CONTRIBUTIONS FROM THE CUSHMAN LABORATORY FOR FORAMINIFERAL RESEARCH

238. CRETACEOUS FORAMINIFERA FROM THE BROWNSTOWN MARL OF ARKANSAS*

By J. A. CUSHMAN and W. H. DEADERICK

The Brownstown marl is of Austin age. The type area is in the vicinity of Brownstown, Sevier County, Arkansas. It seems important to record the faunas of type localities so that they may be used for more exact correlation with faunas of similar age elsewhere. The collections used here were made by the junior author. We are indebted to Dr. Lloyd W. Stephenson of the U. S. Geological Survey for assistance in checking the stratigraphic position of the material used here. Additional species represented by too few specimens, by young stages only, or by incomplete specimens have not been included in the fauna recorded here. Further work will therefore undoubtedly add some species to the fauna. Location of stations in the Brownstown marl recorded here:

222. E. L. Presley place, about 1½ miles southeast of Delight, Ark.

235. About 1½ miles southeast of Ben Lomond on road to Brownstown, Ark.

254. 0.1 mile north of cross roads in Brownstown, Ark. Natural erosion on east side of road.

310. Highway 27, 2.6 miles west of its junction with the Brownstown-Lockesburg road, and just east of Ben Lomond, Ark. Natural erosion, north side of highway.

346. About ¾ mile west of junction of Highway 27 and Brownstown-Lockesburg road, Ark. Turn south on dim woods trail and wind for about 2 miles, natural erosion.

352. ½ mile west of Brownstown and ½ mile north of the Brownstown-Ben Lomond road, Ark. Natural erosion.

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Family REOPHACIDAE

Genus REOPHAX Montfort, 1808

REOPHAX RECTA (Beissel) (Pl. 9, figs. 1-6)

Trochammina recta BEISSEL, Abhandl. kön. Preuss. geol. Landes., n. ser., vol. 3, 1891, p. 22, pl. 5, figs. 1-3.

Reophax recta FRANKE, Abhandl. Preuss. Geol. Landes., n. ser., vol. 111, 1928, p. 19, pl. 2, fig. 3.—BROTZEN, Sver. Geol. Under., Ser. C, No. 396, 1936, p. 30, pl. 1, fig. 2.

Topotype specimens of this species from Dr. A. Franke seem to be identical with the specimens figured here. They differ from *R. constricta* (Reuss) in the larger number of chambers, apertural end without a definite neck, and much less constricted sutures. The specimens from station 310 are all megalospheric, while that figured from station 254 is evidently microspheric and is much more tapering.

Family LITUOLIDAE

Genus HAPLOPHRAGMOIDES Cushman, 1910

HAPLOPHRAGMOIDES sp. (Pl. 9, figs. 7, 8)

The figured specimens from station 310 are much distorted and it is difficult to determine what the original shape really was. They probably represent a new species, but it cannot be adequately described from the material now available.

Genus AMMOBACULITES Cushman, 1910

AMMOBACULITES COPROLITHIFORMIS (Schwager) (Pl. 9, fig. 9)

Haplophragmium coprolithiforme SCHWAGER, Benecke's Geogn.-pal. Beitr., vol. 1, 1868, p. 654, pl. 34, fig. 3.

Ammobaculites coprolithiforme CUSHMAN, Trans. Roy. Soc. Canada, 3d ser., vol. 21, sec. 4, 1927, p. 130, pl. 1, figs. 6, 7.—CUSHMAN and JARVIS, Proc. U. S. Nat. Mus., vol. 80, Art. 14, 1932, p. 13, pl. 3, figs. 4, 5.—WICKENDEN, Journ. Pal., vol. 6, 1932, p. 204, pl. 29, fig. 2.—CUSHMAN, Special Publ. No. 5, Cushman Lab. Foram. Res., 1933, pl. 5, fig. 10.

From the records and available material this seems to be a rather variable and wide-ranging species throughout the Upper Cretaceous. It occurs in material from station 310.

It is possible that when large series are available it may be found possible to divide the Cretaceous material into specific groups with more restricted ranges.

AMMOBACULITES SUBPLANATUS Cushman and Deaderick, n. sp. (Pl. 9, figs. 10, 11)

Test strongly compressed, the coiled portion slightly evolute, the uncoiled portion consisting usually of but 1 or 2 chambers, periphery often slightly lobulate; chambers rather indistinct, 6 or 7 in the adult coil, little if at all inflated, increasing evenly in size as added; sutures indistinct; wall composed of small, more or less evenly sized sand grains with considerable cement; aperture terminal, elongate. Length 1.25 mm.; breadth 0.80 mm.; thickness 0.20 mm.

Holotype (Cushman Coll. No. 38429) from Upper Cretaceous, Brownstown marl, (station 254) 0.1 mile north of cross roads in Brownstown, Sevier Co., Ark. Natural erosion on east side of road.

The species differs from *A. stephensoni* Cushman in the evolute character of the coiled portion, larger number of chambers, and tendency to a lobulate periphery.

Less typical specimens were found also at stations 310, 346, and 352.

Family VERNEUILINIDAE

Genus GAUDRYINA d'Orbigny, 1839

GAUDRYINA BENTONENSIS (Carman) (Pl. 9, figs. 12, 13)

Spiroplectammina bentonensis CARMAN, Journ. Pal., vol. 3, 1929, p. 311, pl. 34, figs. 8, 9.

Gaudryina bentonensis CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 96; Special Publ. No. 7, Cushman Lab. Foram. Res., 1937, p. 42, pl. 6, figs. 21, 22.

This species was originally described from the Upper Cretaceous of Wyoming. From available records and material it appears to range through the formations of Taylor age and occurs in those of Austin age with a possibility that some of the specimens from the Eagle Ford shale, though not well preserved, may belong here. The specimens from the Brownstown marl are very typical. They occur at stations 235, 254, and 310.

GAUDRYINA FAUJASI (Reuss) (Pl. 9, fig. 14)

Textilaria faujasi REUSS, Sitz. Akad. Wiss. Wien, vol. 44, 1861 (1862), p. 320, pl. 3, fig. 9.

Gaudryina faujasi CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 8, 1932, p. 91; Special Publ. No. 7, Cushman Lab. Foram. Res., 1937, p. 39, pl. 5, figs. 17-20; pl. 6, figs. 1, 2.

The types of this species are from the Upper Cretaceous, Maestrichtian stage, of Maestricht, Holland. It occurs at other European localities in the Senonian. There are American occurrences from the Vincentown sand (Eocene) (?) of New Jersey and the upper part of the Taylor marl of Texas. The figured specimen from the Brownstown marl at station 310 seems typical. It is apparently very rare.

GAUDRYINA (SIPHOGAUDRYINA) AUSTINANA Cushman (Pl. 9, figs. 15, 16)

Gaudryina (*Siphogaudryina*) *austinana* CUSHMAN, Special Publ. No. 6, Cushman Lab. Foram. Res., 1936, p. 10, pl. 2, fig. 6; Special Publ. No. 7, 1937, p. 74, pl. 11, figs. 1-3.

From available records this seems to be a fairly good index fossil for the Austin chalk, particularly the upper part, although there are occurrences in the lower part of the Taylor marl. It occurs in the Brownstown marl at station 254 in typical form. The figured specimens show the characteristic rectangular form of the adult stages.

Genus PSEUDOCLAVULINA Cushman, 1936

PSEUDOCLAVULINA CLAVATA (Cushman) (Pl. 9, figs. 17-22)

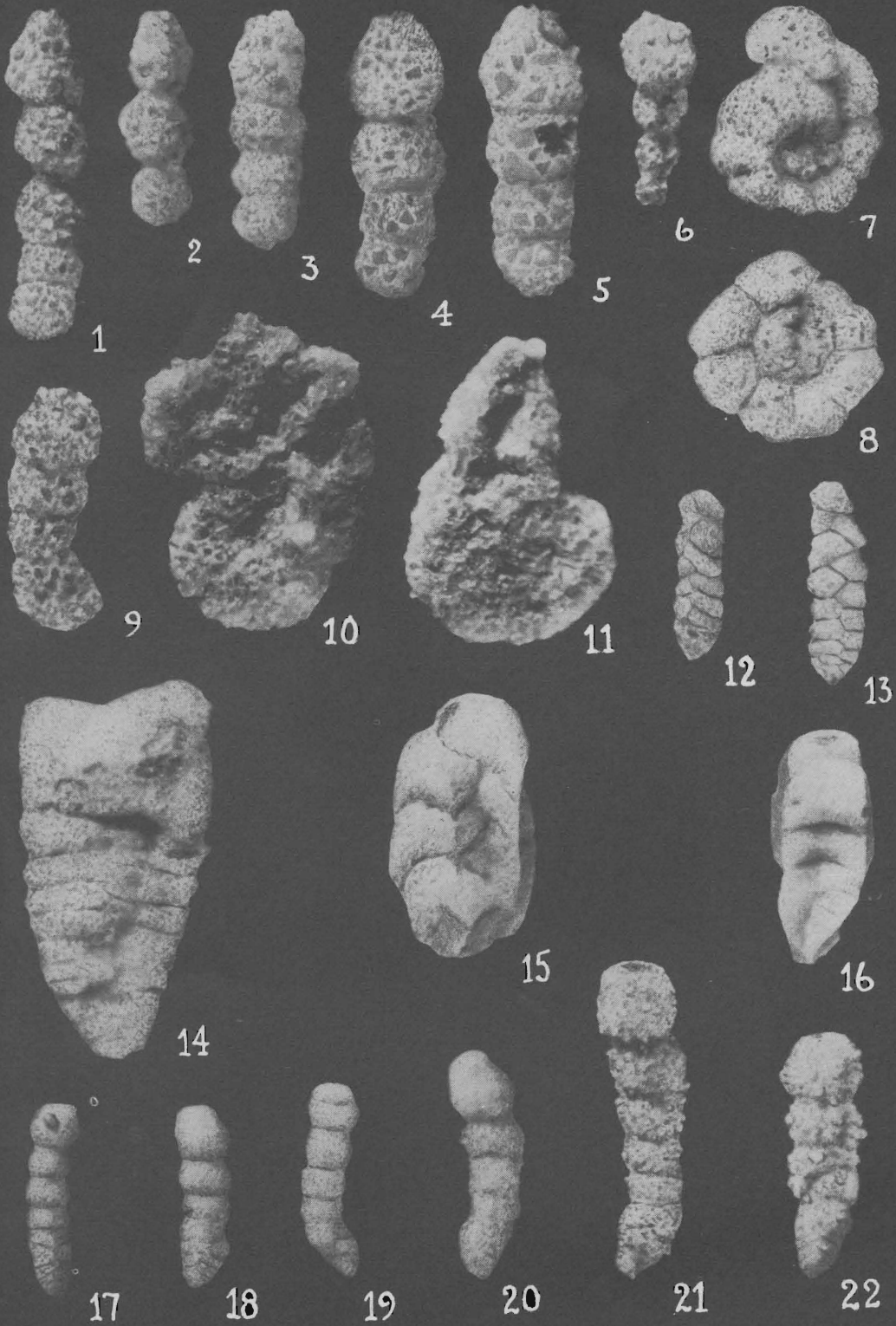
Clavulina clavata CUSHMAN, Bull. Amer. Assoc. Petr. Geol., vol. 10, 1926, p. 589, pl. 17, fig. 4; Journ. Pal., vol. 1, 1927, p. 149, pl. 28, fig. 3.

Clavulina amorpha CUSHMAN (not CUSHMAN, 1926), Tenn. Div. Geol., Bull. 41, 1931, p. 21, pl. 1, figs. 12, 13.

EXPLANATION OF PLATE 9

All figures × 45

FIGS. 1-6. *Reophax recta* (Beissel). 1-5, Megalospheric. Sta. 310. 6, Microspheric. Sta. 254. 7, 8. *Haplophragmoides* sp. Sta. 310. 9. *Ammobaculites coprolithiformis* (Schwager). Sta. 253, 0.7 mi. S. of Brownstown, on road to White Cliffs, Ark. 10, 11. *A. subplanatus* Cushman and Deaderick, n. sp. 10, Holotype. 11, Paratype. Sta. 254. 12, 13. *Gaudryina bentonensis* (Carman). Sta. 254. 14. *G. faujasi* (Reuss). Sta. 310. 15, 16. *G.* (*Siphogaudryina*) *austinana* Cushman. 15, front view; 16, side view. Sta. 254. 17-22. *Pseudoclavulina clavata* (Cushman). 17-20, Smooth form. Sta. 310. 21, 22, Roughened form. Sta. 254.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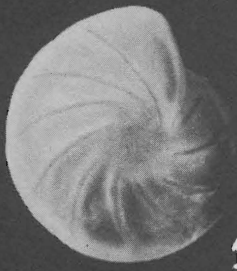

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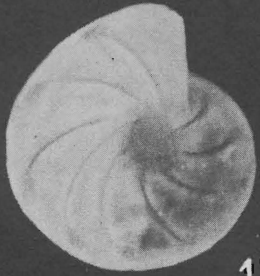

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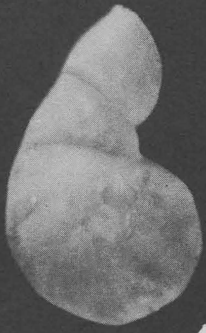

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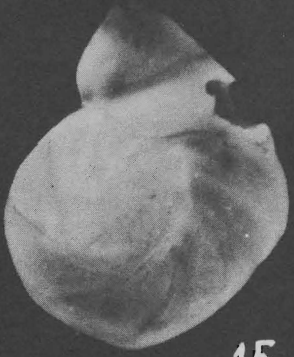

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Clavulina parisiensis SANDIDGE (not D'ORBIGNY), Journ. Pal., vol. 6, 1932, p. 269, pl. 41, fig. 12.

Reophax cylindricus H. B. BRADY, var. *ripleyensis* W. BERRY, in BERRY and KELLEY, Proc. U. S. Nat. Mus., vol. 76, Art. 19, 1929, p. 2, pl. 1, fig. 5.

Reophax coonensis W. BERRY, idem, p. 2, pl. 3, fig. 23.

Pseudoclavulina clavata CUSHMAN, Special Publ. No. 7, Cushman Lab. Foram. Res., 1937, p. 108, pl. 15, figs. 1-13.

From the records and available material this species seems to have first appeared in the formations of upper Austin age and continued throughout the Upper Cretaceous. It shows considerable variation in the surface of the test, some specimens being relatively smooth and others considerably roughened. This may be due to the environmental conditions and the character of the arenaceous material available for making up the test. Both smooth and roughened specimens are shown on our plate; the smooth ones from station 310, and the rougher ones from station 254.

Genus PSEUDOGAUDRYINELLA Cushman, 1936

PSEUDOGAUDRYINELLA CAPITOSA (Cushman) (Pl. 10, figs. 1-5)

Gaudryinella capitosa CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 9, 1933, p. 52, pl. 5, fig. 8.

Pseudogaudryinella capitosa CUSHMAN, Special Publ. No. 7, Cushman Lab. Foram. Res., 1937, p. 139, pl. 19, fig. 12.

The figured specimens show the variability of this species and the tendency of the last-formed chambers to become uniserial. The species is usually most common in formations of Taylor age but it also occurs in material of Austin age, particularly the upper part. Some of the specimens tend toward the var. *serrulata* (Cushman) which seems to be more common than the typical form in beds of Austin age but the majority of the Brownstown specimens are of the typical form. It occurs at stations 254, 310, 346, and 352.

EXPLANATION OF PLATE 10

All figures × 45

FIGS. 1-5. *Pseudogaudryinella capitosa* (Cushman). Sta. 254. 1-3, Specimens showing development of uniserial chambers. 6. *Dorothia glabrella* Cushman. Sta. 254. 7. *Spiroloculina cretacea* Reuss. Sta. 310. 8, 9. *Trochammina diagonis* (Carsey). 8, dorsal view; 9, ventral view. Sta. 254. 10-13. *Robulus münsteri* (Roemer). Sta. 254. 14, 15. *R. taylorensis* (Plummer). Sta. 254.

Family VALVULINIDAE

Genus DOROTHIA Plummer, 1931

DOROTHIA GLABRELLA Cushman (Pl. 10, fig. 6)

Dorothia glabrella CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 9, 1933, p. 56, pl. 6, fig. 9; Special Publ. No. 8, 1937, p. 83, pl. 9, figs. 1, 2.

Specimens of a small species of *Dorothia* occur in the Brownstown marl and seem nearer to *glabrella* than to any other. *D. glabrella* occurs in various formations of Taylor age and apparently extends downward into the upper beds of Austin age. It occurs at stations 235 and 310.

Family MILIOLIDAE

Genus SPIROLOCULINA d'Orbigny, 1826

SPIROLOCULINA CRETACEA Reuss (Pl. 10, fig. 7)

Spiroloculina cretacea REUSS, Denkschr. Akad. Wiss. Wien, Math.-nat. Kl., vol. 7, 1854, p. 72, pl. 26, fig. 9.—EGGER, Ber. Nat. Ver. Passau, 1907, p. 17, pl. 5, fig. 9.—FRANKE, Verhandl. Naturh. Ver. preuss. Rheinlande u. Westfalens, Jahrg. 69, 1912 (1913), p. 261; Abhandl. geol.-pal. Inst. Univ. Greifswald, vol. 6, 1925, p. 9, pl. 1, fig. 9; Abhandl. Preuss. Geol. Landes., n. ser., vol. 111, 1928, p. 127, pl. 11, fig. 27.—W. BERRY and KELLEY, Proc. U. S. Nat. Mus., vol. 76, Art. 19, 1929, p. 16, pl. 2, fig. 6.—CUSHMAN, Tenn. Div. Geol., Bull. 41, 1931, p. 24.

The only available American specimens for comparison are from the lower part of the Taylor marl. The species occurs in Europe in the Emscher and lower Senonian. It is very rare in the available material from the Brownstown marl at station 310 and the figured specimen is incomplete.

Family TROCHAMMINIDAE

Genus TROCHAMMINA Parker and Jones, 1859

TROCHAMMINA DIAGONIS (Carsey) (Pl. 10, figs. 8, 9)

Haplophragmoides diagonis CARSEY, Univ. Texas Bull. 2612, 1926, p. 22, pl. 3, fig. 1.

Trochammina diagonis CUSHMAN and WATERS, Contr. Cushman Lab. Foram. Res., vol. 2, pt. 4, 1927, p. 84, pl. 10, fig. 7.—CUSHMAN, Trans. Roy. Soc. Canada, 3d ser., vol. 21, sec. 4, 1927, p. 132; Special Publ. No. 5, Cushman Lab. Foram. Res., 1933, pl. 18, fig. 2.—PLUMMER, Univ. Texas Bull. 3101, 1931, p. 140.

So far as available specimens show, this species occurs most commonly in the formations of Navarro and Taylor age but the figured specimens from station 254 in the Brownstown marl seem typical. It is apparently rare at this locality.

Family LAGENIDAE

Genus ROBULUS Montfort, 1808

ROBULUS MÜNSTERI (Roemer) (Pl. 10, figs. 10-13)

Robulina münsteri ROEMER, Verstein. norddeutsch. Oolith., Nachtrag., 1839, p. 48, pl. 22, fig. 29; Verstein. norddeutsch. Kreide., 1840-41, p. 98, pl. 15, fig. 30.

Cristellaria münsteri REUSS, Sitz. Akad. Wiss. Wien, vol. 46, 1862 (1863), p. 77, pl. 9, figs. 3, 4.

Robulus münsteri CUSHMAN, Journ. Pal., vol. 6, 1932, p. 334, pl. 50, fig. 2; Contr. Cushman Lab. Foram. Res., vol. 17, 1941, p. 58, pl. 15, fig. 6.—CUSHMAN and HEDBERG, idem, vol. 17, 1941, p. 86, pl. 21, fig. 14.

From records and available material this species has a long vertical range starting in the upper portion of the Austin chalk. The large clear umbo, the prominent, limbate sutures, and slight keel are characteristic features. Specimens occur in the Brownstown marl material from stations 222, 254, 310, 346, and 352.

ROBULUS TAYLORENSIS (Plummer) (Pl. 10, figs. 14, 15)

Astacolus taylorensis PLUMMER, Univ. Texas Bull. 3101, 1931, p. 143, pl. 11, fig. 16; pl. 15, figs. 8-11.

Cristellaria gibba CARSEY (not D'ORBIGNY), Univ. Texas Bull. 2612, 1926, p. 37, pl. 5, fig. 4.

Robulus taylorensis CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 17, 1941, p. 57, pl. 15, fig. 5.

This species is particularly common in the lower beds of Taylor age. The figured specimens from the Brownstown marl at station 254 would seem to indicate that its range extends downward into the upper beds of Austin age. Specimens are rare in the Brownstown marl so far as the material examined shows.

Genus DARBYELLA Howe and Wallace, 1933

DARBYELLA BROWNSTOWNENSIS Cushman and Deaderick, n. sp. (Pl. 11, figs. 1-3)

Test close-coiled in the early portion, tending to become slightly evolute as growth progresses, in the adult with the coil at one side meeting the periphery, on the other side somewhat overlap-

ping the previous coil, periphery acute with a narrow but distinct keel, umbonate region more or less clear showing the earlier coils below; chambers numerous, 10 to 12 in the adult coil, of rather uniform shape, increasing gradually and regularly in size as added, not inflated; sutures distinct, limbate, occasionally slightly raised, very oblique, slightly curved; wall smooth; aperture at the peripheral angle, radiate, with a distinct ventral slit at the middle of the upper end of the truncate ventral face. Diameter 1.60 mm.; thickness 0.60 mm.

Holotype (Cushman Coll. No. 38450) from Upper Cretaceous, Brownstown marl, (station 352) ½ mile west of Brownstown and ½ mile north of the Brownstown-Ben Lomond road, Sevier Co., Ark. Natural erosion.

The genus has not previously been recorded from the Cretaceous. This species differs from *D. wilcoxensis* Cushman and Garrett in the more definite keel, more pointed apertural angle, less prominent sutures, and more compressed test. Specimens occur also at stations 222 and 346.

Genus DENTALINA d'Orbigny, 1826

DENTALINA GRACILIS d'Orbigny (Pl. 11, fig. 4)

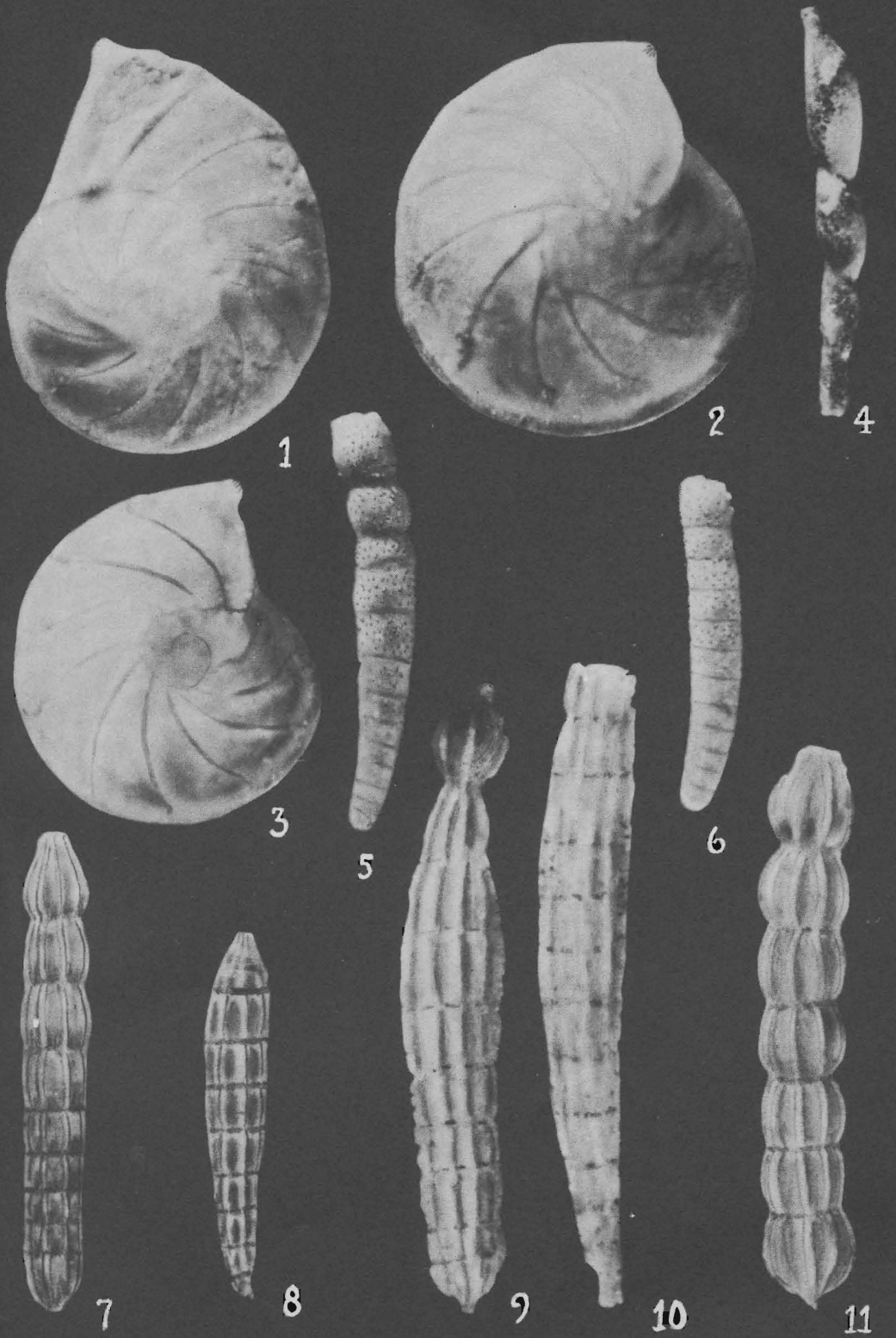
Dentalina gracilis D'ORBIGNY, Mém. Soc. géol. France, ser. 1, vol. 4, 1840, p. 14, pl. 1, fig. 5.—FRANKE, Abhandl. Preuss. Geol. Landes., n. ser., vol. 111, 1928, p. 29, pl. 2, fig. 22.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 16, 1940, p. 77, pl. 13, figs. 9-11.

The range of this species in the Cretaceous is apparently from the upper part of the Austin chalk through the formations of Taylor and Navarro age. There is some variation, as is usual in species of this family, but the species is distinguished by its slender test, elongate chambers, oblique sutures, and distinct neck. It occurs in the Brownstown marl material at station 254.

EXPLANATION OF PLATE 11

All figures × 45

FIGS. 1-3. *Darbyella brownstownensis* Cushman and Deaderick, n. sp. 1, Holotype. 2, 3, Paratypes. Sta. 352. 4. *Dentalina gracilis* d'Orbigny. Sta. 254. 5, 6. *D. basiplanata* Cushman, var. *subsetigera* Cushman and Deaderick, n. var. 5, Holotype. 6, Paratype. Sta. 254. 7-11. *Nodosaria affinis* Reuss. 7, 9, 11, Megalospheric. 8, 10, Microspheric. Sta. 352.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DENTALINA BASIPLANATA Cushman, var. SUBSETIGERA Cushman and Deaderick, n. var. (Pl. 11, figs. 5, 6)

Variety differing from the typical in having the sutures in the early portion slightly raised and the wall with fine, spinose processes throughout.

Holotype of variety (Cushman Coll. No. 38440) from Upper Cretaceous, Brownstown marl, (station 254) 0.1 mile north of cross roads in Brownstown, Sevier Co., Ark. Natural erosion on east side of road.

Specimens all seem to have the peculiar surface ornamentation. The typical form is widely distributed in formations of Taylor and Navarro age but has not been noted in the material of Austin age that has been examined. Except in the varietal characters the specimens are very close to the typical form.

Genus NODOSARIA Lamarck, 1812

NODOSARIA AFFINIS Reuss (Pl. 11, figs. 7-11)

Nodosaria affinis REUSS, Verstein böhm. Kreide., pt. 1, 1845, p. 26, pl. 13, fig. 16; Palaeontographica, vol. 20, pt. 2, 1872-75 (1874), p. 83, pl. 2 (20), fig. 12.—PERNER, Foram. česk. cenomanu, 1892, p. 57, pl. 6, figs. 10, 14.—FRANKE, Abhandl. geol.-pal. Inst. Univ. Greifswald, vol. 6, 1925, p. 37, pl. 3, fig. 25.—W. BERRY and KELLEY, Proc. U. S. Nat. Mus., vol. 76, Art. 19, 1929, p. 6, pl. 1, fig. 8.—CUSHMAN, Tenn. Div. Geol., Bull. 41, 1931, p. 30, pl. 3, figs. 16-20; Journ. Pal., vol. 5, 1931, p. 305, pl. 35, figs. 3-5 (not fig. 2); Contr. Cushman Lab. Foram. Res., vol. 7, 1931, p. 38, pl. 5, fig. 4.—CUSHMAN and JARVIS, Proc. U. S. Nat. Mus., vol. 80, Art. 14, 1932, p. 34, pl. 10, fig. 13.—CUSHMAN, Bull. Geol. Soc. Amer., vol. 47, 1936, p. 417; Contr. Cushman Lab. Foram. Res., vol. 16, 1940, p. 86, pl. 15, figs. 8-23.

Nodosaria proxima W. BERRY and KELLEY (not SILVESTRI), Proc. U. S. Nat. Mus., vol. 76, Art. 19, 1929, p. 7, pl. 1, fig. 13.

This common species seems to range through the Upper Cretaceous above the Eagle Ford shale. The material from the Brownstown marl is typical and occurs at stations 222, 254, 310, 346, and 352. Both microspheric and megalospheric specimens are shown on our plate.

EXPLANATION OF PLATE 12

All figures × 45

FIGS. 1-6. *Vaginulina texana* Cushman. 1, 2, Slender form. Sta. 254. 3-6, Broader, more typical form. Sta. 310. 7-10. *V. texana* Cushman, var. *suturocostata* Cushman and Deaderick, n. var. 7, Holotype. Sta. 310. 8-10, Paratypes. Sta. 254.

Genus VAGINULINA d'Orbigny, 1826

VAGINULINA TEXANA Cushman (Pl. 12, figs. 1-6)

Vaginulina texana CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 6, 1930, p. 30, pl. 4, figs. 2, 3.—MORROW, Journ. Pal., vol. 8, 1934, p. 192, pl. 29, fig. 10.

Vaginulina sp. CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 6, 1930, p. 30, pl. 4, figs. 12, 13.

Vaginulina regina PLUMMER, Univ. Texas Bull. 3101, 1931, p. 162, pl. 10, fig. 22.

This species is a common one and characteristic of the formations of upper Austin age. It is therefore to be expected in the Brownstown marl. It occurs at stations 222, 254, 310, 346, and 352.

The species shows much variation, especially in the relative width of the test. Some of the variations are shown on our plate, from the very narrow, slender specimens to those of larger size and considerable width and thickness. The apertural characters and the typical ornamentation unite the series.

VAGINULINA TEXANA Cushman, var. SUTUROCOSTATA Cushman and Deaderick, n. var. (Pl. 12, figs. 7-10)

Vaginulina simondsi CUSHMAN (not CARSEY), Contr. Cushman Lab. Foram. Res., vol. 6, 1930, p. 27, pl. 4, figs. 6-8.

Variety differing from the typical in the ornamentation of the surface, which has costae parallel to the sides near the periphery, but in the central portion of the adult has short oblique costae limited to the area above the sutures.

Holotype of variety (Cushman Coll. No. 38464) from Upper Cretaceous, Brownstown marl, (station 310) Highway 27, 2.6 miles west of its junction with the Brownstown-Lockesburg road, and just east of Ben Lomond, Sevier Co., Ark. Natural erosion, north side of highway.

Previously this variety was recorded from the Brownstown marl as *V. simondsi* Carsey, but is distinct. *V. simondsi* is apparently limited to formations of the Navarro group. This variety may prove to be a distinct species. It also occurs at stations 222 and 254.

Genus PALMULA Lea, 1933

PALMULA SUTURALIS (Cushman) (Pl. 13, fig. 1)

Flabellina rugosa HERON-ALLEN and EARLAND (not D'ORBIGNY), Journ. Roy. Micr. Soc., 1910, p. 422, pl. 8, fig. 7.—FRANKE, Abhandl. geol.-pal. Inst. Univ. Greifswald, vol. 6, 1925, p. 64, pl. 5, fig. 12; Abhandl. Preuss. Geol. Landes., n. ser., vol. 111, 1928, p. 92, pl. 8, fig. 18.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 6, 1930, p. 32, pl. 4, fig. 15; Journ. Pal., vol. 5, 1931, p. 307, pl. 35, fig. 10.—PLUMMER, Univ. Texas Bull. 3101, 1931, p. 168, pl. 12, fig. 4.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 7, 1931, p. 38, pl. 5, fig. 3.—SANDIDGE, Journ. Pal., vol. 6, 1932, p. 279, pl. 42, fig. 22.

Flabellina suturalis CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 11, 1935, p. 86, pl. 13, figs. 9-18.

Palmula suturalis LOETTERLE, Nebraska Geol. Survey, 2d ser., Bull. 12, 1937, p. 28, pl. 3, fig. 5.

This species ranges through formations of Austin and Taylor age up into the lower formations of Navarro age where it is less common. It occurs in the Brownstown material at stations 254 and 352.

Genus FRONDICULARIA Defrance, 1826

FRONDICULARIA UNDULOSA Cushman (Pl. 13, figs. 2, 3)

Frondicularia undulosa CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 12, 1936, p. 13, pl. 3, figs. 7-11.—LOETTERLE, Nebraska Geol. Survey, 2d ser., Bull. 12, 1937, p. 29, pl. 3, figs. 8, 9.

Typical specimens of this species seem to be limited to beds of Austin age although less typical ones occur in the lower part of the Taylor marl. The specimens from the Brownstown marl in our collection are from station 352.

FRONDICULARIA ACLIS Morrow (Pl. 13, fig. 4)

Frondicularia aclis MORROW, Journ. Pal., vol. 8, 1934, p. 193, pl. 29, fig. 30.

The specimen figured is from station 310 in the Brownstown marl. It seems to belong to this species which, so far as available material shows, is confined in its range to beds of Austin age and the lower beds of Taylor age. The types are from the basal Niobrara, where it is recorded as very rare.

FRONDICULARIA CORDATA Roemer (Pl. 13, figs. 7, 8)

Frondicularia cordata ROEMER, Verstein. norddeutsch. Kreide., 1840-41, p. 96, pl. 15, fig. 8.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 12, 1936, p. 16, pl. 4, figs. 1-3.

Frondicularia goldfussi CUSHMAN (not REUSS), Journ. Pal., vol. 6, 1932, p. 356, pl. 50, figs. 8, 9.

American material of this species, so far as available specimens show, is confined to beds of Taylor and Austin age. In the Brownstown material it occurs at stations 310 and 346. Specimens from both of these stations are figured.

FRONDICULARIA INTERMITTENS Reuss (Pl. 13, figs. 5, 6)

Frondicularia intermittens REUSS, Sitz. Akad. Wiss. Wien, vol. 52, 1865 (1866), p. 460, pl., fig. 11.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 12, 1936, p. 21, pl. 4, figs. 16-18.

Frondicularia inversa CUSHMAN (not REUSS), Tenn. Div. Geol., Bull. 41, 1931, p. 35, pl. 5, figs. 1, 2.

Frondicularia verneuiliana CUSHMAN (not D'ORBIGNY), Contr. Cushman Lab. Foram. Res., vol. 6, 1930, p. 36, pl. 5, figs. 5, 6.

The figured specimens are from station 310. They seem to be young specimens referable to this species which, from available American material, seems largely limited to beds of Taylor age.

FRONDICULARIA cf. F. FRANKEI Cushman (Pl. 13, fig. 10)

While not entirely typical, the specimens figured seem nearer to this species than to any other. They are from station 310.

FRONDICULARIA VERNEUILIANA d'Orbigny (Pl. 13, fig. 9)

Frondicularia verneuiliana D'ORBIGNY, Mém. Soc. géol. France, ser. 1, vol. 4, 1840, p. 20, pl. 1, figs. 32, 33.—BROWN, Ann. and Mag. Nat. Hist., 2d ser., vol. 12, 1853, p. 241, pl. 9, fig. 5.—EGGER, Ber. Nat. Ver. Passau, 1907, p. 29, pl. 1, figs. 6, 15, 16.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1910, p. 419, pl. 7, fig. 15.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 6, 1930, p. 36, pl. 5, figs. 5, 6; idem, vol. 12, 1936, p. 19, pl. 4, fig. 11.

From the American records this species is most common in beds of Taylor age but also extends upward into the Navarro group and downward into the Austin. The figured specimen from the Brownstown marl is from station 254 and is evidently a young specimen.

Genus KYPHOPYXA Cushman, 1929

KYPHOPYXA CHRISTNERI (Carsey) (Pl. 14, figs. 1-7)

Frondicularia christneri CARSEY, Univ. Texas Bull. 2612, 1926, p. 41, pl. 6, fig. 7.

Kyphopyxa christneri CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 5, 1929, p. 1, pl. 1, figs. 1-7.—CHURCH, Journ. Pal., vol. 3, 1929, p. 411.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 6, 1930, p. 33, pl. 4, fig. 20; p. 85, pl. 12, fig. 2.—CUSHMAN and HEDBERG, idem, vol. 6, 1930, p. 65, pl. 9, fig. 5.—VANDERPOOL, Journ. Pal., vol. 4, 1930, pp. 254, 255 (lists).—CUSHMAN, Special Publ. No. 2, Cushman Lab. Foram. Res., 1930, pl. 3, fig. 2.—PLUMMER, Univ. Texas Bull. 3101, 1931, p. 168, pl. 12, figs. 9-19.—CUSHMAN, Journ. Pal., vol. 6, 1932, p. 336, pl. 50, figs. 11, 12; Special Publ. No. 5, Cushman Lab. Foram. Res., 1933, pl. 21, figs. 1, 2.—LOETTERLE, Nebraska Geol. Survey, 2d ser., Bull. 12, 1937, p. 29, pl. 4, fig. 1.

This species seems to be confined to beds of Austin and Taylor age. The genus is apparently confined to the western hemisphere. It is very variable in shape as our figures show. In some of these the proloculum forms the basal angle in a rhomboid test while in others it is completely removed from the periphery by the extension of later chambers about the base. Specimens occur in the Brownstown marl at stations 222, 254, 310, 346, and 352.

Genus LAGENA Walker and Jacob, 1798

LAGENA HISPIDA Reuss ? (Pl. 15, fig. 1)

The specimen figured is from station 310. It may possibly be the end chamber of a hispid species of *Nodosaria* but is figured here for the record.

Family HETEROHELICIDAE

Genus GÜMBELINA Egger, 1899

GÜMBELINA PLUMMERAE Loetterle (Pl. 15, figs. 2-4)

Gümbelina plummerae LOETTERLE, Nebraska Geol. Survey, 2d ser., Bull. 12, 1937, p. 33, pl. 5, figs. 1, 2.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 14, 1938, p. 15, pl. 3, figs. 3-5.

Textularia globulosa CARSEY (not EHRENBERG), Univ. Texas Bull. 2612, 1926, p. 25, pl. 5, fig. 2.

This species ranges from the upper portion of the Austin group through the Taylor and into the lower part of the Navarro group. In the Brownstown material it occurs at stations 235, 310, 346, and 352.

GÜMBELINA REUSSI Cushman (Pl. 15, figs. 5-7)

Gümbelina reussi CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 14, 1938, p. 11, pl. 2, figs. 6-9.

Textularia globulosa REUSS (not EHRENBERG), Verstein. böhm. Kreide., pt. 1, 1845, p. 39, pl. 12, fig. 23(?).

The types of this species are from the lower part of the Austin chalk. Its range includes the Austin chalk and the lower part of the Taylor marl. In the Brownstown marl it occurs at stations 310, 346, and 352.

GÜMBELINA STRIATA (Ehrenberg) (Pl. 15, figs. 8-10)

Textularia striata EHRENBERG, Abhandl. k. Akad. Wiss. Berlin, 1838, p. 135, pl. 4, fig. 1; Mikrogeologie, 1854, pl. 27, fig. 3; pl. 28, fig. 6; pl. 31, fig. 9; pl. 32 *i*, fig. 4 *b*; pl. 32 *ii*, figs. 11, 14.—CUSHMAN, Journ. Pal., vol. 1, 1928, pp. 215, 216, pl. 34, fig. 4 *b*; pl. 35, figs. 11, 14.

Gümbelina striata EGGER, Abhandl. kön. bay. Akad. Wiss. München, Cl. II, vol. 21, 1899, p. 33, pl. 14, figs. 37-39 (not 5-7, 10, 11).—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 14, 1938, p. 8, pl. 1, figs. 34-40.

The only typical specimens in the Brownstown marl material are from station 310. They may be distinguished from *G. plummerae* Loetterle by the lessening of the ornamentation on the later chambers, which are less expanded.

GÜMBELINA GLOBOCARINATA Cushman

Gümbelina globocarinata CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 14, 1938, p. 10, pl. 2, figs. 4, 5.

A few specimens from station 346 seem to belong to this species. It is found in the upper part of the Austin and ranges upward to the Neylandville marl.

Family BULIMINIDAE

Genus LOXOSTOMA Ehrenberg, 1854

LOXOSTOMA CUSHMANI Wickenden (Pl. 15, figs. 11-13)

Loxostomum cushmani WICKENDEN, Trans. Roy. Soc. Canada, 3d ser., vol. 26, sec. 4, 1932, p. 91, pl. 1, fig. 6.—CUSHMAN, Special Publ. No. 9, Cushman Lab. Foram. Res., 1937, p. 171, pl. 20, figs. 9-13.

Loxostomum clavatum CUSHMAN (not CUSHMAN, 1927), Journ. Pal., vol. 6, 1932, p. 340, pl. 51, fig. 8.

Typical specimens occur in the Brownstown material at stations 310 and 346. It is known to be most common in beds of upper Austin age although it extends upward to beds of upper

Taylor age. The indentations and lobular processes are more strongly developed in this species than in *L. clavatum* (Cushman) which is largely confined to beds of Taylor age.

Family ROTALIIDAE

Genus GYROIDINA d'Orbigny, 1826

GYROIDINA DEPRESSA (Alth) (Pl. 15, figs. 14-16)

Rotalina depressa ALTH, Haidinger's Nat. Abhandl., vol. 3, 1850, p. 266, pl. 13, fig. 21.

Gyroidina depressa, CUSHMAN and CHURCH, Proc. Calif. Acad. Sci., ser. 4, vol. 18, 1929, p. 515, pl. 41, figs. 4-6.—CUSHMAN, Journ. Pal., vol. 5, 1931, p. 311, pl. 36, fig. 2; idem, vol. 6, 1932, p. 341.—WICKENDEN, idem, vol. 6, 1932, p. 206, pl. 29, fig. 9.—LOETTERLE, Nebraska Geol. Survey, 2d ser., Bull. 12, 1937, p. 42, pl. 6, fig. 7.—CUSHMAN and HEDBERG, Contr. Cushman Lab. Foram. Res., vol. 17, 1941, p. 97, pl. 23, figs. 11, 12.

Rotalia cretacea CARSEY, Univ. Texas Bull. 2612, 1926, p. 48, pl. 5, fig. 7.

Rotalia beccarii (LINNÉ), var. *ripleyensis* W. BERRY, in BERRY and KELLEY, Proc. U. S. Nat. Mus., vol. 76, Art. 19, 1929, p. 15, pl. 3, figs. 10-12.

The American specimens have been compared with topotypes from Lemberg and seem to be identical. In a large series there is some variation in the number of chambers, degree of openness of the umbilical region, and convexity of the test. The range is through nearly the whole of the Upper Cretaceous. It has not been found common in the Brownstown marl but is present at stations 254 and 310.

Genus VALVULINERIA Cushman, 1926

VALVULINERIA INFREQUENS Morrow (Pl. 15, figs. 17-19)

Valvulineria infrequens MORROW, Journ. Pal., vol. 8, 1934, p. 197, pl. 30, fig. 3.

The types of this species are from the basal Niobrara chalk of Kansas. From available material the species occurs in beds of Austin age and in lower beds of Taylor age. In the Brownstown material it occurs at stations 235 and 254.

Family GLOBIGERINIDAE

Genus GLOBIGERINA d'Orbigny, 1826

GLOBIGERINA CRETACEA d'Orbigny ? (Pl. 15, figs. 20-22)

Specimens of *Globigerina* are common in the Brownstown marl at stations 235, 254, 310, 346, and 352. They are usually referred to d'Orbigny's species but need more study in comparison with types and topotypes of the numerous species already known from the Cretaceous.

Family GLOBOROTALIIDAE

Genus GLOBOTRUNCANA Cushman, 1927

GLOBOTRUNCANA CANALICULATA (Reuss) (Pl. 15, figs. 23-27)

Rosalina canaliculata REUSS, Denkschr. Akad. Wiss. Wien, Math.-nat. Kl., vol. 7, 1854, p. 70, pl. 26, fig. 4.

Globigerina canaliculata EGGER, Abhandl. kön. bay. Akad. Wiss. München, Cl. II, vol. 21, 1899, p. 172, pl. 21, figs. 15-17, 24-26.

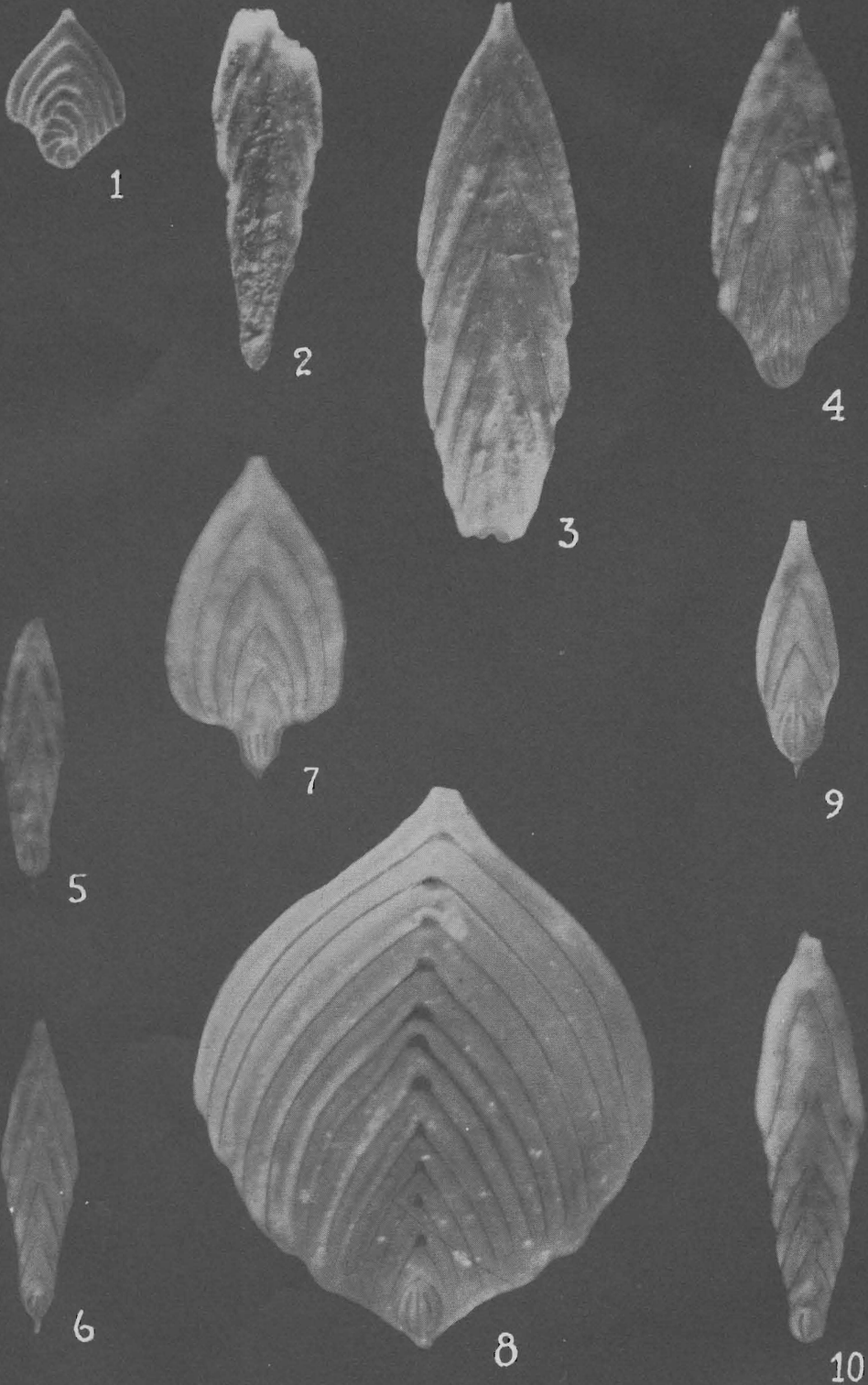
Globotruncana canaliculata CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 3, 1927, p. 116, pl. 23, fig. 11.—WHITE, Journ. Pal., vol. 2, 1928, p. 282, pl. 38, fig. 3.—CUSHMAN, idem, vol. 6, 1932, p. 343, pl. 51, fig. 14.

The types of this species are from the Cretaceous, Senonian, of Europe. Like many other pelagic species it has a wide range in the Cretaceous in beds of Austin, Taylor, and Navarro age. It occurs at stations 235, 254, 310, 346, and 352 in the Brownstown marl.

EXPLANATION OF PLATE 13

All figures × 45

FIG. 1. *Palmula suturalis* (Cushman). Young specimen. Sta. 352. 2, 3. *Frondicularia undulosa* Cushman. Sta. 352. 4. *F. aclis* Morrow. Sta. 310. 5, 6. *F. intermittens* Reuss. Sta. 310. 7, 8. *F. cordata* Roemer. 7, Young specimen. Sta. 310. 8, Adult. Sta. 346. 9. *F. verneuiliana* d'Orbigny. Sta. 254. 10. *F.* cf. *F. frankei* Cushman. Sta. 310.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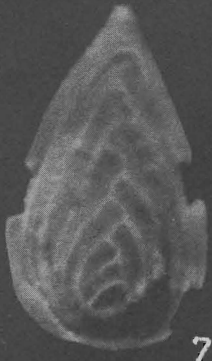

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Family ANOMALINIDAE

Genus PLANULINA d'Orbigny, 1826

PLANULINA TAYLORENSIS (Carsey) (Pl. 15, figs. 28-31)

Anomalina taylorensis CARSEY, Univ. Texas Bull. 2612, 1926, p. 47, pl. 6, fig. 1.

Planulina taylorensis CUSHMAN, Tenn. Div. Geol., Bull. 41, 1931, p. 62, pl. 12, fig. 5; Journ. Pal., vol. 5, 1931, p. 314, pl. 36, fig. 6; idem, vol. 6, 1932, p. 345.—LOETTERLE, Nebraska Geol. Survey, 2d ser., Bull. 12, 1937, p. 63, pl. 11, fig. 4.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 16, 1940, p. 35, pl. 6, fig. 10.

This species is largely confined to beds of Taylor age and the lower beds of Navarro age. The specimens from the Brownstown marl are very close to the Taylor species. They are fairly common at stations 254, 310, 346, and 352.

EXPLANATION OF PLATE 14

All figures × 45

FIGS. 1-7. *Kyphopyxa christneri* (Carsey). 1-3, Sta. 222. 4-7, Sta. 346. Series showing specimens with pointed apex (figs. 1 and 2), to the rounded base, caused by the embracing later chambers (figs. 5, 7).

239. A NEW *CRIBROGENERINA* FROM THE PERMIAN OF TEXAS

By JOSEPH A. CUSHMAN

Although several species of *Cribrogenerina* have been described from the middle Permian of Sumatra by Lange, and a few elsewhere, apparently no American species have been described. I am indebted to Dr. J. Brookes Knight and to Mr. Stanislav Kriz for permission to describe this species collected by the latter. The species is represented by a fine series of specimens which have been etched out of limestone. The collection includes specimens both in their original condition and where the cavity of the test has been filled and the original wall entirely dissolved. These internal casts help to show the essential characters of the test.

In most species of *Climacammina* the test is biserial for a considerable portion of its development and the uniserial chambers are few while the aperture consists of but a few irregular openings in the terminal face. On the other hand in *Cribrogenerina* the biserial stage is greatly reduced in the microspheric form and may be lacking in the megalospheric form, the test being entirely uniserial. The aperture becomes regularly cribrate early in the development and in the adult the entire terminal face is a cribrate plate as shown in our figures. It seems therefore that the following species should belong under *Cribrogenerina*.

CRIBROGENERINA KRIZI Cushman, n. sp. (Pl. 16, figs. 1-7)

Test fairly large, conical or slightly clavate, the apertural end often expanding rapidly in diameter, biserial in the early stages at least in the microspheric form, the later and larger portion of the test uniserial, circular in transverse section; chambers of the biserial portion few, increasing slowly in size as added, not inflated, later uniserial chambers of rather uniform height but rapidly increasing in diameter as added, slightly if at all inflated; sutures indistinct in the biserial stage, slightly depressed in the uniserial stage; wall arenaceous, of rather uniformly sized grains, apparently with a calcareous cement and fairly smoothly finished on the exterior; aperture in the adult stages evenly cribrate and occupying the entire terminal face. Length up to 3.5 mm.; diameter up to 1.5 mm.

Holotype (Cushman Coll. No. 38421) from the Permian, Bone Springs limestone, about 100 feet above the base on the northern portal of Apache Canyon, Sierra Diablo, Hudspeth Co., Texas.

This species differs from *C. sumatrana* (Volz) in the more definite biserial chambers and the clavate test with its rapid increase in breadth toward the apertural end.

The records of *Cribrogenerina* are so few that those available are given here for reference.

Cribrogenerina sumatrana (VOLZ). Genotype.

Bigenerina sumatrana VOLZ, Geol. Pal. Abhandl., vol. 10, 1904, p. 96, text fig. 5.

Cribrogenerina sumatrana SCHUBERT, Neues Jahrb. für Min., Beil. Bd. 25, 1907, p. 245.

The types are from the "Upper Carboniferous" of Sumatra. A longitudinal section is the only figure given, showing a cribrate plate as early as the third chamber and no biserial chambers.

Cribrogenerina wysogorskyi (VOLZ).

Bigenerina wysogorskyi VOLZ, l. c., p. 96, text fig. 4.

The figure given is a longitudinal section of an apparently microspheric form with four biserial chambers and the following nine chambers uniserial with completely cribrate apertures. It is also from the "Upper Carboniferous" of Sumatra, and would seem to belong to *Cribrogenerina*.

The following species are described by Lange from the Middle Permian of Sumatra:

Cribrogenerina climacamminoides Lange, Verhandl. Geol.-Mijn. Gen. Ned. Kol., Geol. Ser., vol. 7, 1925, p. 246, pl. 2, fig. 46. This is placed by Lange as midway between *Climacammina* and *Cribrogenerina*. The only figure is a longitudinal section that shows little of the structure.

C. macillenta Lange, l. c., p. 246, pl. 2, fig. 47. Apparently this was described from a single specimen which is figured in longitudinal section, and shows little in the way of details.

C. vermiculata Lange, l. c., p. 247, pl. 2, fig. 48. The section shows little structure.

C. obesa Lange, l. c., p. 248, pl. 2, fig. 49. This species is again only figured in longitudinal section. The cribrate aperture is

apparent, and the author mentions twelve apertures in one chamber visible in section, showing that there must have been many in the whole apertural wall.

C. verbeeki Lange, l. c., p. 249, pl. 2, fig. 50. The figured section shows little, but the text mentions four apertures in one of the sections of the apertural wall.

C. permica Lange, l. c., p. 249, pl. 2, fig. 51. The figured section shows as many as five apertures in the sectioned apertural face.

All of the foregoing species are nearly or entirely uniserial throughout. On the other hand, the species figured by Lange and described as *Climacammina valvulinoides*, l. c., p. 243, pl. 2, fig. 43, shows that this species has very definite, cribrate apertures, but a biserial early development, and perhaps should have been placed under *Cribrogenerina*.

Cribrogenerina nitida (Lee, Chen and Chu).

Bigenerina nitida Lee, Chen and Chu, Acad. Sinica. Mem. Nat. Research Inst. Geology, vol. 9, 1930, p. 103, pl. 5, fig. 4.

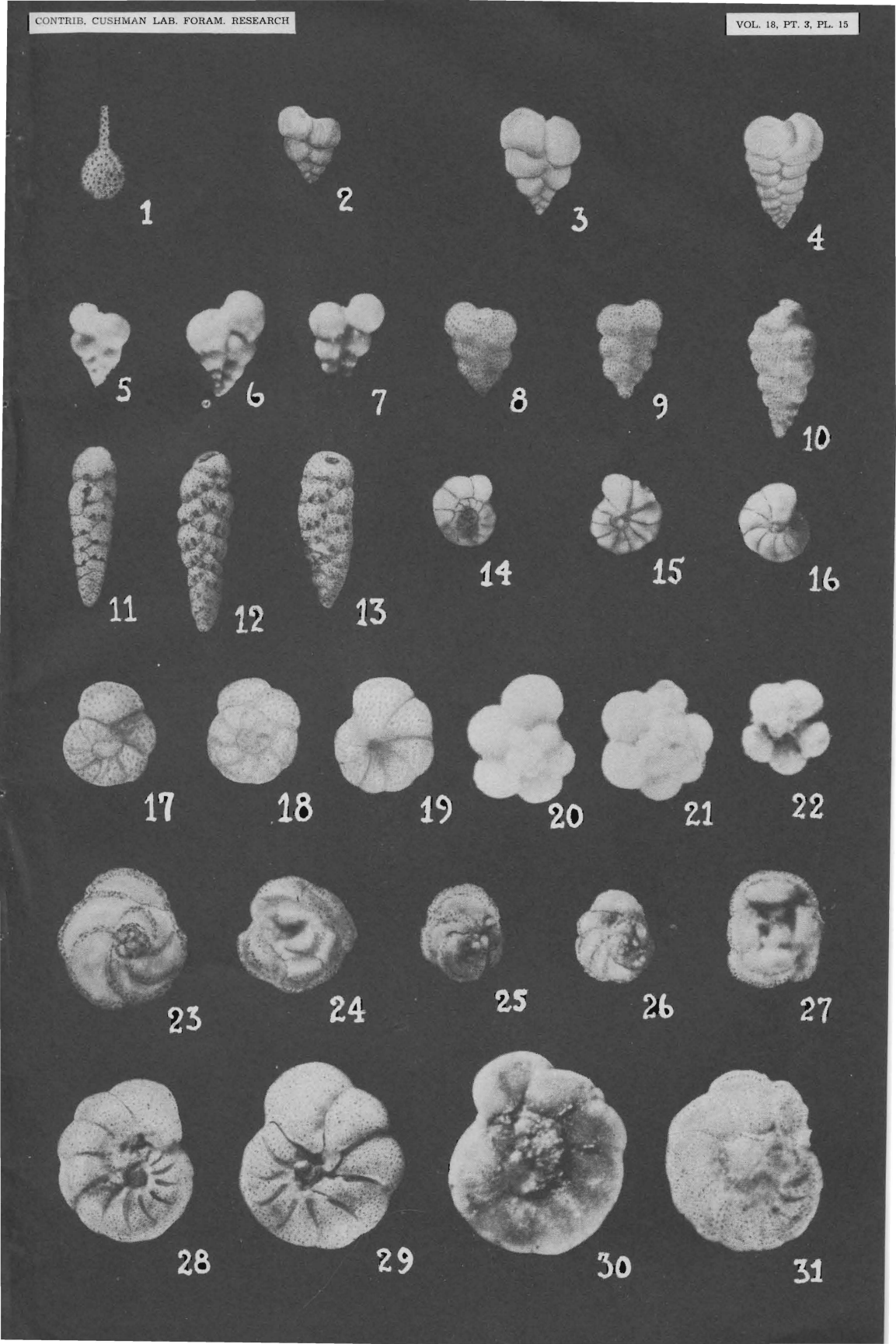
Cribrogenerina nitida Liebus, Abhandl. Preuss. Geol. Landes., Neue Folge, Heft 141, 1932, p. 158, pl. 9, fig. 19.

The originals of this were from China. Liebus records it from the Carboniferous of Germany, but his figure gives little detail, and thus this only record for the genus in Europe must be somewhat questionable until better material is available.

EXPLANATION OF PLATE 15

All figures × 45

FIG. 1. *Lagena hispida* Reuss (?). Sta. 310. 2-4. *Gümbelina plummerae* Loetterle. Sta. 352. 5-7. *G. reussi* Cushman. Sta. 352. 8-10. *G. striata* (Ehrenberg). Sta. 310. 11-13. *Loxostoma cushmani* Wickenden. 11, Sta. 310. 12, 13, Sta. 346. 14-16. *Gyroidina depressa* (Alth). 14, dorsal view; 15, 16, ventral views. Sta. 254. 17-19. *Valvulineria infrequens* Morrow. 17, 18, dorsal views; 19, ventral view. Sta. 254. 20-22. *Globigerina cretacea* d'Orbigny (?). 20, 21, dorsal views; 22, ventral view. Sta. 254. 23-27. *Globotruncana canaliculata* Reuss. 23, 25, 26, dorsal views; 24, 27, ventral views. 23-25, Sta. 346. 26, 27, Sta. 352. 28-31. *Planulina taylorensis* (Carsey). Sta. 254.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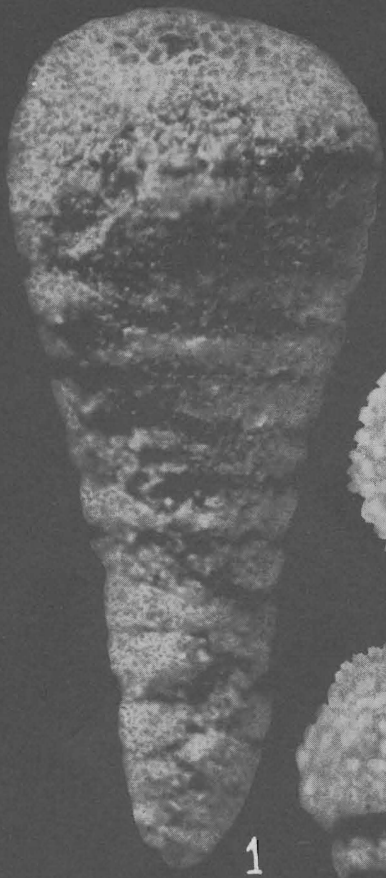

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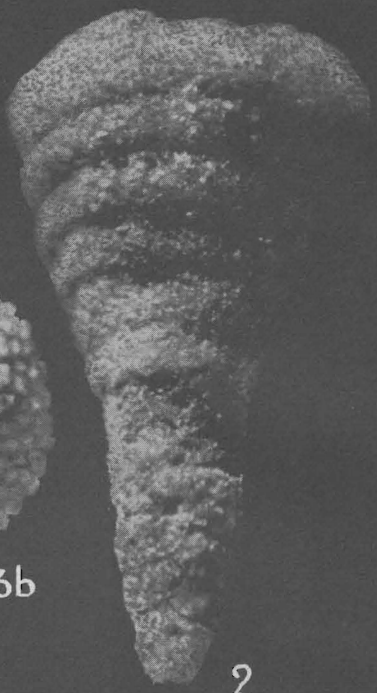

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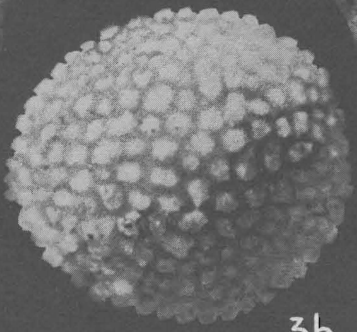

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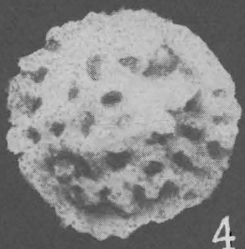

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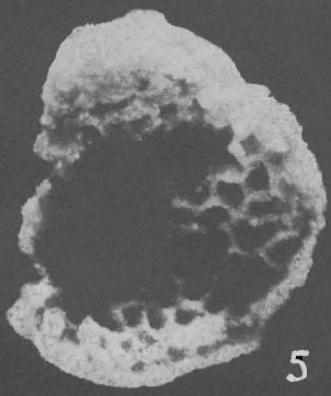

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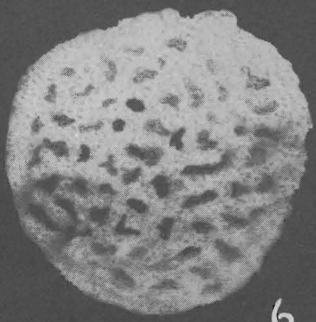

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RECENT LITERATURE ON THE FORAMINIFERA

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

Raggatt, H. G., and Irene Crespin. Geological Notes on Natural Gas and Oil Corporation's Bore at Balmain, City of Sydney, New South Wales.—Australian Journ. Sci., vol. IV, No. 3, Dec., 1941, pp. 102, 103.—Note occurrence of two genera of foraminifera.

Macfadyen, W. A. A Post-glacial Microfauna from Swansea Docks.—Geol. Mag., vol. LXXIX, No. 2, March-April, 1942, pp. 133-146.—Lists many species of foraminifera both Post-glacial and some reworked Cretaceous ones. A new name, *Bolivina britannica*, is proposed for the form usually referred to *Bolivina laevigata* (Williamson).

Garrett, J. B. Some Miocene Foraminifera from subsurface strata of coastal Texas.—Journ. Pal., vol. 16, No. 4, July, 1942, pp. 461-463, pl. 70.—7 species figured, the following new: *Lenticulina hanseni*, *Bolivina gladius*, *B. westi*, *Discorbis bolivarensis*, *Planulina palmerae*, and *Cibicides steini*.

A new species of *Discorbis* from the Weches formation of Texas.—L. c., p. 484, text figs. 1 *a-c*.—Describes *Discorbis stenzeli*, n. sp.

Thalmann, Hans E. Bibliography and index to new genera, species, and varieties of Foraminifera for the year 1939.—L. c., pp. 489-520.

Schenck, Hubert G. and T. S. Childs, Jr. Significance of *Lepidocyclina* (*Lepidocyclina*) *californica*, New Species, in the Vaqueros Formation (Tertiary), California.—Stanford Univ. Publ., Geol. Sci., vol. III, No. 2, 1942, pp. 1-83, pls. I-IV, 7 text figs.

Myers, Earl H. A Quantitative Study of the Productivity of the Foraminifera in the Sea.—Proc. Amer. Philos. Soc., vol. 85, No. 4, June, 1942, pp. 325-342, 1 pl., 6 text figs.—The studies are based on *Elphidium crispum*.

EXPLANATION OF PLATE 16

All figures × 30

FIGS. 1-7. *Cribrogenerina krizi* Cushman, n. sp. 1, Holotype. 2-7, Paratypes. 1, 2, exteriors, front views. 3 *a*, *b*, internal cast showing projecting pillars replacing the tubular apertures of the original. *a*, front view; *b*, apertural view. 4, 6, end views, showing cribrate plates from exterior. 5, Same from interior. 7, Specimen showing partial section.

Parr, W. J. A New Genus, Planulinoides, and some Species of Foraminifera from Southern Australia.—Mining and Geological Journal, vol. 2, No. 5, Sept., 1941, p. 305, text figs. a-c.—4 species described, 3 new, and a new genus: *Planulinoides* n. gen.; genotype, *Discorbina biconcava* Jones and Parker; *Streblus pauperatus* n. sp.; and *Quinqueloculina pseudoreticulata* n. sp.

New Genera of Foraminifera from the Tertiary of Victoria.—L. c., vol. 2, No. 6, pp. 361-363, text figs. 1-4.—The following new: *Spirosigmoilina* n. gen., genotype, *Spiroloculina tateana* Howchin; *Austrotrillina* n. gen., genotype, *Trillina howchini* Schlumberger; *Crespinella* n. gen., genotype, *Operculina* (?) *umbonifera* Howchin and Parr.

The Age of the Lignite Deposits at Parwan.—L. c., pp. 363, 364.—Lists numerous foraminifera.

Foraminifera and a tubicolous Worm from the Permian of the North-West Division of Western Australia.—Journ. Roy. Soc. Western Australia, vol. 27, 1940-41 (publ. May 15, 1942), pp. 97-115, 2 pls.—12 genera and 15 species of foraminifera are recorded, the following 12 new: *Ammodiscus wandageeensis, A. nitidus, Glomospira adhaerens, Tolypammina undulata, Hyperammina coleyi, H.* (?) *rudis, Hyperamminoides acicula, Psammosphaera pusilla, Crithionina teicherti, Reophax subasper, R. tricameratus, Trochammina subobtusa.*

Cushman, Joseph A. A Report on Samples Obtained by the Boring at Heron Island, Great Barrier Reef, Australia.—Reports of the Great Barrier Reef Committee, vol. V, Appendix 1, April 30, 1942, pp. 112-119, pls. XI, XII.—Foraminifera from the samples listed and a few figured; none new.

Thompson, M. L. New Genera of Pennsylvanian Fusulinids.—Amer. Journ. Sci., vol. 240, June, 1942, pp. 403-420, pls. 1-3.—4 new genera established: *Millerella,* n. gen., genotype *M. marblensis,* n. sp.; *Pseudostaffella,* n. gen., genotype *P. needhami,* n. sp.; *Waeringella,* n. gen., genotype *W. spiveyi,* n. sp.; and *Dunbarinella,* n. gen., genotype *D. ervinensis,* n. sp.

J. A. C.