraucana* Cushman but differs from that species in the more acute, slightly keeled periphery and less curved sutures on the ventral side. It is one of the commonest species in the McBean collections, occurring at all three stations.

**Genus VALVULINERIA** Cushman, 1926

**VALVULINERIA TEXANA** Cushman and Ellisor (Pl. 11, fig. 6)

*Valvulineria texana* CUSHMAN and ELLISOR, Contr. Cushman Lab. Foram. Res., vol. 7, 1931, p. 56, pl. 7, fig. 9.—HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p.

70, pl. 13, fig. 6.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 4, fig. 1.

This species has been recorded only from the Jackson (Eocene) of Texas and Louisiana. Specimens are fairly common at all stations, and, when compared with the types, seem identical.

Genus **GYROIDINA** d'Orbigny, 1826

**GYROIDINA SOLDANII** d'Orbigny, var. **OCTOCAMERATA** Cushman and G. D. Hanna  
(For references, see these Contributions, vol. 19, 1943, p. 40.)

This variety is a very common one in the McBean material, occurring at all three stations. It is widely distributed in the Eocene in beds of Jackson and Claiborne age and possibly of Wilcox age.

Genus **EPONIDES** Montfort, 1808

**EPONIDES COCOAENSIS** Cushman

*Eponides cocoaensis* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 4, 1928, p. 73, pl. 10, fig. 2; U. S. Geol. Survey Prof. Paper 181, 1935, p. 47, pl. 19, figs. 1, 2.—KELLEY, Bull. Amer. Assoc. Petr. Geol., vol. 27, 1943, pp. 8, 11 (lists).—MARTIN, Stanford Univ. Publ., Univ. Ser., Geol. Sci., vol. 3, No. 3, 1943, p. 10 (list).

Typical specimens of this species occur in the McBean material from all three stations. It is known from beds of Jackson age (Eocene) in Alabama, Mississippi, and South Carolina, and is recorded in lists of species from the Eocene of California.

Genus **SIPHONINA** Reuss, 1850

**SIPHONINA JACKSONENSIS** Cushman and Applin

*Siphonina jacksonensis* CUSHMAN and APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 180, pl. 9, figs. 20-23.—CUSHMAN, Proc. U. S. Nat. Mus., vol. 72, Art. 20, 1927, p. 5, pl. 1, fig. 6.—CUSHMAN and M. A. HANNA, Trans. San Diego Soc. Nat. Hist., vol. 5, 1927, p. 53, pl. 5, fig. 6.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 3, fig. 21.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 48, pl. 20, figs. 2-8.—FRANKLIN, Journ. Pal., vol. 18, 1944, p. 316, pl. 47, fig. 6.

This is a characteristic species of the Jackson (Eocene) of Texas, Louisiana, Mississippi, Alabama, and North Carolina. It is also recorded from the Alazan clay of Mexico and the Carapita formation of Venezuela. It is common at all three stations.

Genus **CANCRIS** Montfort, 1808

**CANCRIS CUBENSIS** Cushman and Bermúdez (Pl. 11, fig. 7)

*Cancris cubensis* CUSHMAN and BERMÚDEZ, Contr. Cushman Lab. Foram. Res., vol. 13, 1937, p. 25, pl. 2, figs. 48-50.—BERMÚDEZ, Mem. Soc. Cubana Hist. Nat., vol. 11, 1937, p. 343.—PALMER, l. c., vol. 15, 1941, p. 197, pl. 16, figs. 1, 12.—CUSHMAN and TODD, Contr. Cushman Lab. Foram. Res., vol. 18, 1942, p. 85, pl. 22, figs. 1-3.

Numerous specimens in the McBean material, although somewhat smaller than the types, seem identical in all other respects. The species

is known from the Eocene and Oligocene of Cuba. It occurs at all three stations.

### Family CASSIDULINIDAE

#### Genus PULVINULINELLA Cushman, 1926

##### PULVINULINELLA ATLANTISAE Cushman (Pl. 11, fig. 8)

*Pulvinulinella atlantisae* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 15, 1939, p. 72, pl. 12, fig. 16.

This species was described from Eocene deposits off the Atlantic coast brought up in cores. Specimens in the McBean collections from all three stations were compared with the types and seem identical.

##### PULVINULINELLA DANVILLENISIS Howe and Wallace (Pl. 11, fig. 9)

*Pulvinulinella danvillensis* HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 71, pl. 13, fig. 7.

A number of specimens from station 3 seem identical with this species from the Jackson (Eocene) of Louisiana. It is a very small species but seems to hold its characters very constantly.

#### Genus CASSIDULINA d'Orbigny, 1826

##### CASSIDULINA GLOBOSA Hantken

Very rare specimens were found in the McBean material from station 3.

##### CASSIDULINA WINNIANA Howe (Pl. 11, fig. 10)

*Cassidulina winniana* HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 82, pl. 11, figs. 7, 8.

Rare specimens from stations 2 and 3 seem, in size and general characters, very much like the type figure from the Cook Mountain formation of Louisiana.

### Family HANTKENINIDAE

#### Genus HANTKENINA Cushman, 1924

##### HANTKENINA LONGISPINA Cushman (Pl. 11, figs. 11, 12)

*Hantkenina longispina* CUSHMAN, Proc. U. S. Nat. Mus., vol. 66, Art. 30, 1924, p. 2, pl. 2, fig. 4; Bull. Amer. Assoc. Petr. Geol., vol. 9, 1925, p. 299, pl. 7, fig. 3.—COLE, Bull. Amer. Pal., vol. 14, No. 51, 1927, p. 24, pl. 4, fig. 7.—CUSHMAN, Journ. Pal., vol. 1, 1927, p. 160, pl. 26, fig. 2.—NUTTALL, l. c., vol. 4, 1930, pp. 274, 284.—HOWE and

#### EXPLANATION OF PLATE 11

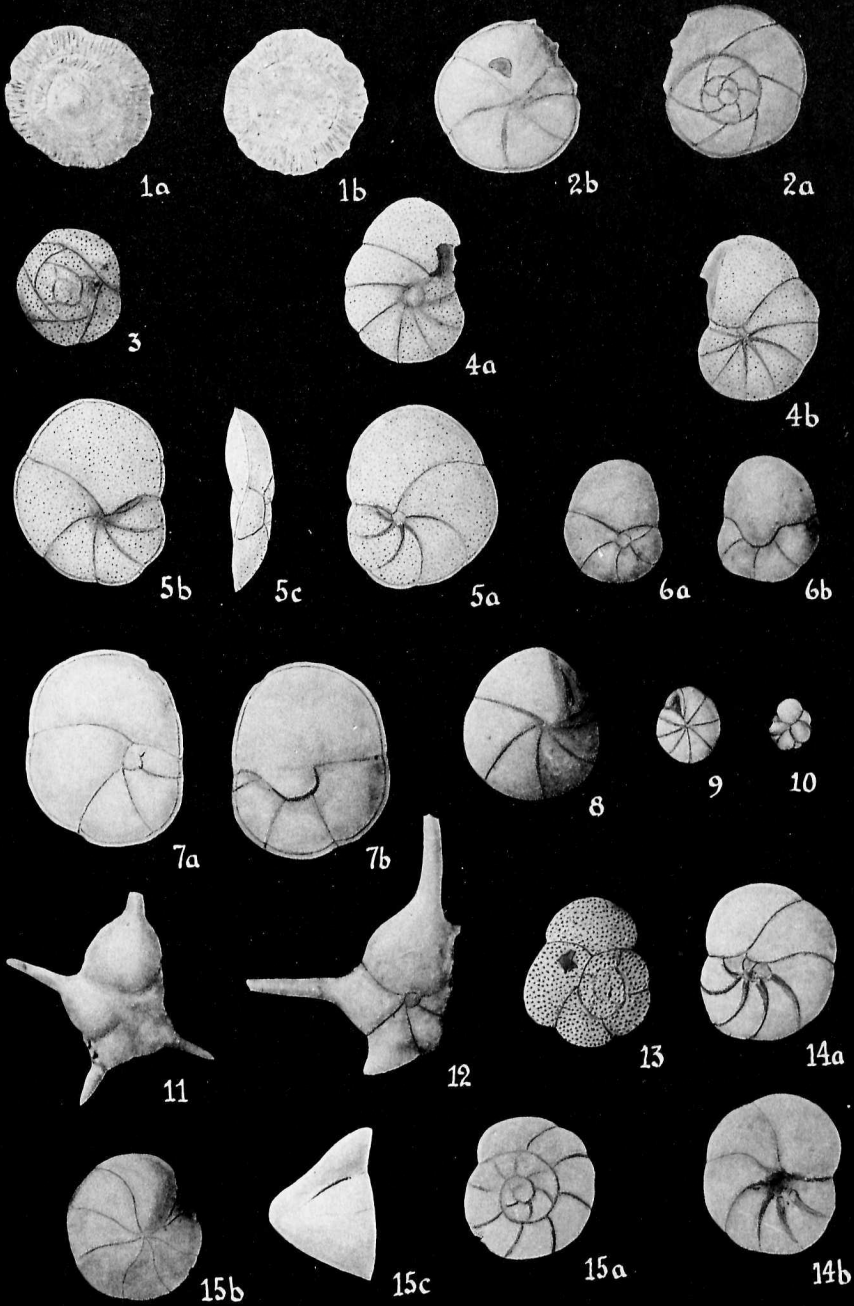
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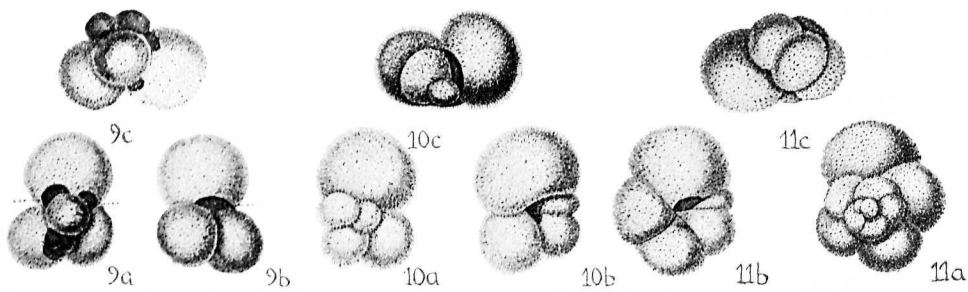
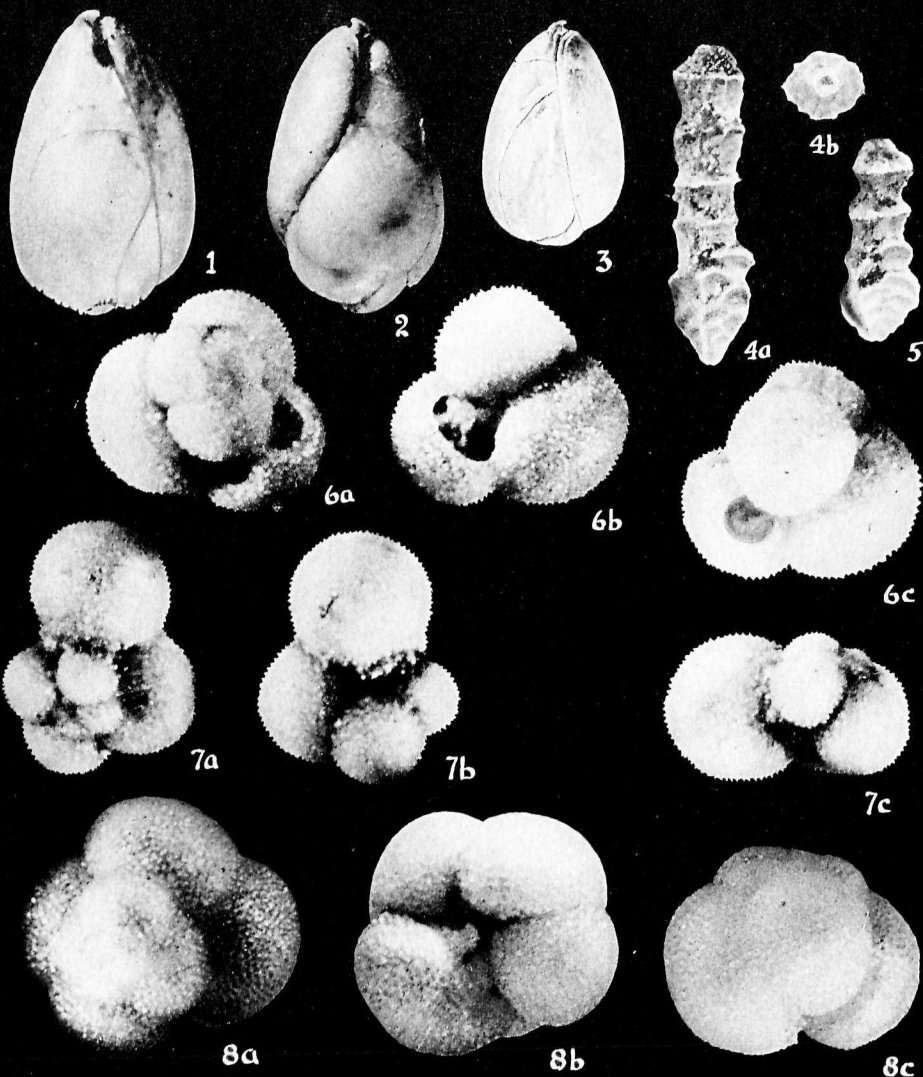
FIG. 1. *Patellina advena* Cushman.  $\times 60$ . 2. *Discorbis assulata* Cushman.  $\times 60$ . 3. *D. hemisphaerica* Cushman. 4. *D. yeguaensis* Weinzierl and Applin.  $\times 60$ . 5. *D. georgiana* Cushman and Herrick, n. sp.  $\times 60$ . Holotype. 6. *Valvulineria texana* Cushman and Ellisor.  $\times 60$ . 7. *Cancris cubensis* Cushman and Bermúdez.  $\times 60$ . 8. *Pulvinulinella atlantisae* Cushman. 9. *P. danvillensis* Howe and Wallace. 10. *Cassidulina winniana* Howe. 11, 12. *Hantkenina longispina* Cushman. 13. *Globorotalia coccoensis* Cushman. 14. *Cibicides danvillensis* Howe and Wallace.  $\times 60$ . 15. *C. westi* Howe.  $\times 60$ .

In all figures: *a*, dorsal view; *b*, ventral view; *c*, apertural view.

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WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 55, pl. 10, fig. 2.—PIJPERS, Geol. Pal. Bonaire, 1933, p. 67, text figs. 77-79.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 85, pl. 12, fig. 23.—THALMANN, Stanford Univ. Publ., Univ. Ser., Geol. Sci., vol. 3, No. 1, 1942, p. 6 (table).

A very few rather small specimens of this Eocene species occur at stations 1 and 2 in the McBean material. This species is recorded from beds of Jackson and Claiborne age.

### Family GLOBOROTALIIDAE

#### Genus GLOBOROTALIA Cushman, 1927

##### GLOBOROTALIA COCOAENSIS Cushman (Pl. 11, fig. 13)

*Globorotalia cocoaensis* CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 4, 1928, p. 75, pl. 10, fig. 3.—HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 75, pl. 14, fig. 4.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 4, fig. 6.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 50, pl. 21, figs. 1-3.—CORYELL and EMBICH, Journ. Pal., vol. 11, 1937, p. 301, pl. 43, fig. 11.—THALMANN, Stanford Univ. Publ., Univ. Ser., Geol. Sci., vol. 3, No. 1, 1942, p. 9 (list).

This species is very rare in the McBean material, occurring only at stations 2 and 3. It is a characteristic species of beds of Jackson age (Eocene).

##### GLOBOROTALIA CRASSATA (Cushman)

(For references, see these Contributions, vol. 19, 1943, p. 44.)

A few specimens from stations 1 and 3 seem to belong to this species which is widely distributed in the upper Eocene.

##### GLOBOROTALIA CENTRALIS Cushman and Bermúdez

*Globorotalia centralis* CUSHMAN and BERMÚDEZ, Contr. Cushman Lab. Foram. Res., vol. 13, 1937, p. 26, pl. 2, figs. 62-65.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 84, pl. 12, figs. 4-6.

A number of specimens in the McBean material from stations 1 and 3 are very similar to this species, except in the surface which is roughened and in some specimens almost spinose. The species was described from the upper Eocene of Cuba and recorded from the Cook Mountain formation (Eocene) of Louisiana.

### EXPLANATION OF PLATE 12

FIGS. 1-3. *Globobulimina caribbea* Cushman and Bermúdez, n. sp. Recent, off Cuba. 1, 2,  $\times 20$ . 3,  $\times 32$ . 1, Holotype. 2, 3, Paratypes. 3, Young form. 4, 5. *Pseudoclavulina moorevillensis* Cushman and Applin, n. sp. Cretaceous, Alabama.  $\times 30$ . 4, Holotype. 5, Paratype. a, side view; b, apertural view. 6, 9. *Globigerinoides rubra* (d'Orbigny). Recent, Atlantic. 6,  $\times 75$ . 9, Type figures. a, a, dorsal views; b, b, ventral views; c, c, peripheral views. 7, 10. *Globigerina siphonijera* d'Orbigny. Recent, Atlantic. 7,  $\times 75$ . 10, Type figures. a, a, dorsal views; b, b, ventral views; c, c, peripheral views. 8, 11. *G. dutertrei* d'Orbigny. Recent, Atlantic. 8,  $\times 75$ . 11, Type figures. a, a, dorsal views; b, b, ventral views; c, c, peripheral views.

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## Family ANOMALINIDAE

## Genus ANOMALINA d'Orbigny, 1826

## ANOMALINA COSTIANA Weinzierl and Applin

*Anomalina costiana* WEINZIERL and APPLIN, Journ. Pal., vol. 3, 1929, p. 409, pl. 44, fig. 7.—HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 86, pl. 13, figs. 9-11.—CUSHMAN and APPLIN, Contr. Cushman Lab. Foram. Res., vol. 19, 1943, p. 45, pl. 8, fig. 11.—BECK, Journ. Pal., vol. 17, 1943, p. 609, pl. 109, figs. 12, 19, 23.

Rare specimens from station 3 very closely resemble this species described from the Yegua formation of the Claiborne group (Eocene) of Texas and recorded from the Cook Mountain formation of Louisiana and the Eocene of Washington.

## Genus CIBICIDES Montfort, 1808

## CIBICIDES MISSISSIPPIENSIS (Cushman)

*Anomalina mississippiensis* CUSHMAN, U. S. Geol. Survey Prof. Paper 129-E, 1922, p. 98, pl. 21, figs. 6-8; l. c., Prof. Paper 129-F, 1922, p. 137; l. c., Prof. Paper 133, 1923, p. 42.—HOWE, Journ. Pal., vol. 2, 1928, p. 174 (list).—COLE and PONTON, Bull. 5, Florida State Geol. Survey, 1930, p. 46, pl. 9, figs. 2, 3.  
*Cibicides mississippiensis* ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, 1933, pl. 5, figs. 6, 7.—CUSHMAN, U. S. Geol. Survey Prof. Paper 181, 1935, p. 54, pl. 22, fig. 3.—CUSHMAN and McGLAMERY, l. c., Prof. Paper 197-B, 1942, p. 75, pl. 7, fig. 14.—APPLIN and JORDAN, Journ. Pal., vol. 19, 1945, p. 130 (list).—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 21, 1945, p. 10.

This species is widely distributed in the lower Oligocene and in beds of Jackson age (Eocene). Specimens in the McBean material from station 3 are rather rare but seem typical.

## CIBICIDES DANVILLENSIS Howe and Wallace (Pl. 11, fig. 14)

*Cibicides danvillensis* HOWE and WALLACE, Louisiana Geol. Bull. No. 2, 1932, p. 77, pl. 14, fig. 5.

This is one of the commonest species in the McBean material. It was described from the Jackson (Eocene) of Louisiana and our specimens agree closely with topotypes with which they were compared. They are from all three stations.

## CIBICIDES WESTI Howe (Pl. 11, fig. 15)

*Cibicides westi* HOWE, Geol. Bull. 14, Louisiana Geol. Survey, 1939, p. 88, pl. 13, figs. 20-22.—KELLEY, Bull. Amer. Assoc. Petr. Geol., vol. 27, 1943, p. 11 (list).

Abundant specimens occurring in all the samples of the McBean collection are very close to this species described from the Cook Mountain formation of the Claiborne group (Eocene) of Louisiana. They are slightly thicker than the Claiborne form and more pointed at the umbilical end, but otherwise are very similar.

## CIBICIDES cf. LOBATULUS (Walker and Jacob)

Abundant specimens in all the McBean samples may be referred to



this species. They are flattened and evidently represent attached specimens, as they show a great deal of variation in the shape of the test. With these are other specimens somewhat similar in general characters but the test is somewhat thicker and more irregular in shape. It is difficult to separate these two forms.

**CIBICIDES PSEUDOUNGERIANUS** (Cushman)

(For references, see these Contributions, vol. 15, 1939, p. 76.)

This species has a wide distribution in the Tertiary of America and, from the records, has a long vertical range. It is fairly common at all the stations in the McBean material but not as abundant as the preceding species. It has been found widely distributed in beds of Jackson age (Eocene) of the Gulf and Atlantic Coastal Plain.

Family **PLANORBULINIDAE**

Genus **PLANORBULINELLA** Cushman, 1927

**PLANORBULINELLA** cf. **LARVATA** (Parker and Jones)

Very rare specimens from station 1 are similar to this species but are very small. There are numerous records for this species from the American Oligocene, but none from the Eocene.

269. A NEW SPECIES OF *GLOBOBULIMINA* FROM THE  
WESTERN ATLANTIC

By JOSEPH A. CUSHMAN and PEDRO J. BERMÚDEZ

The genus *Globobulimina* is represented largely by species from the Pacific area and Southern Europe. The species here described is by far the largest of the genus so far known.

**GLOBOBULIMINA CARIBBEA** Cushman and Bermúdez, n. sp. (Pl. 12, figs. 1-3)

Test very large for the genus, slightly pyriform, early chambers slightly visible at the base, sides convex and tapering gradually toward the apertural end; chambers distinct, somewhat inflated, the last two making up a large portion of the surface of the test; sutures distinct, depressed, especially in the last-formed whorl; wall smooth except at the base where in some specimens there is a slight tendency to become spinose; aperture elongate, with a slight lip at one side and a somewhat thickened, curving tooth projecting distinctly above the general outline of the test. Length of adult specimens 1.90-2.45 mm.; diameter 1.13-1.57 mm.

Holotype (Cushman Coll. No. 44079) from off southern Cuba, *Atlantis* station 3345, lat. 21° 08' N., long. 79° 56' 30" W., 690-700 fathoms.

This species differs from *Globobulimina perversa* (Cushman) in its larger size, slightly more elongate form, and the tendency to spinosity at the base.

## 270. A NEW *PSEUDOCLAVULINA* FROM THE UPPER CRETACEOUS OF ALABAMA

By JOSEPH A. CUSHMAN and ESTHER R. APPLIN

*PSEUDOCLAVULINA MOOREVILLENSIS* Cushman and Applin, n. sp. (Pl. 12, figs. 4, 5)

Test elongate, in the adult about  $3\frac{1}{2}$  times as long as broad, early portion triserial, triangular in section, the angles acute and slightly carinate, adult portion uniserial, circular in transverse section, the periphery with a strong keel at the middle of each chamber and concave between; chambers of the early triserial portion rather indistinct, those of the adult uniserial portion distinct, thickest in the middle with a distinct, raised ridge; sutures depressed in the adult; wall arenaceous, slightly roughened; aperture rounded, terminal, with a slightly thickened lip. Length 1.25-1.60 mm.; diameter 0.35-0.42 mm.

Holotype (Cushman Coll. No 44087) from the Upper Cretaceous, Mooreville tongue of the Selma chalk, 4 feet below top, 5 miles SE. of Boligee on Forkland Road, on hill slopes east of Taylor Creek, Greene Co., Ala. Collected by D. Hoyer Eargle.

This species differs from *Pseudoclavulina eggeri* Cushman from the Upper Cretaceous of Germany in the more sharply angular triserial portion, the more distinct uniserial chambers and the distinctive, sharply raised areas of the middle part of the later chambers. This species seems to be an index fossil for the top portion of the Mooreville tongue of the Selma chalk, and is common at this point in the section in wells across Mississippi, Alabama, and Georgia.

## 271. THE SPECIES OF *GLOBIGERINA* DESCRIBED BY D'ORBIGNY IN 1839 FROM SHORE SANDS OF CUBA

By JOSEPH A. CUSHMAN

In his work on the foraminifera, in De la Sagra's "Histoire physique, politique, et naturelle de l'Île de Cuba," in 1839 d'Orbigny described and figured three species assigned to *Globigerina*: *G. rubra*, *G. siphonifera*, and *G. dutertrei*. A study of specimens from the Western Atlantic seems to show that these are all valid species. Copies of d'Orbigny's original figures are given and photographs of specimens from the Western Atlantic.

**GLOBIGERINOIDES RUBRA** (d'Orbigny) (Pl. 12, figs. 6, 9)

*Globigerina rubra* d'ORBIGNY, in DE LA SAGRA, Hist. Physiq. Pol. Nat. Cuba, 1839, "Foraminiferes," p. 82, pl. 4, figs. 12-14.

This is a very distinctive species, usually with a deep red color, especially in the early chambers, and has been made the genotype of *Globigerinoides* Cushman, 1927. It has a high spire, although this is somewhat variable, and has supplementary apertures in the adult on the upper margin of the chambers. It is a well known and widely distributed species, especially in the Tropical Atlantic. The surface is, as figured by d'Orbigny, finely spinose.

**GLOBIGERINA SIPHONIFERA** d'Orbigny (Pl. 12, figs. 7, 10)

*Globigerina siphonifera* d'ORBIGNY, in DE LA SAGRA, Hist. Physiq. Pol. Nat. Cuba, 1839, "Foraminiferes," p. 83, pl. 4, figs. 15-18.

This species has hardly been referred to since its description in 1839. d'Orbigny figured a specimen with four chambers in the adult whorl, the chambers increasing rather rapidly in size as added, the surface with rather fine spinose projections, and the aperture small. A very similar specimen is figured (pl. 12, fig. 7) from *Challenger* station 122, but the surface is not as hispid as that figured by d'Orbigny. Other specimens found with this, however, do show a more spinose surface. The series of specimens agree very well in other characters with d'Orbigny's figure and description, and it would seem that this is a valid species in the Western Atlantic and may perhaps be found in the deeper water deposits of the late Tertiary of the same region. It may be distinguished from *G. bulloides* d'Orbigny by its very much smaller aperture.

The specific name, *siphonifera*, is apparently derived from the surface character which d'Orbigny described as "petits tubes percés à leur extrémité" and fig. 18 on his plate shows these "siphons" greatly enlarged.

**GLOBIGERINA DUTERTREI** d'Orbigny (Pl. 12, figs. 8, 11)

*Globigerina dutertrei* d'ORBIGNY, in DE LA SAGRA, Hist. Physiq. Pol. Nat. Cuba, 1839, "Foraminiferes," p. 84, pl. 4, figs. 19-21.

This species has been confused with *G. dubia* Egger and *G. conglomerata* Schwager. It has four or five globular chambers in the adult whorl increasing very gradually and evenly in size as added, the spire rather low but fairly distinct, the ventral side strongly umbilicate, the aperture itself rather small and with a slight lip. The surface is fairly smooth and composed of numerous slightly raised areas, close together, and rather evenly distributed over the entire surface. It is not definitely reticulate as are so many species of this family.

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

**Crespin, Irene.** Permian Foraminifera from Oonah, Tasmania.—*Australian Journal of Science*, vol. VII, No. 2, Oct. 1944, p. 59.—Several genera and species recorded, none new.

Some Permian Foraminifera from Eastern Australia.—*Proc. Roy. Soc. Queensland*, vol. LVI, No. 3, Feb. 5, 1945, pp. 23-30, pl. III.—A number of species are described and figured, the following new: *Nodosaria serocoldensis*, *N. springsurensis*, *Dentalina grayi*, and *Frondicularia parri*.

The Hutton Creek Bore, Queensland.—Commonwealth of Australia, Dept. of Supply and Shipping, Mineral Resources Survey, Report No. 1945/14, Feb. 16, 1945, pp. 1-3, 1 diagram.—A few foraminifera listed.

The Arcadia Bore, Queensland.—L.c., Report No. 1945/15, Feb. 16, 1945, pp. 4-7, 1 diagram.—A few foraminifera listed.

Preliminary Notes on a Microfauna from the Lower Cretaceous Deposits in the Great Artesian Basin.—L.c., Report No. 1945/16, Feb. 20, 1945, pp. 1-5, map.—Numerous foraminifera listed with numerous localities given.

**Brotzen, F.** De Geologiska Resultaten fran Borringarna vid Höllviken. Preliminär rapport, Del I: Kritan.—*Sveriges Geologiska Undersökning*, Ser. C, No. 465, (1944) 1945, pp. 1-65, pls. 1, 2, 10 text figs.—Pages 43-57, with plates 1 and 2 and several text figures, contain a chapter in English entitled "Certain Foraminifera characteristic of the profile." Numerous species and varieties are noted and a number figured, the following new: *Pseudowuigerina rugosa* n. sp., *Bolivinooides peterssoni* n. sp., *Pseudovalvulineria vombensis* n. sp., *Stensiöina exsculpta* (Reuss), var. *gracilis* n. var., *Cibicoides* (*Cibicides*) *turonica* n. sp., *C. (C.) cenomanica* n. sp., *Cibicides formosa* n. sp., and *Anomalinooides globosa* n. sp.

**Cole, W. Storrs.** Larger Foraminifera of Lau, Fiji.—In Ladd and Hoffmeister, *Bull.* 181, Bernice P. Bishop Museum, 1945, pp. 272-297, pls. 12-30.—Numerous species and varieties are described and figured, the following new: *Operculina mbalavensis* n. sp., *Lepidocyclina* (*Multilepidina*) *fijiensis* n. sp., *L. (Nephrolepidina) plummerae* n. sp., *L. (N.) rutteni* Van der Vlerk, var. *lauensis* n. var., *L. (Eulepidina) oneataensis* n. sp., and *L. thikombiaensis* n. sp.

Stratigraphic and Paleontologic Studies of Wells in Florida—No. 4.—*Florida Geol. Survey, Geol. Bull.* No. 28, May, 1945, pp. 1-160, pls. 1-22, numerous text figures and tables.—Many species and varieties of foraminifera are described and figured, the following new: *Lepidocyclina* (*Nephrolepidina*) *leonensis* n. sp., *L. (N.) sanfernandensis* Vaughan and Cole, var. *tallahasseeensis* n. var., and *L. (N.) suwanneensis* n. sp.

**Cushman, Joseph A.** Parallel Evolution in the Foraminifera.—*Amer. Journ. Sci.*, vol. 243-A, *Daly Volume*, 1945, pp. 117-121, pls. 1, 2.—Various lines of evolution in different groups are noted and illustrated.

**Richards, Horace G.** Subsurface Stratigraphy of Atlantic Coastal Plain between New Jersey and Georgia.—Bull. Amer. Assoc. Petr. Geol., vol. 29, No. 7, July, 1945, pp. 885-955, 27 figs.—A few foraminifera listed.

**Goukoff, Paul P.** Stratigraphic Relations of Upper Cretaceous in Great Valley, California.—L. c., pp. 956-1007, 17 figs.—A table showing the distribution of many species of foraminifera is given.

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