CONTRIBUTIONS FROM THE CUSHMAN LABORATORY FOR FORAMINIFERAL RESEARCH

199. TWO NEW SPECIES OF *ROBERTINA*

By JOSEPH A. CUSHMAN and FRANCES L. PARKER

In our studies of *Robertina*, the following species have been found to be undescribed.

ROBERTINA PLUMMERAE Cushman and Parker, n. sp. (Pl. 16, fig. 1)

Test almost 2½ times as long as broad, greatest breadth at the middle, initial end subacute, apertural end tapering, rounded; chambers, 6 pairs in the final whorl, increasing gradually in size as added; sutures distinct, slightly depressed; wall smooth; aperture elliptical, short, supplementary aperture almost as large. Length 0.46-0.66 mm.; breadth 0.20-0.24 mm.

Holotype (Cushman Coll. No. 24675) from the Claiborne, Crockett formation, Shipp's Ford on the Colorado River, 3¾ miles due east of Smithville, Bastrop Co., Texas.

This species differs from *R. wilcoxensis* Cushman and Ponton in being longer, more twisted, less ovate in shape, and in having a larger secondary aperture.

ROBERTINA GERMANICA Cushman and Parker, n. sp. (Pl. 16, fig. 2)

Robertina angusta (CUSHMAN), CUSHMAN and PARKER, Contr. Cushman Lab. Foram. Res., vol. 12, 1936, p. 96 (part).

Test twice as long as broad, initial end bluntly pointed, apertural end flattened; chambers, 7-8 pairs in the final whorl, slowly increasing in size as added; sutures distinct, slightly limbate, not depressed; wall smooth; aperture narrow, elliptical, reaching

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ERRATA FOR VOLUME 14, PART 4, DECEMBER, 1938

The following three lines should replace lines 12—14 on p. 83 after the line reading:

Test about twice as long as broad, somewhat fusiform, the

later portion slightly compressed and tending to become biserial; chambers distinct, inflated, the last two less overlapping; sutures distinct, not greatly depressed; wall ornamented throughout

The following three lines should replace lines 25—27 on p. 89 after the line reading:

"*Uvigerina pigmaea* d'Orbigny" (Pl. 14, fig. 14) (Nuttall, Journ. Pal., vol. 6, 1932, p. 21, pl. 5, fig. 6.) This somewhat resembles d'Orbigny's species, but does not seem to be identical. It is from the Alazan shales of Mexico.

The following three lines should replace lines 36—38 on p. 92 after the line reading:

not been used for any other material since d'Orbigny's original

use of it, and as *B. aculeata* has been frequently used, although it must be admitted not always for the same species, it seems best to allow the name *B. trilobata* to lapse.

about half-way into the apertural face, supplementary aperture deeply cut, narrow. Length 0.46-0.83 mm.; breadth 0.22-0.40 mm.

Holotype (Cushman Coll. No. 24674) from the lower Oligocene of Calbe, near Magdeburg, Germany. The species occurs at other lower Oligocene localities of Germany as well.

This species resembles *R. angusta* (Cushman), but differs from it in its greater length in proportion to its breadth, more pointed initial end, and its slightly more twisted test.

200. NOTES ON THE OLIGOCENE SPECIES OF *UVIGERINA* AND *ANGULOGERINA*

By JOSEPH A. CUSHMAN and PATRICIA G. EDWARDS

A continuation of our studies of *Uvigerina* and its related forms has resulted in numerous notes which may be of general interest. It has been possible to study actual type or topotype specimens of nearly all the species recorded from the Oligocene. It is at once apparent that the older species described from the Oligocene of Europe have been wrongly interpreted by later workers. Especially is this the case in regard to "*Uvigerina tenuistriata* Reuss" as noted under that species.

One of the interesting points in a comparison of material from Europe and America is the fact that the European species are comparatively small, and most of them belong to *Angulogerina*, while true Uvigerinas are relatively rare. In the American Oligocene there are numerous well developed species of typical *Uvigerina* developed from their ancestral forms in the Eocene, and Angulogerinas are relatively rare. It has been necessary to give new names to a few of the species after comparison with the types and topotypes of the known species.

UVIGERINA GRACILIS Reuss (Pl. 13, figs. 3-6)

Uvigerina gracilis REUSS, Zeitschr. deutsch. geol. Ges., vol. 3, 1851, p. 77, pl. 5, figs. 39 *a*, *b*.—BORNEMANN, l. c., vol. 7, 1855, p. 343.—REUSS, Denkschr. Akad. Wiss. Wien, vol. 25, 1865, p. 150.—ANDREAE, Abhandl. Geol. Special-Karte Elsass-Lothringen, vol. 2, pt. 3, 1884, pp. 118, 141.—HUCKE, Ber. Nat. Ver. Dessau, Heft 2, 1930, p. 15 (list).

Test small, slender, slightly fusiform, initial end without a spine; chambers very distinct, inflated, rather regularly triserial throughout, in old age specimens with the final chambers more loosely arranged; sutures distinct, strongly depressed; wall finely hispid to smooth, the last-formed chambers often entirely smooth; aperture small, with a definite, slender neck and slightly phialine lip. Length 0.30-0.60 mm.; diameter 0.15-0.20 mm.

The types of this species are from the middle Oligocene, Septarienthon, of Hermsdorf, near Berlin, Germany. We have abundant topotypes of this species. It is a characteristic species of the middle Oligocene of Germany, represented besides the type locality in our material from the Septarienthon of Pietzpuhl, and in the Cerithien sand of Offenbach. The references given above are all from the German Oligocene. The species has not been found in our material from other areas.

UVIGERINA BECCARII Fornasini (Pl. 13, fig. 7)

Uvigerina beccarii FORNASINI, Rend. Accad. Sci. Bologna, vol. 2, (1897-1898) 1898, p. 12, pl. 1, fig. 5.—GALLOWAY and MORREY, Bull. Amer. Pal., vol. 15, 1929, p. 38, pl. 6, fig. 2.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 5, 1929, p. 95, pl. 13, fig. 37.

The figured specimen shows the characters of this species as it occurs in the Oligocene (?) material from Manta, Ecuador. It very closely resembles the type figure, and agrees well with the original description, but the Ecuador form has a more definite neck. Topotype specimens of *U. beccarii* are not available for comparison. The series from Ecuador shows considerable variation, some of the specimens tending strongly toward *U. mexicana* Nuttall in their characters, and may perhaps be found to be included in the range of that species.

UVIGERINA GALLOWAYI Cushman (Pl. 13, figs. 8, 9)

Uvigerina alata GALLOWAY and MORREY (not CUSHMAN and APPLIN), Bull. Amer. Pal., vol. 15, No. 55, 1929, p. 38, pl. 6, fig. 1.

U. gallowayi CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 5, 1929, p. 94, pl. 13, figs. 33, 34.

Test rather short, especially in the megalospheric form, more elongate and fusiform in the microspheric, apertural end truncate; chambers closely set, slightly inflated; sutures not deep, largely obscured by the ornamentation; wall comparatively thick,

ornamented by 12-18 high, plate-like, longitudinal costae, mostly independent of the chamber limits, becoming almost spinose at the base, and diminishing toward the apertural end leaving the last chambers nearly smooth; aperture with a short neck and lip, in a depression of the outer face. Length up to 1.10 mm.; diameter 0.45 mm.

The types are from material from the Tertiary of Manta, Ecuador, probably of upper Oligocene age. It also occurs in material of similar age from Venezuela.

UVIGERINA MARIANNENSIS Cole and Ponton (Pl. 13, fig. 12)

Uvigerina mariannensis COLE and PONTON, Bull. 5, Florida State Geol. Survey, 1930, p. 40, pl. 6, fig. 6.

"Test minute, fusiform; chambers and sutures indistinct; test covered by numerous, rather prominent, raised costae which run the entire length of the test; aperture on a very short neck with a phialine lip. Length 0.67 millimeter."

This species was described from the lower Oligocene, Marianna limestone, of Florida. So little is known of its structure and possible variations that it is difficult to fully determine the characters of this species, even as to whether or not it is a true *Uvigerina.*

UVIGERINA VICKSBURGENSIS Cushman and Ellisor (Pl. 13, figs. 10, 11)

Uvigerina vicksburgensis CUSHMAN and ELLISOR, Contr. Cushman Lab. Foram. Res., vol. 7, 1931, p. 54, pl. 7, figs. 7 *a*, *b*.—ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, 1933, pl. 3, figs. 10 *a*, *b*.

Test elongate, 2-2½ times as long as broad, nearly circular in end view; chambers numerous, fairly distinct, only slightly inflated; sutures fairly distinct, slightly depressed; wall ornamented by numerous, slightly raised, longitudinal costae, usually broken at the sutures, but a few of them extending across adjacent chambers; aperture with a very short neck. Length 0.60-0.70 mm.; diameter 0.30 mm.

The types of this species are from the lower Oligocene, from a core sample from Humble Oil and Refining Company's No. 73 Sims Smith at 6,174 feet, Goose Creek, Harris Co., Texas. It occurs at numerous localities in the lower Oligocene of the Gulf Coastal Plain Region of the United States, and similar specimens occur in the Alazan of Mexico. The specimens referred by

Nuttall to *U. gardnerae* Cushman and Applin (Journ. Pal., vol. 6, 1932, p. 22, pl. 5, fig. 11) reproduced on our plate, should probably be referred to *U. vicksburgensis.*

UVIGERINA ALAZANENSIS Nuttall (Pl. 13, fig. 17)

Uvigerina alazanensis NUTTALL, Journ. Pal., vol. 6, 1932, p. 22, pl. 5, fig. 10.

"Test elongate, fusiform, subcylindrical or tapered, broadest at the base of the last chamber. Sutures indistinct, except in the last few chambers which are somewhat inflated with depressed sutures. Last chamber smooth. Remainder of test with twelve or more narrow, plate-like costae, most of which extend the whole length of the test and join at the initial end, which is subacute or rounded. The aperture consists of a short tubular neck with a flaring lip sometimes situated in a slight depression. Average length 1.2 mm., width 0.5-0.6 mm.

"This is a very common form in the Alazan. It is distinguished from *U. jacksonensis* Cushman (1925, Contr. Cushman Lab. Foram. Research, vol. 1, p. 67, pl. 10, fig. 13) by being more elongate and tapering, also the costae are more continuous from one chamber to the next. *U. gallowayi* Cushman (1929, idem, vol. 5, p. 94, pl. 13, figs. 33, 34) with paratypes of which it has been compared, may be distinguished by its short spinose projections towards the initial end and by being less tapered."

The types of this species are from the lower Oligocene, Alazan shale, Western Asuncion, State of Vera Cruz, Mexico.

UVIGERINA MEXICANA Nuttall (Pl. 13, figs. 14, 15)

Uvigerina mexicana NUTTALL, Journ. Pal., vol. 6, 1932, p. 22, pl. 5, figs. 12, 13.—PALMER and BERMUDEZ, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, 1936, p. 291.

"Test short, stout, earlier portion pointed or subacute, broadest at about one-third the total distance from the apertural end. Initial two-thirds of the test with sutures indistinct, covered with numerous longitudinal costae, which are continuous from one chamber to another. Costae gradually becoming absent in the later part of the test, the last chambers being smooth and inflated, separated by distinct depressed sutures. Aperture a very short tube in a depressed or flattened area of the last chamber. Average length 0.7 mm.

"This species resembles *U. semiornata* d'Orbigny (1846, Foram. Foss. Vienne, p. 189, pl. 11, figs. 23, 24) from which it may be distinguished by its different costae and aperture. *U. beccarii* Fornasini (1898, Riv. Acc. Sci. Bologna, vol. 2, p. 12, pl. 1, fig. 5) has much fewer costae."

The types are from the lower Oligocene, Alazan shale, 2 kms. S. 55° W. of La Ceiba crossing of the Rio Buena Vista, Hacienda Llano Grande, Mexico.

UVIGERINA SPINICOSTATA Cushman and Jarvis, var. ALAZANENSIS Nuttall

(Pl. 13, fig. 16)

Uvigerina spinicostata CUSHMAN and JARVIS, var., CUSHMAN and JARVIS, Contr. Cushman Lab. Foram. Res., vol. 5, 1929, p. 12, pl. 3, figs. 9, 10.

Uvigerina spinicostata CUSHMAN and JARVIS, var. *alazanensis* NUTTALL, Journ. Pal., vol. 6, 1932, p. 23, pl. 6, fig. 1.

"Variety differing from the typical in the test being proportionately somewhat shorter and stouter, in the apertural neck being narrower and in the costae being less numerous. Average length 1.1 mm., width 0.5 mm."

The types of the variety are from the lower Oligocene, Alazan shale, of Western Asuncion, State of Vera Cruz, Mexico.

UVIGERINA CANARIENSIS d'Orbigny, var. SPINULOSA Hadley (Pl. 14, fig. 9)

Uvigerina canariensis D'ORBIGNY, var. *spinulosa* HADLEY, Bull. Amer. Pal., vol. 20, No. 70A, 1934, p. 18, pl. 2, fig. 17.

"Triserial, elongate, roughly circular in cross section; initial end rounded or bluntly pointed, with a short, sharp terminal spine; chambers numerous, later ones inflated and somewhat overlapping; wall calcareous, smooth except for faint striae and small downward pointing spines near the initial end; the decorations become fainter toward the anterior end and disappear before the final chamber is reached; aperture with a tubular neck and thin flaring lip, the neck is located in a depression in the final chamber.

"This variety differs from the typical in the development of small anterior spines as well as the terminal one.

"Length of type including spine and neck, .70 mm."

The types of this variety are from the Oligocene, from white marl in bank 50 meters SE. of entrance gate to Cuban Naval Academy, Marel, Pinar del Rio Province, Cuba.

UVIGERINA GARDNERAE Cushman and Applin, var. CUBANA Hadley (Pl. 13, fig. 18)

Uvigerina gardnerae CUSHMAN and APPLIN, var. *cubana* HADLEY, Bull. Amer. Pal., vol. 20, No. 70A, 1934, p. 19, pl. 2, fig. 12.

"Initial end bluntly rounded, greatest diameter near the apertural end; chambers numerous, somewhat overlapping, inflated; wall calcareous, decorated with numerous heavy costae which are not continuous from chamber to chamber, the general trend of the costae is longitudinal but they sometimes make a considerable angle with the axis of the test; aperture usually broken, but a few forms show a short tubular neck and a slight lip.

"The above variety differs from the typical species in the possession of coarser costae and the costae do not break up into spines near the anterior end.

"Length of type, .72 mm.; greatest diameter, .41 mm."

The types of this variety are from the Oligocene, basal marl of Yumuri River, gorge near town of Matanzas, Matanzas Province, Cuba.

UVIGERINA CUBANA Palmer and Bermudez (Pl. 13, figs. 18, 19)

Uvigerina cubana PALMER and BERMUDEZ, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, 1936, p. 292, pl. 17, figs. 5, 6.

"Test large, stout, broadest across the middle portion. Early sutures obscured by ornamentation; later sutures depressed, chambers slightly inflated. Ornamentation comprising 3 broad, plate-like costae extending from the apex to beyond the middle portion of the test, giving the test a triangular shape. Intercalated between the main flanges are numerous irregularly placed costae which seldom cross more than 1½ chambers; on some specimens these are sharp and at the basal extremity are projecting; on others they are rounded. Aperture an elongated neck with thin lip and tooth. Length to 1.4 mm.

"Both megalospheric and microspheric forms may be distinguished, the latter being sharply pointed with three broad flanges.

"*U. cubana* varies greatly. Some specimens are almost smooth except for the 3 primary flanges; others have the intervening areas well covered by costae, and were it not for the large series available for examination the extremes might appear to be varietally distinct.

"The Cuban species appears to be closely related to *U. curta* Cushman and Jarvis (1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 13, pl. 3, figs. 13-15), *U. gallowayi* Cushman (idem, p. 94, pl. 13, figs. 33, 34), and *U. alazanensis* Nuttall (1932, Journ. Pal., vol. 6, p. 22, pl. 5, fig. 10), differing from all in the development of 3 prominent flanges. *U. curta* very closely resembles the megalospheric, and *U. gallowayi* resembles both megalospheric and microspheric forms. It is possible that comparison of actual specimens will indicate that the Cuban specimens are a trialate variety of one of these species."

UVIGERINA CAPAYANA Hedberg (Pl. 14, fig. 1)

Uvigerina pygmaea D'ORBIGNY, var. *capayana* HEDBERG, Journ. Pal., vol. 11, 1937, p. 677, pl. 91, fig. 19.

Test short and stout, broadly fusiform; chambers closely set

EXPLANATION OF PLATE 13

FIGS.

1. *Robertina plummerae* Cushman and Parker, n. sp. × 70. Holotype. Eocene, Claiborne, Bastrop Co., Texas. *a*, front view; *b*, rear view.
2. *R. germanica* Cushman and Parker, n. sp. × 45. Holotype. Lower Oligocene, Calbe, near Magdeburg, Germany. *a*, front view; *b*, rear view.

3–6. *Uvigerina gracilis* Reuss. 6 *a*, *b*, (After Reuss). Oligocene, Hermsdorf, near Berlin, Germany. 3–5, × 70. Topotypes.

7. *U. beccarii* Fornasini. × 40. (After Cushman.) Oligocene, Venezuela.

8, 9. *U. gallowayi* Cushman. × 40. Oligocene, Manta, Ecuador.

10, 11. *U. vicksburgensis* Cushman and Ellisor. 10, Holotype. × 50. Lower Oligocene, Well sample, Goose Creek, Harris Co., Texas. *a*, front view; *b*, apertural view. 11, (After Nuttall.) Oligocene, Alazan shale, Mexico.

12. *U. mariannensis* Cole and Ponton. (After Cole and Ponton.) Lower Oligocene, Marianna limestone, Florida.

13. "*U. gardnerae* Cushman and Applin, var. *cubana* Hadley." (After Hadley.) Oligocene, Cuba.

14, 15. *U. mexicana* Nuttall. × 50. (After Nuttall.) Oligocene, Alazan shale, Mexico.

16. *U. spinicostata* Cushman and Jarvis, var. *alazanensis* Nuttall. × 50. (After Nuttall.) Oligocene, Alazan shale, Mexico.

17. *U. alazanensis* Nuttall. × 50. (After Nuttall.) Oligocene, Alazan shale, Mexico.

18, 19. *U. cubana* Palmer and Bermudez. (After Palmer and Bermudez.) 18, × 32. 19, × 35. Oligocene, Cuba.


1b


1a


3


4


2a


2b


6a


6b


5


10b


11


7


8


9


10a

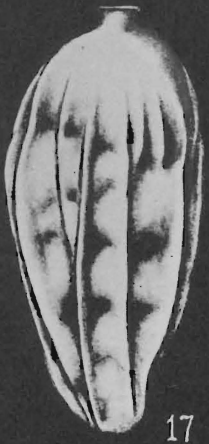

12


13


14


15


16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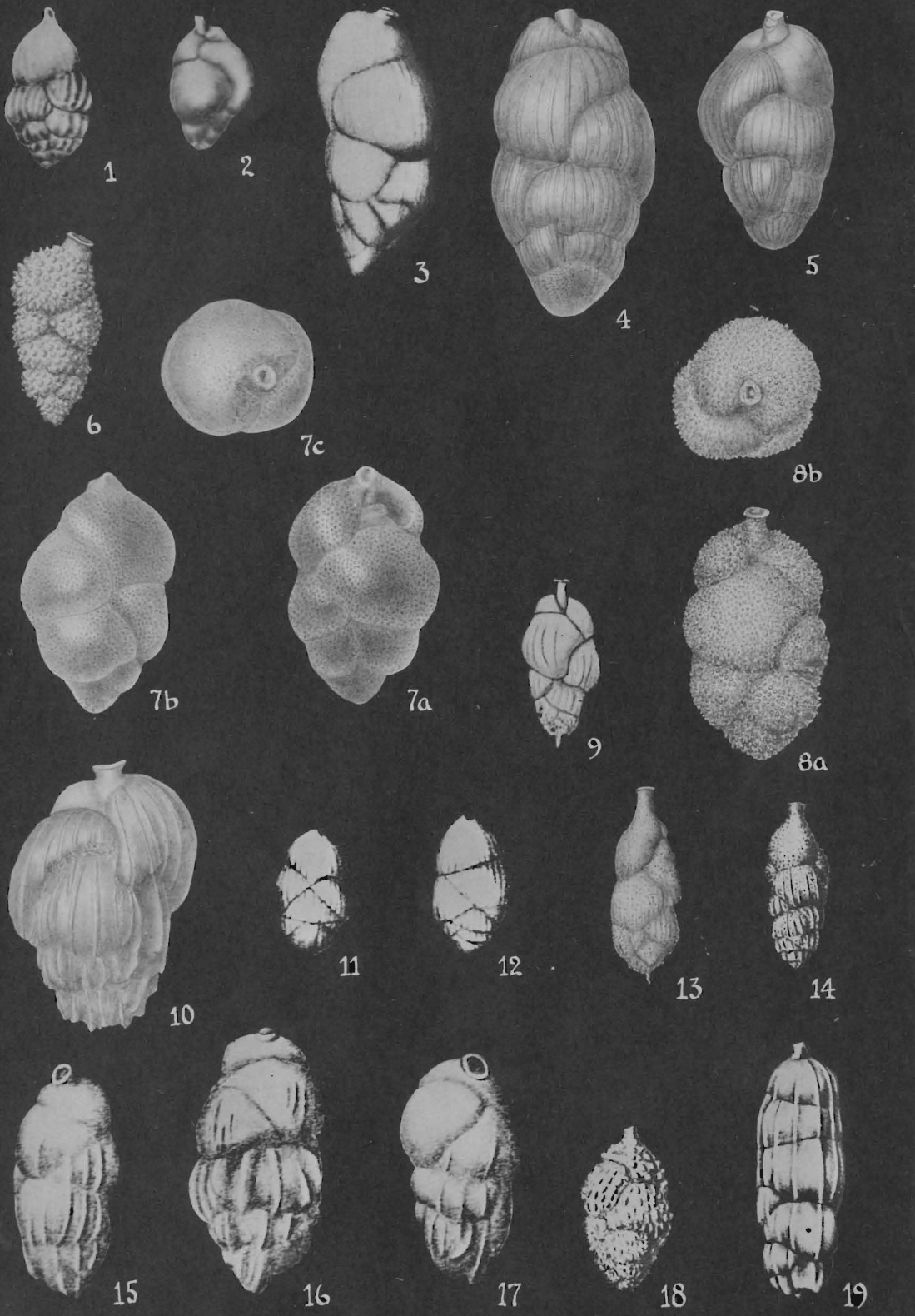
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except the last which may be less overlapping, increasingly inflated as added; sutures fairly distinct, not deeply depressed; wall ornamented by longitudinal costae, those of each chamber independent of adjacent ones, in the last-formed chamber the costae obsolescent or wanting, or the surface finely spinose; aperture with a slight neck. Length 0.42 mm.; diameter 0.18 mm.

The types of this species are from the Oligocene, Carapita formation, on Quebrada Carapita, District of Libertad, State of Anzoategui, Venezuela.

Although this was originally referred to *U. pygmaea* d'Orbigny as a variety, it seems best to raise it to specific rank, as the species of d'Orbigny seems to be one of the later Tertiary of southern Europe.

As noted by Hedberg, this closely resembles the form recorded by Hadley as *U. gardnerae* Cushman and Applin, var. *cubana*

EXPLANATION OF PLATE 14

FIGS.

1. *Uvigerina capayana* Hedberg. × 90. (After Hedberg.) Oligocene, Carapita formation, Venezuela.
2. *U. carapitana* Hedberg. × 70. (After Hedberg.) Oligocene, Carapita formation, Venezuela.
3–5. *U. nuttalli* Cushman and Edwards, n. sp. 3, × 55. (After Nuttall.) Holotype. 4, 5, × 60. Paratypes. Lower Oligocene, Alazan shales, Mexico.
6. *U. rustica* Cushman and Edwards, n. sp. × 45. Holotype. Oligocene, Venezuela.
7. *U. ecuadorensis* Cushman and Edwards, n. sp. × 70. Holotype. Oligocene, Ecuador. *a*, front view; *b*, side view; *c*, apertural view.
8. *U. mantaensis* Cushman and Edwards, n. sp. × 70. Holotype. Oligocene, Ecuador. *a*, front view; *b*, apertural view.
9. "*U. canariensis* d'Orbigny, var. *spinulosa* Hadley." (After Hadley.) Oligocene, Cuba.
10. *Uvigerina* sp.(?) × 90. Middle Oligocene, Söllingen, Germany.
11, 12. "*U. semiornata* d'Orbigny." (After Cushman.) Upper Oligocene, France.
13. "*U. auberiana* d'Orbigny." (After Cushman.) Oligocene, Venezuela.
14. "*U. pigmaea* d'Orbigny." (After Nuttall.) Oligocene, Alazan shale, Mexico.
15–17. "*U. cocoaensis* Cushman." (After Cushman and Schenck.) Oligocene(?), Oregon.
18. "*U. auberiana* d'Orbigny." (After Nuttall.) Oligocene, Alazan shale, Mexico.
19. "*U. tenuistriata* Reuss." (After Nuttall.) Oligocene, Alazan shale, Mexico.

from the Oligocene of Cuba, and larger series may show them to be the same, especially as *U. carapitana* Hedberg seems to occur at both localities.

UVIGERINA CARAPITANA Hedberg (Pl. 14, fig. 2)

Uvigerina carapitana HEDBERG, Journ. Pal., vol. 11, 1937, p. 677, pl. 91, fig. 20.

"Test small, stout, compact, rather bulbous; periphery smoothly rounded. Triserial, with about 3 to 4 whorls visible. Sutures distinct, depressed; chambers inflated, laterally lobed. Wall thick; generally smooth though some specimens show faint longitudinal striations in the early chambers. Neck tubular, terminal, in a depression near the indented margin of the last chamber; usually without a distinct lip although the neck is often slightly flaring." Length 0.42 mm.; diameter 0.30 mm.

The types are from the Oligocene, Carapita formation, on Quebrada Carapita, District of Libertad, State of Anzoategui, Venezuela.

We have specimens apparently identical from the Oligocene, gorge of Yumuri River, Matanzas, Cuba.

UVIGERINA NUTTALLI Cushman and Edwards, n. sp. (Pl. 14, figs. 3-5)

Uvigerina canariensis D'ORBIGNY, var. NUTTALL, Journ. Pal., vol. 6, 1932, p. 22, pl. 5, fig. 9.

Test 2-2½ times as long as broad, tapering, with the greatest breadth toward the apertural end which is usually somewhat rounded truncate; chambers distinct, but not greatly inflated, irregularly triserial, increasing rather rapidly in size as added; sutures distinct, slightly depressed; wall ornamented with very low, longitudinal costae, in part continuous over the sutures, very variable in their amount of development; aperture at the end of a short, tubular neck with a distinct lip, the neck fitted into a depression of the outer wall. Length 0.55-0.75 mm.; diameter 0.30-0.40 mm.

Holotype (Cushman Coll. No. 16421) from the Oligocene of Western Asuncion, State of Vera Cruz, Mexico.

This species differs from *U. canariensis* d'Orbigny in the distinctly truncate apertural end, longitudinal costae, and very short, deeply set, tubular neck. Besides the type locality, there are

numerous localities in the lower Oligocene of the Gulf Coastal Plain represented in our material, especially from the Red Bluff clay and Marianna limestone. There is a considerable variation in the development of the costae in the series from any locality.

UVIGERINA RUSTICA Cushman and Edwards, n. sp. (Pl. 14, fig. 6)

Uvigerina hispida GALLOWAY and MORREY (not SCHWAGER), Bull. Amer. Pal., vol. 15, 1929, p. 39, pl. 6, fig. 3.—CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 5, 1929, p. 95, pl. 13, fig. 35.

U. auberiana NUTTALL (not D'ORBIGNY), Quart. Journ. Geol. Soc., vol. 84, 1928, p. 94, pl. 6, fig. 16.

Test about twice as long as broad, somewhat fusiform, the use of it, and as *B. aculeata* has been frequently used, although it must be admitted not always for the same species, it seems best to allow the name *B. trilobata* to lapse.
with close-set, short, blunt spines; aperture usually somewhat at one side of the axis, with a short, stout neck and slight, phialine lip. Holotype: length 0.65 mm.; diameter 0.40 mm.

Holotype (Cushman Coll. No. 14333) from the Oligocene (?) of Sea Cliff, 5.55° E. of Cemetery of Aguide, District of Zemorra, Venezuela.

The species also occurs in material of similar age in Venezuela and Trinidad. It differs from *U. hispida* Schwager in the coarser, more blunt spines, less pointed initial end which is without spines, and the shorter, stouter neck at one side of the axis.

UVIGERINA ECUADORENSIS Cushman and Edwards, n. sp. (Pl. 14, fig. 7)

Test short and stout, about 1½ times as long as broad, broadly fusiform, rounded at the initial end; chambers distinct, few, inflated, increasing very rapidly in size as added, the last-formed one concave on the inner margin; sutures distinct, but only slightly depressed; wall nearly smooth, but with large, distinct pits; aperture peculiarly shaped, compressed oval, at the end of a short, tapering, somewhat inwardly pointing neck, without a distinct lip. Length 0.45-0.55 mm.; diameter 0.30-0.35 mm.

Holotype (Cushman Coll. No. 24676) from the lower Oligocene, Punta Blanca shales, Sea Cliff, near village of Rio Sico, Ecuador.

This is a very distinctive species differing from *U. canariensis* d'Orbigny in the stout, broad form, the peculiarly pitted surface, and the very short, tapering, inwardly pointing neck without a distinct lip.

UVIGERINA MANTAENSIS Cushman and Edwards, n. sp. (Pl. 14, fig. 8)

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

Test stout and broad, about 1½ times as long as broad, fusiform; chambers comparatively few, much inflated, especially in the later portion, last-formed one tending to assume a terminal position; sutures fairly distinct in the later portion, only slightly depressed; wall very finely hispid throughout; aperture terminal, with a short, slender neck and phialine lip. Length 0.50-0.60 mm.; diameter 0.30-0.35 mm.

Holotype (Cushman Coll. No. 24677) from the Oligocene (?), on sea-coast near Manta, Ecuador.

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

UVIGERINA sp.(?) (Pl. 14, fig. 10)

This form from the middle Oligocene of Söllingen, Germany, is one of the few true Uvigerinas found in our European material. Because of its rarity we could not obtain a series adequate for a description, nevertheless it seems important to register its occurrence. Smaller, related forms, probably the young, were also found here.

ANGULOGERINA TENUISTRIATA (Reuss) (Pl. 15, figs. 1-7)

Uvigerina tenuistriata REUSS, Sitz. Akad. Wiss. Wien, vol. 62, pt. 1, 1870, p. 485; VON SCHLICHT, Foram. Septar. Pietzpuhl, 1870, pl. 22, figs. 34-37.

Test small, 2-2½ times as long as broad, generally triserial, later portion loosely so and somewhat irregular; chambers of the earliest portion usually indistinct, later very distinct, and in the adult decidedly triangular in transverse section, the inner face flattened or slightly concave; sutures indistinct in the earlier portion, later distinct and depressed; wall ornamented by longitudinal costae of variable development, the last chamber in adults often smooth; aperture with a short but definite neck and slight lip, the opening compressed. Length 0.50-0.70 mm.; diameter 0.30 mm.

The types of this species are from the Oligocene of Pietzpuhl, Germany. We have an excellent series of topotypes of this species for study. The original figures are not well drawn, as is true of many of the figures in the von Schlicht volume of plates. A study of the topotypes shows that the species belongs to *Angulogerina*. The species is a very well characterized one, and occurs in our material from the middle Oligocene of Germany at the following localities: Septarienthon of Pietzpuhl; Hermsdorf near Berlin; Cerithien sand of Offenbach; Rupelton of Ratigen near Dusseldorf, and from the Oligocene of Hartmansweiler, Alsace.

Owing to the poor figures given, and to the fact that fig. 37 of von Schlicht represents a comparatively smooth form which is probably *U. gracilis* Reuss which also occurs at Pietzpuhl, there has been much confusion in regard to this species. In the *Challenger* Report, Brady assigned some Recent material to this species which was very different, and his figures have been used by later workers to give the characters. As a result, the range of figures assigned to this species is very wide, and almost none of them represents the species developed abundantly at the type locality.

ANGULOGERINA GERMANICA Cushman and Edwards, n. sp. (Pl. 15, figs. 14-16)

Test 1½-2½ times as long as broad, generally fusiform in front view, earlier chambers compact, later ones more loosely triserial, adult test triangular in transverse section; chambers distinct, inflated, earlier ones much overlapping, later ones less so, earlier ones much inflated and rounded, in the adult becoming triangular, the inner face flattened or slightly concave; sutures distinct, rather deeply depressed; wall ornamented by numerous longitudinal costae, those of each chamber independent of adjacent ones, earliest ones entire, later becoming broken up into elongate divisions, somewhat serrate, in old age specimens with last chambers sometimes smooth; aperture comparatively large, elliptical, with a short, stout neck and slight lip. Length 0.30-0.45 mm.; diameter 0.18-0.20 mm.

Holotype (Cushman Coll. No. 24678) from the lower Oligocene of Calbe, near Magdeburg, Germany.

This species differs from *A. tenuistriata* (Reuss) in the more inflated chambers, the short neck, and the very much broken, longitudinal costae in typical specimen. On our plate 15, figure

16 is a specimen from the middle Oligocene, Rupelton, of Ratigen, near Dusseldorf, Germany, representing a form which has a very much smoother type of ornamentation, more overlapping chambers, and is more definitely triangular. However, with it are numerous specimens which seem to definitely connect this with typical *A. germanica.*

ANGULOGERINA OLIGOCAENICA (Andreae) (Pl. 15, figs. 8-11)

Uvigerina oligocaenica ANDREAE, Bericht Senckenberg. Ges., 1894, p. 50, text fig. 1.

Test small, slender, elongate, fusiform; chambers distinct, somewhat inflated, earlier ones compact, later ones becoming more elongate and somewhat loosely coiled, tending to become angled, and in some specimens roughly triangular in section; sutures distinct, depressed; wall ornamented with numerous fine, longitudinal costae, usually somewhat broken up into irregular spinose projections in the later part, the final chambers appearing hispid or smooth; aperture with a slender neck, and a distinct, phialine lip, the opening usually not circular, but roughly triangular or compressed. Length 0.40-0.50 mm.; diameter 0.15-0.18 mm.

The types of this species are from well samples 240 meters deep in the middle Oligocene, Septarienthon, of Sulzunter den Wald, and from Lobsann, Germany. Andreae also records it as probably occurring at Ratigen, near Dusseldorf, Germany. We have abundant material from the last two localities, which shows the rather wide variation in this species which seems to belong under *Angulogerina.*

Our figures show some of this variation and the differences in the microspheric and megalospheric forms. Besides Ratigen and Lobsann, the localities given by Andreae, we have the species from the middle Oligocene of Germany at the following localities: Söllingen; Oeding in Westphalia; Wiesloch, near Heiderberg, Baden; Duisberg, Rhein Province; and from the lower Oligocene of Calbe, near Magdeburg. It seems to be confined to this region so far as our available material shows.

ANGULOGERINA OLIGOCAENICA (Andreae), var. GLOBOSA (Stoltz) (Pl. 15, figs. 12, 18)

Uvigerina tenuistriata D'ORBIGNY, var. *globosa* STOLTZ, Notiz. Ver. für Erdkunde, vol. 5, pt. 7, 1925, p. 130, text fig.

Under this varietal name, Stoltz figures a form with very irregular later chambers. His figures are copied on our plate. The types of the variety are from the middle Oligocene, Septarienthon of Vogelsburg, Germany. Somewhat similar specimens occur at other localities where *A. oligocaenica* is found in any considerable numbers. The early stages with their somewhat broken and spinose costae seem more closely related to *A. oligocaenica* than to *A. tenuistriata* (Reuss).

ANGULOGERINA SAGRINIFORMIS (Spandel) (Pl. 15, fig. 17)

Uvigerina sagriniformis SPANDEL, Ber. Offenbacher Ver. Nat., 1901-1909 (1909), p. 209, pl. 2, fig. 2.

A copy of the rather inadequate type figure is given on our plate. We have found rare specimens from the middle Oligocene of the Mainz Basin which may possibly be referred to this species, the type locality for which is this same general area. These are elongate specimens, rather smoothly finished in the later portions especially, and with very slightly depressed sutures. Further study by someone of the original type specimen and better figures are necessary before this form can be placed with any certainty.

ANGULOGERINA BYRAMENSIS (Cushman) (Pl. 15, figs. 18, 19)

Uvigerina byramensis CUSHMAN, U. S. Geol. Survey Prof. Paper 129-E, 1922, p. 95, pl. 18, fig. 5; Prof. Paper 129-F, 1922, p. 133; Prof. Paper 133, 1923, p. 34, pl. 4, figs. 10, 11.—APPLIN, Bull. Amer. Assoc. Petr. Geol., vol. 9, 1925, p. 25.—HOWE, Journ. Pal., vol. 2, 1928, p. 175 (list).—COLE and PONTON, Bull. 5, Florida State Geol. Survey, 1930, p. 39, pl. 9, fig. 7.—COLE and GILLESPIE, Bull. Amer. Pal., vol. 15, No. 57 *b*, 1930, p. 11, pl. 2, fig. 6.

Angulogerina byramensis ELLISOR, Bull. Amer. Assoc. Petr. Geol., vol. 17, 1933, pl. 3, fig. 16.—CUSHMAN and MCGLAMERY, U. S. Geol. Survey Prof. Paper 189-D, 1938, p. 109, pl. 26, figs. 9, 10.

Test elongate, slender, somewhat fusiform, earlier portion rounded in section, adult portion becoming triangular; chambers distinct, earlier ones closely set, rounded, slightly inflated, later ones becoming somewhat loosely arranged and more definitely triangular; wall in the early portion finely but distinctly longitudinally costate, the later chambers often becoming almost entirely smooth; aperture with a short, cylindrical or compressed neck with a distinct, phialine lip. Length 0.25-0.40 mm.; diameter 0.12-0.18 mm.

The types of this species are from the lower Oligocene, Byram marl of Mississippi. The species is a rather common and widely distributed one in the lower Oligocene of the Gulf Coastal Plain region of the United States, and occurs in the lower Oligocene of Mexico.

There is some considerable amount of variation in the strength of the ornamentation and, as is usual in this group, in the amount of irregularity of the later chambers. It is a good index fossil for the American lower Oligocene.

Cole and Gillespie have named a form var. *mesonensis* from the Oligocene, Meson formation, of Mexico, but no figures were given.

ANGULOGERINA RUGOPLICATA Cushman (Pl. 15, fig. 20)

Angulogerina rugoplicata CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 11, 1935, p. 33, pl. 5, figs. 5 *a*, *b*.

Test about twice as long as broad, generally triangular in end view, the sides slightly concave, and the angles in the adult truncate, somewhat fusiform in side view, greatest diameter at about the middle; chambers distinct, strongly concave at the base, irregular, increasing in height toward the apertural end; sutures strongly depressed; wall distinctly perforate, with slight traces of longitudinal striae; aperture circular, terminal, with a very short, cylindrical neck and a very slight, rounded lip. Length 0.30 mm.; diameter 0.15 mm.

The types are from the lower Oligocene, 41 feet above limestone ledge, bottom of hill on road ascending from Waltersville, Mississippi, to National Cemetery.

This is a very strongly rugose species, and easily distinguished from the other lower Oligocene species of the genus.

ANGULOGERINA VICKSBURGENSIS Cushman (Pl. 15, figs. 21, 22)

Angulogerina vicksburgensis CUSHMAN, Contr. Cushman Lab. Foram. Res., vol. 11, 1935, p. 33, pl. 5, figs. 3, 4.

Test elongate, 2½-3 times as long as broad, triangular in end view, sides somewhat convex, the angles rounded, early portion rapidly enlarging, adult portion with the sides nearly parallel; chambers numerous, distinct, generally triserial, slightly inflated, increasing in height in the adult; sutures distinct, slightly depressed; wall smooth, finely but distinctly perforate; aperture circular, terminal, with a distinct, cylindrical neck and prominent

lip. Length 0.35-0.40 mm.; diameter 0.12-0.15 mm.

The types are from the lower Oligocene, Byram marl, on ledge at water's edge under expansion bridge on Pearl River at Byram, Mississippi. It is rather widely distributed in the Byram marl.

The following Oligocene records are not represented by large enough series in our collections to warrant placing them definitely, but are recorded here for reference, and the figures reproduced on our plates.

"*Uvigerina semiornata* d'Orbigny" (Pl. 14, figs. 11, 12) (Cushman, Bull. Soc. Sci. Seine-et-Oise, ser. 2, vol. 9, 1928, p. 54, pl. 2, figs. 10 *a*, *b*.) These specimens are from the upper Oligocene, Stampien, of France.

"*Uvigerina cocoaensis* Cushman" (Pl. 14, figs. 15-17) (Cushman and Schenck, Univ. Calif. Publ., Bull. Dept. Geol. Sci., vol. 17, 1928, p. 312, pl. 43, figs. 17-19.) This form occurs in the Bassendorf shales of Oregon and in other supposedly Oligocene series of the West Coast of America. Further study of larger series is necessary for exact specific determination.

"*Uvigerina auberiana* d'Orbigny" (Pl. 14, fig. 13) (Cushman, Contr. Cushman Lab. Foram. Res., vol. 5, 1929, p. 95, pl. 13, fig. 36.) This rare form recorded from Venezuela is probably not the same as d'Orbigny's species, but more specimens are necessary to show its variation.

"*Uvigerina pigmaea* d'Orbigny" (Pl. 14, fig. 14) (Nuttall, later portion slightly compressed and tending to become biserial; chambers distinct, inflated, the last two less overlapping; sutures distinct, not greatly depressed; wall ornamented throughout

"*Uvigerina auberiana* d'Orbigny" (Pl. 14, fig. 18) (Nuttall, l. c., pl. 5, fig. 7.) In some respects this resembles the species here described as *U. rustica*, but seems to be coarser, and has the spines in definite rows. It is from the Alazan.

"*Uvigerina tenuistriata* Reuss" (Pl. 14, fig. 19) (Nuttall, l. c., pl. 5, fig. 8.) As will be seen from our discussion of Reuss' species, this form from the Alazan is not the same.

There are a few other records accompanied by figures which are either too indefinite, too small, or not represented by material in our collections, and therefore are not mentioned here, as well as other records unaccompanied by figures.

201. THE RECENT SPECIES OF *BULIMINA* NAMED BY D'ORBIGNY IN 1826

By JOSEPH A. CUSHMAN and FRANCES L. PARKER

In his work in 1826, Tableau Méthodique de la classe des Cephalopodes, d'Orbigny names a number of Recent forms under *Bulimina*, mostly from the Adriatic. A search of material collected by the senior author at Rimini, on the Adriatic Sea, has revealed a number of these species, and our material from Madagascar has given us the species described from there. Of the thirteen Recent species named by d'Orbigny in 1826, one, *B. marginata*, was figured, two, *B. trilobata* and *B. aculeata*, are based upon species published by Soldani, and two are illustrated by models issued in 1826, *B. elegans* and *B. caudigera*. The illustrations which were to accompany the 1826 work, the "planches inedites," were never published, but tracings of the figures were published by Fornasini nearly three-quarters of a century later. In the meantime, those species without figures of models remained in the category of "nomina nuda," unless published with figures by d'Orbigny or others during the interim. We have tried, from a study of topotypes and other available means, to determine the status of these species, and our notes are here given.

"BULIMINA STRIATA d'Orbigny" (Pl. 16, figs. 1-3)

Bulimina striata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 2. —GUÉRIN-MENÉVILLE'S CUVIER, Iconographie, Mollusques, 1829-43, p. 9, pl. 2, fig. 16.—CUVIER, Animal Kingdom, Henderson's Ed., III, 1834 (pls. 1837), p. 18, pl. 3, fig. 16.—FORNASINI, Mem. Accad. Sci. Istit. Bologna, ser. 5a, vol. 9, 1901, p. 372, text fig. 1.

The above references (with the exception of Fornasini, 1901) all precede that of *Bulimina inflata* Seguenza, 1862, a name to which many Recent and fossil forms with longitudinal costae have been referred. A study of our collections of Late Tertiary and Recent material has shown numerous specimens of the form represented by the original figures of *B. striata* and *B. inflata*. The earlier figures given by Cuvier are very evidently from the originals on d'Orbigny's "planches inedites." The figures of *B. striata* show a form with somewhat finer and more numerous

costae, the base of the chambers more truncated and more whorls in the test than in *B. inflata*. These distinctions may perhaps be made between these two forms, but our material, both Recent and Pliocene, shows apparent intermediate stages. If then, the two forms are really one species, the question of nomenclature becomes somewhat complicated. The name *B. striata* has been allowed to lapse since Cuvier's publication of it, and the later name *B. inflata* Seguenza has been used very often, not always for the same form as a glance at the figures assigned to the name will show.

According to the strict use of the Rules of Nomenclature, therefore, d'Orbigny's name of *B. striata* would take precedence over *B. inflata* Seguenza. As so many forms are referred to this later name, it might be useful to re-establish d'Orbigny's name of *B. striata* for those Late Tertiary and Recent forms of the Mediterranean region and perhaps of the Indo-Pacific. Figures from Fornasini are given on our plate as well as drawings of specimens from Rimini, the type locality. Figures of *B. inflata* have already been given in a previous issue (vol. 14, pl. 10, figs. 4, 5).

"BULIMINA SULCATA d'Orbigny" (Pl. 16, fig. 4)

Bulimina sulcata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 3.—FORNASINI, Mem. Accad. Sci. Istit. Bologna, ser. 5a, vol. 9, 1901, p. 372, text fig. 2.

The types of this species are from Rimini, but we have failed to find any *Bulimina* in our material that could be assigned to this name. The aperture as drawn in the figure given by Fornasini, by its peculiar form and position, strongly suggests that this may be a *Uvigerina*. Fornasini's figures are copied on our plate.

"BULIMINA MARGINATA d'Orbigny" (Pl. 16, figs. 5, 6)

Bulimina marginata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 4, pl. 12, figs. 10-12.

The types of this species are also from Rimini in the Adriatic. It is the only one figured on d'Orbigny's published plates in 1826, a copy of which is reproduced on our plate. Also we have figured topotype specimens from Rimini. The species seems to be a well characterized one, rather widely distributed in the Mediterranean and Atlantic regions, and occurring as a Late Tertiary fossil in

the same areas. Not all of the figures referred to this are identical, and most of the records are not accompanied by figures, and so it is difficult to give its exact distribution, either in the present seas or as a fossil. The figures given by Brady in the *Challenger* Report, pl. 51, figs. 3-5 are from *Porcupine* station 11, west of Ireland, and probably represent d'Orbigny's species. Many of the other figures referred to it lack accurate details, and a study of original material is necessary.

"BULIMINA TRILOBATA d'Orbigny" (Pl. 16, fig. 7)

Bulimina trilobata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 6. —PARKER, JONES and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, p. 172, pl. 11, fig. 127.—FORNASINI, Mem. Accad. Sci. Istit. Bologna, ser. 5a, vol. 9, 1901, p. 373, text fig. 3.

Polymorpha pineiformia SOLDANI (part), Testacea, vol. 1, pt. 2, 1791, p. 119, pl. 131, fig. XX.

"BULIMINA ACULEATA d'Orbigny" (Pl. 16, figs. 8-10)

Bulimina aculeata D'ORBIGNY, l. c., p. 269, No. 7.—PARKER, JONES and H. B. BRADY, l. c., p. 172, pl. 11, fig. 128.—FORNASINI, l. c., p. 373, text fig. 4.

Polymorpha pineiformia SOLDANI (part), l. c., p. 118, pl. 127, fig. I.?; pl. 130, fig. vv.

Copies of d'Orbigny's figures are given of these two species. The originals of Soldani are so indefinite that they are hardly worth further consideration. The specimens from Rimini, the locality given for both, show forms with smooth tests in the later portion and spinose initial end (Pl. 16, fig. 10), with various gradations to such forms as that with numerous short spines in the later chambers (Pl. 16, fig. 9). We have found no specimens that seem very close to the figures referred to *B. trilobata* (Pl. 16, fig. 7). A question of nomenclature may be involved, as the name *B. trilobata* precedes *B. aculeata* in d'Orbigny's 1826 paper, but both are on the same page. The Soldani figures are entirely unidentifiable, and need not be considered. As no specimens definitely referable to *B. trilobata* were found, and the name has not been used for any other material since d'Orbigny's original Journ. Pal., vol. 6, 1932, p. 21, pl. 5, fig. 6.) This somewhat resembles d'Orbigny's species, but does not seem to be identical. It is from the Alazan shales of Mexico.

"BULIMINA ARIMINENSIS d'Orbigny" (Pl. 16, fig. 11)

Bulimina ariminensis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1827, p. 269, No. 8.—FORNASINI, Boll. Soc. geol. Ital., vol. 20, 1901, p. 178, text fig. 3.

"BULIMINA ELONGATA d'Orbigny" (Pl. 16, fig. 12)

Bulimina elongata D'ORBIGNY, l. c., p. 269, No. 9; Foram. Foss. Bass. Tert. Vienné, 1846, p. 187, pl. 11, figs. 19, 20.—FORNASINI, Mem. Accad. Sci. Istit. Bologna, ser. 5a, vol. 9, 1901, p. 373, text fig. 5.—CUSHMAN and PARKER, Contr. Cushman Lab. Foram. Res., vol. 13, 1937, p. 49, pl. 7, figs. 1-3.

These two species are probably identical so far as our material from Rimini shows. Although the name *B. ariminensis* appears first in the page in d'Orbigny's 1826 work, no further reference to it was given with figures until Fornasini in 1901. Meanwhile d'Orbigny himself had referred Miocene material from the Vienna Basin to his *B. elongata*, and had given figures so that there is no question as to the validity of names in this particular species. The Rimini specimens seem identical with the Miocene ones from the Vienna Basin. A full description and notes on synonyms are given in our 1937 reference.

"BULIMINA ELEGANS d'Orbigny" (Pl. 16, fig. 13)

Bulimina elegans D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 270, No. 10; Modèles, 1826, No. 9.

"BULIMINA PUNCTATA d'Orbigny" (Pl. 16, fig. 14)

Bulimina punctata D'ORBIGNY, l. c., p. 270, No. 11.—FORNASINI, Mem. Accad. Sci. Istit. Bologna, ser 5a, vol. 9, 1901, p. 6, text fig. 6.

A drawing of the plaster model No. 9 from our collection of d'Orbigny's 1826 models, is given on our plate, as well as the figure given by Fornasini of *B. punctata*. Both of these forms evidently represent a *Buliminella*, and probably the same species, but we have not found any specimens in our material from Rimini that could be referred to it.

"BULIMINA BREVIS d'Orbigny" (Pl. 16, fig. 15)

Bulimina brevis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 270, No. 13. —FORNASINI, Mem. Accad. Sci. Istit. Bologna, ser. 5a, vol. 9, 1901, p. 6, text fig. 7.

The original reference to this in 1826 gave Rimini as the type locality. Later d'Orbigny in 1840 (Mém. Soc. géol. France, ser. 1, vol. 4, 1840, p. 41, pl. 4, figs. 13, 14), gave the name to a Cretaceous form, and as he there figured it, the name must now be applied to the Cretaceous species, and the earlier reference is purely a nomen nudum, and as such is no longer to be considered.

"BULIMINA LAEVIGATA d'Orbigny" (Pl. 16, fig. 16)

Bulimina laevigata D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 270, No. 14.—FORNASINI, Boll. Soc. geol. Ital., vol. 20, 1901, p. 182, text fig. 4.

From a study of our material, this seems to be identical with *B. ovata* d'Orbigny described and figured by d'Orbigny in his Vienna Basin Monograph in 1846, and *B. laevigata* becomes a synonym.

"BULIMINA CAUDIGERA d'Orbigny" (Pl. 16, figs. 17, 18)

Bulimina caudigera D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 270, No. 16; Modèles, 1826, No. 68.—PARKER, JONES and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 30, pl. 2, fig. 65.—BASSET, Ann Soc. Sci. Charente-Inf., 1884 (1885), p. 161, fig.

Fornasini considered this species a synonym of *B. pyrula* d'Orbigny, described from the Vienna Basin in 1846. Our model in the 1826 series shows very little in the way of sutures. The figure of a model given by Parker, Jones and H. B. Brady, however, shows much more definitely the position and character of the sutures. The figure of the model given by Basset is more like our model in its characters. The specimen drawn on our plate is from Rimini, and seems to represent this species. From the models and specimens, *B. caudigera* is a more elongate fusiform species, with much longer chambers than *B. pyrula*, and is probably distinct.

"BULIMINA MADAGASCARENSIS d'Orbigny" (Pl. 16, figs. 19, 20)

Bulimina madagascarensis D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 270, No. 17.—FORNASINI, Mem. Accad. Sci. Istit. Bologna, ser. 6a, vol. 5, 1908, p. 47, pl. 1, fig. 13.

This form has not been referred to, except by Fornasini, since d'Orbigny's original reference. In our Recent material from Tamatave, Madagascar, the same species has occurred. A figure is given on our plate. It is evidently a *Buliminella*, to which genus the species should be transferred. If it has a distribution similar to other species described from Madagascar, it is to be looked for in the general Indo-Pacific region.

202. *MARGINULINA TEXASENSIS* CUSHMAN, A NEW NAME

By JOSEPH A. CUSHMAN

Attention has been called to the fact that the species I described as *Marginulina texana* in these Contributions (Vol. 13, pt. 4, Dec., 1937, p. 95, pl. 14, figs. 1-4) from the Cretaceous of Texas is pre-occupied by *M. texana* Garrett and Ellis (Journ. Pal., vol. 11, No. 8, 1937, p. 632), the Journal preceding by two days the mailing of the Contributions. To avoid confusion, the Cretaceous species is here named *Marginulina texasensis.*

RECENT LITERATURE ON THE FORAMINIFERA

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

LeCalvez, J. Un Foraminifère géant *Bathysiphon filiformis* G. O. Sars.—Archives de Zoologie Expérimentale et Générale, Vol. 79, No. 2, 1937, pp. 82-88, text figs. I, II.

Recherches sur les Foraminiferes. 1. Développement et reproduction.—L. c., Vol. 80, fasc. 3, June 1938, pp. 163-333, pls. II-VII, text figs. 1-26. —An exhaustive paper on the life cycle in several species showing the cytological characters and the details of the chromidia in division. The bearing of these researches on the systematic treatment of the foraminifera should be noted. It is a paper which should be thoroughly studied by all students of the foraminifera.

Haas, Merrill W. and Ralph G. Hubman. Notas sobre la Estratigrafia de los Campos Costaneros dell Distrito Bolivar, Cuenca de Maracaibo, Venezuela.—Bol. Geol. Min., vol. 1, 1937, pp. 123-164.—Lists numerous foraminifera.

Scheffen, W. Strandbeobachtungen im Malayischen Archipel. 2. Die tonigschlammige Flachseeküste.—Geol. der Meere und Binnengewasser, Bd. 1, Heft 2/3, 1937, pp. 260-278, text figs. 12-21.—Figures a few foraminifera.

Glaessner, M. On a New Family of Foraminifera.—Studies in Micropaleontology, vol. 1, fasc. 3, 1937, pp. 19-29, pls. I, II.

Macfadyen, W. A. On a Marine Holocene Fauna in North-Western Scotland.—In D. F. W. Baden-Powell, Journ. Animal Ecology, vol. 6, No. 2, Nov., 1937, pp. 273-283; (Foraminifera, pp. 274-276).—Lists.

Jordan, Louise. No. 1. Basbirin Kuyusundaki Kucuk Foraminiferanin bir Mutalaasi. A Study of the Small Foraminifera in the Basbirin Well No. 1.—Publications of M. T. A. Institute, Ankara, 1937, pp. 1-8 (Turkish), 1-7 (English), pls. I-IV.—A discussion of the occurrence and conditions of deposition.

Leupold, Wolfgang. Zur Stratigraphie der Flyschbildungen zwischen Linth und Rhein.—Eclogae geologicae Helvetiae, vol. 30, No. 1, 1937, pp. 1-23.—Numerous foraminifera mentioned.

Thalmann, Hans E. Mitteilungen über Foraminiferen. III, 9, Über Polystomella bolivinoides Schubert, 1911. 10, Über das Genus Staffia Schubert, 1911. 11, Weitere Nomina mutata in Brady's Werk über die Foraminiferen der "Challenger"-Expedition (1884). 12, Zwei Nomina Conservanda: Nummulites Lamarck, 1801, una Cristellaria Lamarck, 1812. 13, Notizen zur Systematik der Gattung Uvigerina d'Orbigny, 1826. 14, Bemerkungen zu den Gattungen Vaginulinopsis Silvestri, 1904, Marginulinopsis Silvestri, 1904 und Hemicristellaria Stache, 1864.—Eclogae geologicae Helvetiae, vol. 30, No. 2, 1937, pp. 337-356, pls. XXI-XXIII.—The following new names proposed: *Nodogenerina jedlitschkai, N. challengeriana, Planularia magnifica,* var. *falciformis,*

EXPLANATION OF PLATE 15

FIGS.

1–3, 5–7. *Angulogerina tenuistriata* (Reuss). 1–3, (After von Schlicht.) 5, 6, × 120. Topotypes. Oligocene, Pietzpuhl, Germany. 7, (After Spandel.)

4. "*Uvigerina tenuistriata* Reuss." (After von Schlicht.)

8–11. *A. oligocaenica* (Andreae). 8, (After Andreae.) 9–11, × 90. Middle Oligocene, Rupelton, Ratigen, near Dusseldorf, Germany.

12, 13. *A. oligocaenica* (Andreae), var. *globosa* (Stoltz). (After Stoltz.)

14–16. *A. germanica* Cushman and Edwards, n. sp. × 100. 14, 15, Lower Oligocene, near Magdeburg, Germany. 14, Holotype. 15, Paratype. 16, Middle Oligocene, Rupelton, Ratigen, near Dusseldorf, Germany.

17. *A. sagriniformis* (Spandel). (After Spandel.)

18, 19. *A. byramensis* (Cushman). × 75. Lower Oligocene, Leaf River, Mississippi.

20. *A. rugoplicata* Cushman. × 100. Holotype. Lower Oligocene, Mississippi. *a*, front view; *b*, apertural view.

21, 22. *A. vicksburgensis* Cushman. × 100. 22, Holotype. 21, Paratype. *a*, front view; *b*, apertural view. Lower Oligocene, Byram marl, Byram, Mississippi.


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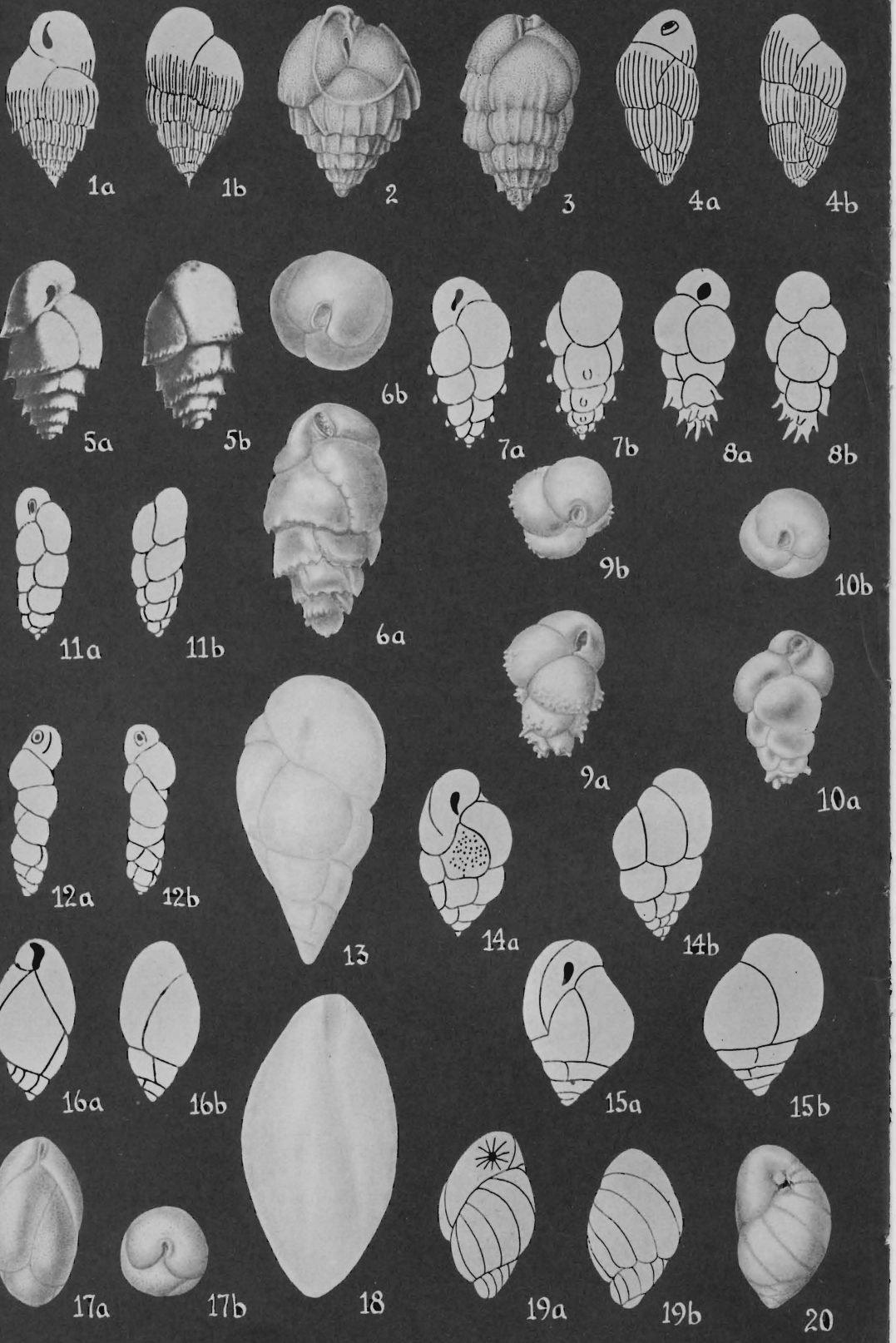
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Marginulinopsis densicostata, M. calva, M. decurse-costata, M. infracompressa, Vaginulinopsis compressa, V. excreta, V. panda, V. gradata, V. longestriata, V. echinata, V. modesta.

Caudri, C. M. Bramine. Beitrag zur Alter-bestimmung des Flysches der Niesen-Decke.—L. c., 1937, pp. 403-418, pls. XXX-XXXII.—Figures *Nummulites*, etc.

van Eek, D. Foraminifera from the Telisa—and the Lower Palembang-Beds of South Sumatra.—"De Ingenieur in Nederlandsch-Indie," IV, Mijnbouw Geol., Jaargang IV, No. 4, April, 1937, pp. 47-55, pl. I.—A new species, *Lepidocyclina besaiensis.*

LeRoy, L. W. A Preliminary Study of the Microfaunal Facies Along a Traverse Across Peper Bay, West Coast of Java.—L. c., Jaargang V, No. 8, Aug., 1938, pp. 130-133, 2 text figs. (maps).

LeCalvez, Jean. *Les Chromosomes spiraux de la premiere mitose schizogonique du Foraminifere* Patellina corrugata *Will.*—Comptes rendus des séances de l'Académie des Sciences, vol. 205, Nov. 29, 1937, pp. 1106-1108, 6 text figs.

EXPLANATION OF PLATE 16

FIGS.

1–3. "*Bulimina striata* d'Orbigny." 1, (After Fornasini.) *a*, front view; *b*, rear view. 2, 3, × 45. Recent, Rimini.

4. "*B. sulcata* d'Orbigny." (After Fornasini.) *a*, front view; *b*, rear view.

5, 6. "*B. marginata* d'Orbigny." 5, (After d'Orbigny.) *a*, front view; *b*, rear view. 6, × 50. Recent, Rimini. *a*, front view; *b*, apertural view.

7. "*B. trilobata* d'Orbigny." (After Fornasini.) *a*, front view; *b*, rear view.

8–10. "*B. aculeata* d'Orbigny." 8, (After Fornasini.) *a*, front view; *b*, rear view. 9, 10, × 35. Recent, Rimini. *a*, *a*, front views; *b*, *b*, apertural views.

11. "*B. ariminensis* d'Orbigny." (After Fornasini.) *a*, front view; *b*, rear view.

12. "*B. elongata* d'Orbigny." (After Fornasini.) *a*, side view; *b*, front view.

13. "*B. elegans* d'Orbigny." (From d'Orbigny's Model.)

14. "*B. punctata* d'Orbigny." (After Fornasini.) *a*, front view; *b*, rear view.

15. "*B. brevis* d'Orbigny." (After Fornasini.) *a*, front view; *b*, rear view.

16. "*B. laevigata* d'Orbigny." (After Fornasini.) *a*, front view; *b*, rear view.

17, 18. "*B. candigera* d'Orbigny." 17, × 35. Recent, Rimini. *a*, front view; *b*, apertural view. 18, (From d'Orbigny's Model.)

19, 20. "*B. madagascarensis* d'Orbigny." 19, (After Fornasini.) *a*, front view; *b*, rear view. 20, × 50. Recent, Tamatave, Madagascar.

Chapman, Frederick. Cherty Limestone with *Planorbis* from the Mount Elder Range, Western Australia.—Proc. Roy. Soc. Victoria, vol. L, pt. 1, (new series), Dec. 29, 1937, pp. 59-66, pl. VI.—Mentions a few foraminifera.

Brand, Erich. Über Foraminiferen im Zechstein der Wetterau.—Senckenbergiana, Bd. 19, No. 5/6, Dec. 31, 1937, pp. 375-380, 1 text fig.—A new species, *Frondicularia stockheimia*, n. sp., among others recorded.

Bermudez, Pedro J. Nueva Especie de Bulimina del Cretacico Superior Cubano.—Mem. Soc. Cubana Hist. Nat., vol. XII, No. 2, May 24, 1938, pp. 89-90, text figs. 1-3.—*B. madrugaensis*, n. sp.

Foraminiferos de la Fauna de Jicotea (Eoceno Medio), Provincia Santa Clara, Cuba.—L. c., pp. 91-96.—Notes various species; none new.

Nueva Especie de Seabrookia del Cretacico Superior Cubano.—L. c., No. 3, Jul. 30, 1938, pp. 163-165, text figs. 1-3.—*Seabrookia cretacica*, n. sp.

Lee, Wallace, C. O. Nickell, James S. Williams and Lloyd G. Henbest. Stratigraphic and Paleontologic Studies of the Pennsylvanian and Permian Rocks in North-Central Texas.—Univ. Texas Publ. No. 3801, Jan. 1, 1938, pp. 1-252.—Notes on several Fusulinidae (pp. 238-243).

Rhumbler, L. Foraminiferen aus dem Meeressand von Helgoland, gesammet von A. Remane (Kiel).—"Kieler Meeresforschungen" Bd. II, 1938, pp. 157-222, text figs. 1-64.—Numerous genera and species described and figured, the following new: Genus *Causia, C. injudicata, C. sidebottomi;* Genus *Spirillinoides, S. circumcinctus; Trochammina squamata,* forma *pluricubiculata;* forma *adaperta;* forma *intermedia;* forma *obtusa;* forma *astrifica; T. ochracea,* forma *heronearlandica;* Genus *Remaneica, R. helgolandica; R. plicata,* forma *lichenopsis; Discorbis globularis,* forma *cyprinodon;* Genus *Earlmyersia; E. punctulata,* forma *liliputana.*

Cushman, J. A. and Winnie McGlamery. Oligocene Foraminifera from Choctaw Bluff, Alabama.—U. S. Geol. Survey Prof. Paper 189-D, 1938, pp. 101-119, pls. 24-28.—Numerous species described and figured; the following new: *Globulina fimbriata, Buliminella choctawensis, Bolivina quadricosta, B. choctawensis, Discorbis choctawensis, Eponides choctawensis, E. alabamensis, Cancris sagra,* var. *pauciloculata, Asterigerina choctawensis, A. alabamensis, Cibicides choctawensis.*

Silvestri, A. Foraminiferi dell' Eocene della Somalia, Parte I.—Palaeontographica Italica, vol. XXXII, Suppl. 3, 1938, pp. 49-89 (37-77), pls. III-XII (I-X).—Numerous species figured, some with new names.

Parr, Walter J. Upper Eocene Foraminifera from Deep Borings in King's Park, Perth, Western Australia.—Journ. Roy. Soc. W. Australia, vol. XXIV, 1937-38, pp. 69-101, pls. I-III, 1 text fig.—The following described as new: *Vaginulina subplumoides, Pseudoglandulina clarkei, Lagena luciae, L. perthensis, L. terrilli, Buliminella westraliensis; Angulogerina subangularis, Gümbelina venezuelana,* var. *rugosa; Heronallenia pusilla, Ceratobulimina westraliensis; Pulvinulinella obtusa,* var. *westraliensis; Anomalina perthensis, A. westraliensis, Cibicides pseudoconvexus, C. umbonifer, Globorotalia chapmani, Bolivinopsis crespinae.*

Chapman, F. The Importance of Foraminifera in Modern Geological Work.—Micr. Soc. Victoria, vol. VIII, No. 4, May, 1938, pp. 24-30.

Chapman, Frederick and Walter J. Parr. Australian and New Zealand Species of the Foraminiferal Genera *Operculina* and *Operculinella*.—Proc. Roy. Soc. Victoria, vol. L, pt. 1 (new series), May 23, 1938, pp. 279-299, pls. XVI, XVII, 1 text fig.—Numerous species described and figured, the following new: *Operculina victoriensis, O. kawakawaensis, O. metapauensis.*

Schott, Wolfgang. Über die Sedimentations—geschwindigkeit rezenter Tefseesedimente.—Geologischen Rundschau, Bd. XXIX, Heft 3/5, 1938, pp. 322-329.—Mentions foraminifera.

Stratigraphie rezentere Tief-seesedimente auf Grund der Foraminiferen fauna.—L. c., pp. 330-333.

Gravell, Donald W. and Marcus A. Hanna. Subsurface Tertiary Zones of Correlation through Mississippi, Alabama and Florida.—Bull. Amer. Assoc. Petr. Geol., vol. 22, No. 8, Aug., 1938, pp. 984-1013, pls. 1-7, 5 text figs.—Figure numerous key species of foraminifera.

Wright Barker, R. On *Camerina petri* M. G. Rutten and *Nummulites striatoreticulatus* L. Rutten.—Geol. Mag., vol. LXXV, No. 884, Feb., 1938, pp. 49-51, pl. III.

Ovey, C. D. Notes on the Foraminifera from the Fossiliferous Tuffs of Roche Bluff.—Phil. Trans., Roy. Soc. London, vol. 229, No. 557, 1938, p. 81.—List of species identified.

Difficulties in Establishing Relationships in the Foraminifera.—Proc. Geol. Assoc., vol. XLIX, pt. 2, 1938, pp. 160-170, pls. 8, 9, text figs. 29-32.

Hanna, Marcus A. Wilcox Eocene Production at Segno Field, Polk County, and Cleveland Field, Liberty County, Texas.—Bull. Amer. Assoc. Petr. Geol., vol. 22, No. 9, Sept., 1938, pp. 1274-77.—Foraminiferal zones given.

Garrett, J. B. The Hackberry Assemblage.—An Interesting Foraminiferal Fauna of Post-Vicksburg Age from Deep Wells in the Gulf Coast.—Journ. Pal., vol. 12, No. 4, July, 1938, pp. 309-317, pl. 40, figs. 1, 2.—Lists numerous species, the following described as new: *Ammobaculites nummus, Nonion lunatum, Bolivina perca, Uvigerina stephensoni, Gyroidina scalata.*

Hanzawa, Shoshiro. An Aberrant Type of the Fusulinidae from the Kitakami Mountainland, Northeastern Japan.—Proc. Imperial Acad., vol. XIV, No. 7, 1938, pp. 255-259, text figs. 1-16.—A new genus, *Nipponitella*, with new species, *N. explicata, N. auriculla, N. expansa.*

Macfadyen, W. A. Modern Studies of the Foraminifera.—Nature, vol. 141, Apr. 23, 1938, pp. 750, 751.

Baggelaar, H. Some correcting notes on "Tertiary rocks from the Misool-Archipelago (Dutch East Indies)".—Proc. Kon. Ned. Akad., vol. XLI, No. 3, 1938.

Brotzen, F. Der Postkimmerische Bau des Sudlichsten Schwedens.—Geol. Fören. Förhandl., Bd. 60, Heft 1, 1938, pp. 73-87.—Mentions several foraminifera.

Huzimotu, Haruyosi. Some Foraminiferous Fossils from the Kôten Series of Zidô Coal-Field, Tyôsen.—Journ. Geol. Soc. Japan, vol. 45, No. 533,

Feb., 1938, pp. 271-276, pl. 8(1).—A new variety, *Fusulinella bocki*, var. *zidoensis*.

Flandrin, Jacques. Contribution a l'Etude Paléontologique du Nummulitique Algérien.—Materiaux pour la Carte Géologique de l'Algérie, ser. 1, Paleontologie, No. 8, 1938, pp. 1-158, Atlas, pls. 1-15.—Larger foraminifera described and illustrated by photographs, the following new: *Nummulites irregularis*, var. *Douvillei*, *N. irregulariformis*, *N. morissanensis*, *N. numidus*, *N. Dallonii*, *N. Betieri*, *N. Joleaudi*, *N. Doncieuxi*, *Nephrolepidina marginata*, var. *inermis*.

Rutten, L. M. R. Bibliography of West Indian Geology.—Geographische en Geologische Mededeelingen, Physiographisch-geologische Reeks, No. 16, 1938, pp. i-vii, 1-103.

Henson, F. R. S. Stratigraphical Correlation by Small Foraminifera in Palestine and Adjoining Countries.—Geol. Mag., vol. LXXV, May, 1938, pp. 227-233.

Crespin, Irene. Upper Cretaceous Foraminifera from the Northwest Basin, Western Australia.—Journ. Pal., vol. 12, No. 4, July, 1938, pp. 391-395, 1 text fig. (map).—Numerous foraminifera listed.

The Occurrence of *Lacazina* and *Biplanispira* in the Mandated Territory of New Guinea.—Pal. Bull., No. 3, Aug., 1938, pp. 1-8, pls. 1-2.

A Lower Miocene Limestone from the Ok Ti River, Papua.—L. c., pp. 9-16, pl. 3, map.

Asano, Kiyosi. On the Japanese Species of *Elphidium* and Its Allied Genera.—Journ. Geol. Soc. Japan, vol. 45, No. 538, July, 1938, pp. 581-591, pl. 14(3).—Eleven species, four new: *Elphidium subgranulosum*, *E. yabei*, *E. kusiroense*, *Elphidiella nagaoi*.

On the Japanese Species of *Nonion* and Its Allied Genera.—L. c., pp. 592-599, pl. 15(4).—Thirteen species and varieties, two new: *Nonion japonicum*, *N. pompilioides etigoense*.

On the Japanese Species of *Bolivina* and Its Allied Genera.—L. c., pp. 600-609, pl. 16(5).—Twenty species and varieties, six new: *Bolivina bradyi*, *B. pseudodifformis*, *Loxostoma amygdalaeforme iokiense*, *Bifarina japonica*, *Bolivinita quadrilatera cuneata*, *Geminaricta pacifica*.

On the Japanese Species of *Uvigerina* and Its Allied Genera.—L. c., pp. 609-18, pl. 17(6).—Twelve species, four new: *Uvigerina yabei*, *U. substriata*, *U. pseudoampullacea*, *Angulogerina japonica*.

On Some Pliocene Foraminifera from the Setana Beds, Hokkaido.—Jap. Journ. Geol. Geogr., vol. XV, Nos. 1-2, 1938, pp. 87-103, pls. IX-XI, text figs. 1, 2.—Numerous species listed, some described and figured; new forms described: *Karreriella baccata japonica*, *Quinqueloculina hasimotoi*, *Pyrgo ezo*, *Eponides sasai*, *Sigmomorphina nagaoi*, *S. hokkaidoensis*, *S. setanaensis*, *S. kuromatunaiensis*.

Fisk, H. N. Geology of Grant and La Salle Parishes, Louisiana.—Louisiana Geol. Survey Geol. Bull. No. 10, Jan., 1938, pp. I-XV, 1-246, pls. I-XXIII, text figs. 1-16, maps.—Gives check lists of foraminifera.

Macfadyen, W. A. Post-glacial Foraminifera from the English Fenlands.—Geol. Mag., vol. LXXV, No. 891, Sept., 1938, pp. 409-17.

LaCroix, E. Sur une texture méconnue de la coquille de diverses Massilines

des mers tropicales.—Bull. Instit. Oceanographique, No. 750, May 20, 1938, pp. 1-8, text figs. 1-4.

Révision du genre Massilina.—L. c., No. 754, Aug. 8, 1938, pp. 1-11, text figs. 1-9.—The following new: Genus *Pseudomassilina, P. oblonga,* and var. *robusta, P. macilenta* var. *Earlandi, P. corrugata,* and var. *jubata.*

Palmer, Dorothy K. Cuban Foraminifera of the Family Valvulinidae.—Mem. Soc. Cubana Hist. Nat., vol. 12, No. 4, Sept. 30, 1938, pp. 281-301, pls. 19-23.—New Species: *Cuneolina* (?) *bermudezi, C. cojimarensis.*

Cole, W. Storrs. Stratigraphy and Micropaleontology of Two Deep Wells in Florida.—Florida Dept. Conservation, Geol. Bull. No. 16, 1938, pp. 1-73, pls. 1-12, text figs. 1-3.—Two new species: *Miogypsina gunteri, Bulimina kickapooensis.*

J. A. C.