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MIO-OLIGOCENE (AQUITANIAN) FORAMINIFERA FROM THE GOAJIRA PENINSULA, COLOMBIA

BY

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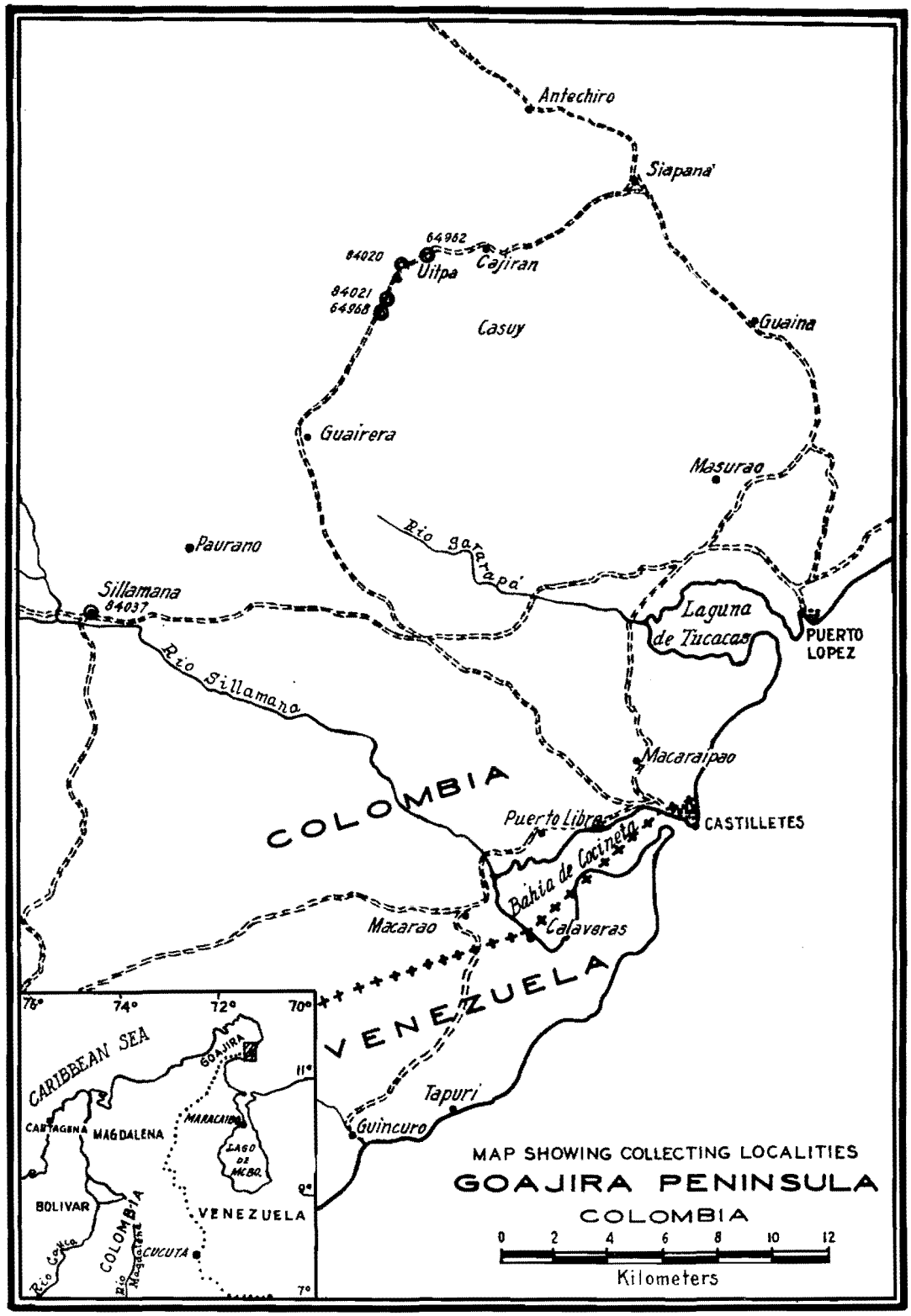
CONTENTS


Antechiro
Siapana'
64962
84020
Cajiran
Uitpa
84021
64968
Casuy
Guaina
Guairera
Masurao
Rio Garapa'
Paurano
Sillamana
84037
Laguna
de Tucacas
PUERTO
LOPEZ
Rio Sillamana
Macaraipao
COLOMBIA
Puerto Libre
CASTILLETES
Bahia de Cocinetas
Calaveras
Macarao
VENEZUELA
Tapuri
Guincuro
78°
74°
72°
70°
CARIBBEAN SEA
GOAJIRA
11°
CARTAGENA
MAGDALENA
MARACAIBO
LAGO
DE
MCBO.
9°
BOLIVAR
COLOMBIA
VENEZUELA
Rio Catia
Rio Magdalena
CUCUTA
7°
MAP SHOWING COLLECTING LOCALITIES
GOAJIRA PENINSULA
COLOMBIA
0 2 4 6 8 10 12
Kilometers

MIO-OLIGOCENE (AQUITANIAN) FORAMINIFERA FROM THE GOAJIRA PENINSULA, COLOMBIA[1]

LEROY E. BECKER AND A. N. DUSENBURY, JR.
Maracaibo, Venezuela

ABSTRACT

The foraminiferal faunas at Uitpa and Sillamana, Colombia, have been divided into 58 genera and 137 species. Seven new species are described. The foraminiferal assemblages indicate a Mio-Oligocene (Aquitanian) age and a marine, open-sea environment between 100 and 300 fathoms in depth. Correlations, based on Foraminifera, are suggested between the Mio-Oligocene beds of the Goajira Peninsula, Colombia, and those of other regions in the Caribbean area.

INTRODUCTION

The Foraminifera described and figured herein are from silty clay-shales, shales and sandstones that crop out in the northeastern part of the Goajira Peninsula, Colombia. The outcrops are well exposed near the small Indian settlements of Uitpa and Sillamana. The exposures can be reached by a dry-weather road from Maracaibo, Venezuela, situated approximately 150 kilometers to the south.

List of Samples

Uitpa, Colombia

1. Creole serial No. 84,020. From a low hill 200 meters south 50° east of the water hole at Uitpa.
   Lithology: CLAY-SHALE: grayish orange, soft, silty, micaceous, fossiliferous.
   Collectors: A. B. Cockrum and L. E. Becker.
2. Creole serial No. 84,021. Along west road bank one kilometer south of the water hole at Uitpa.
   Lithology: SHALE: dark greenish gray, soft, fossiliferous, with crystals of gypsum.
   Collectors: A. B. Cockrum and L. E. Becker.
3. Creole serial No. 64,962. Gully along road one kilometer northeast of Uitpa.
   Lithology: SANDSTONE: gray to tan, soft, fine-grained, argillaceous, glauconitic, fossiliferous.
   Collectors: J. M. Gorman and G. D. Kiser.
4. Creole serial No. 64,968. Gully near top of ridge approximately 1.5 kilometers south of Uitpa.
   Lithology: SHALE: dark gray, soft, arenaceous.
   Collectors: J. M. Gorman and G. D. Kiser.

Sillamana, Colombia

1. Creole serial No. 84,037. From a gypsum pit 30 meters north of road at Sillamana.
   Lithology: CLAY-SHALE: buff to light brown, soft, silty, micaceous, fossiliferous, with crystals of gypsum.
   Collectors: F. W. Johnson, K. F. Dallmus, J. C. Maxwell and L. E. Becker.

1 Published with the permission of Creole Petroleum Corporation, Caracas, Venezuela.

Identification

Several comprehensive papers on the Tertiary Foraminifera of northern South America and the Caribbean islands have been published recently. The writers have compared their Goajiran Foraminifera with those appearing in the published literature dealing primarily with the Miocene and Oligocene of the Caribbean area. Many of the identifications, however, are based also on comparison with topotype material from the following localities:

Venezuela:

1. Carapita formation. Quebrada Carapita, District of Libertad, State of Anzoátegui.

Ecuador:

2. Tosagua formation. Near Manta, Manabí Province. Collector: Dr. A. A. Olsson.

Dominican Republic:

1. Sombrerito formation. Six kilometers north of San Cristóbal on road to La Toma, Trujillo Province. Collector: Dr. P. J. Bermúdez.

Jamaica:

1. Miocene. One-half mile east of Buff Bay, Portland Parish, Surrey County.

Trinidad, B.W.I.:

1. Ste. Croix formation. South of Princess Town, Victoria County. Trinidad Government Cadastral Survey coördinates: N. 224.500 links, E. 410.270 links.
2. Cipero marl formation. Zones I, II and III. South of San Fernando, Victoria County. Low cliffs from the south end of the sea wall to the mouth of the Cipero River.
3. Brasso formation, Esmeralda member. East of Morichal, Victoria County. Trinidad Government Cadastral Survey coördinates: N. 278.100 links, E. 412.000 links.

Cuba:

1. Finca Adelina marl, Tinguaro formation. Water well on Finca Adelina, approximately 9.5 kilometers east of Colón and 0.5 kilometers north of Central Highway, Matanzas Province.
2. Cojímar formation. In quarry and along road above Rio Cojímar at south edge of Cojímar village, Havana Province.

Acknowledgments

The study of the Goajira material began in the Maracaibo Geological Laboratory and was complered in the Jusepín Geological Laboratory of the Creole

Petroleum Corporation, in Venezuela. All of the photographs were prepared in the company's former Laboratorio Central de Geología in Caracas and were later retouched in pencil at Maracaibo and Jusepín.

The writers thank Dr. Pedro J. Bermúdez for checking the identifications. Leo Weingeist helped immeasurably with the photography of the specimens and Harry W. Anisgard read the manuscript and gave valuable suggestions regarding the age of the foraminiferal assemblages. Miss Marisa Jensen typed the manuscript.

The writers are indebted to the late F. W. Penny of San Fernando, Trinidad, B.W.I., for guidance in the field to the classical Oligocene localities in southern Trinidad. Mr. F. Keijzer supplied the foraminiferal material from the Finca Adelina marl of Cuba.

ECOLOGY

An analysis of the microfauna suggests a marine, open-sea environment during the deposition of the Mio-Oligocene beds in the two areas. The Sillamana and Uitpa samples yielded 14 and 16 foraminiferal families, respectively. At both localities approximately 50 percent of the total number of species belong to genera of the families Lagenidae and Buliminidae. The predominance of the Lagenidae and Buliminidae indicates that deposition probably took place in water somewhere between 100 and 300 fathoms in depth, and with water temperatures somewhere between 12°C. and 20°C. The single specimen of *Heterostegina*? sp. and the single specimen of *Heterosteginoides ecuadorensis* (Tan) would normally live in shallower water, hence it may be assumed that they are thanatocoenotic rather than biocoenotic.

The greater number of species and specimens recorded at Uitpa may not necessarily indicate environmental differences between the two areas. Only one sample was collected in the Sillamana area, but four samples were collected at Uitpa. The comparative paucity of Foraminifera recorded from Sillamana may therefore be due to insufficient sampling.

AGE

From Table 2 it will be noted that at Uitpa two species with a known range restricted to the Aquitanian were encountered, as well as eighteen species of Aquitanian and older age, two species of Aquitanian and younger age, one species with a known range older than Aquitanian and two species with a known range younger than Aquitanian. The ranges of the remaining species straddle the Aquitanian. The Aquitanian age of the beds in the vicinity of Uitpa, therefore, seems to be well substantiated.

After Table 2 had been completed in 1955, the importance of the presence at Uitpa of *Heterosteginoides ecuadorensis* (Tan) was first recognized. This species, under several different names, had been reported from beds supposedly ranging in age from middle Oligocene to lower Miocene. However, according to Drooger (1956, p. 187-188), its range is strictly limited to the Aquitanian.

At Sillamana there were found no species restricted to the Aquitanian, nine species of Aquitanian and older age, no species of Aquitanian and younger age, two species with a known range older than Aquitanian and one species with a known range younger than Aquitanian. The ranges of the remaining species straddle the Aquitanian. Since the beds at Sillamana lie stratigraphically above the beds at Uitpa, it is evident that they too should be assigned to the Aquitanian.

Some authorities place the Aquitanian in the base of the Miocene, while others prefer to include it in the uppermost Oligocene. In the last two or three years the majority opinion appears to be swinging toward its assignment to the lowermost Miocene. The writers propose to avoid this still unsettled controversy by calling the Aquitanian Mio-Oligocene.

CORRELATION

Unfortunately, the paper by Petters and Sarmiento on the "Oligocene and Lower Miocene biostratigraphy of the Carmen-Zambrano area, Colombia" was not published until January, 1956, and therefore could not be included in our tables, which were completed in October, 1955. The Goajira Peninsula fauna has 44 species in common with the fauna from the *Siphogenerina basispinata* zone of the Carmen-Zambrano area and should be considered correlative.

The foraminiferal assemblages from Sillamana and Uitpa are thought to be correlative with those described by Renz (1942) from the *Robulus wallacei* and *Siphogenerina transversa* zones of the Agua Salada group in the eastern part of the state of Falcón in western Venezuela and with the one recorded by Hedberg from the middle zone of the Carapita formation of eastern Venezuela. The Goajira fauna also is believed to be equivalent to those found in the Ste. Croix formation, the *Globigerinatella insueta* zone of the Cipero formation, and the lower zone of the Esmeralda member of the Brasso formation in Trinidad.

The faunas of the *Globorotalia fohsi* zones of the Agua Salada group and the Cipero formation and the fauna of the Cojímar formation of Cuba are deemed slightly younger than the Goajira fauna. Drooger (1956) has placed these faunas as high as the lower part of the upper middle Miocene Tortonian stage, but Blow (1957), more correctly in our opinion, calls them upper lower Miocene (Burdigalian stage). Unfortunately, our tables were completed in 1955 before these attempts at transatlantic correlation had been made, and at that time we erroneously included the *Globorotalia fohsi* zone and the Cojímar formation in the Aquitanian.

Dorr's Papantla fauna in Mexico, the Foraminifera from near Manta, Ecuador, described by Galloway and Morrey, and the fauna of the Bissex Hill marl of Barbados, all contain many species occurring in the Goajira faunules and may be contemporaneous or slightly older.

Table 2. Ranges of important species of northern South America, Central America, Mexico and the West Indies occurring at Sillamana and Uitpa.

	SPECIES AND KNOWN RANGE	SILLAMANA	UITPA	RECENT	PLEISTOCENE	PLIOCENE	MIOCENE U	MIOCENE M	MIOCENE L	AQ	OLIGOCENE U	OLIGOCENE M	OLIGOCENE L	EOCENE U	EOCENE M	EOCENE L
1	*Angulogerina illingi Cushman and Renz*	A														
2	*Angulogerina porrecta (Brady), var. fimbriata (Sidebottom)*		S													
3	*Anomalinoides trinitatensis (Nuttall)*		A													
4	*Astacolus subliuus (Nuttall), var. multicamerata (Cushman and Stainforth)*	S	F													
5	*Baggina cojimarensis Palmer*		A													
6	*Bolivina caudriae Cushman and Renz*		S													
7	*Bolivina isidroensis Cushman and Renz*		S													
8	*Bolivina pisciformis Galloway and Morrey*	A	A													
9	*Bolivina plicatella Cushman*	A	A													
10	*Bolivina tongi Cushman*	A	A													
11	*Bulimina alligata Cushman and Laiming*	A														
12	*Bulimina bleeckeri Hedberg*		A													
13	*Cassidulina havanensis Cushman and Bermúdez*		S													
14	*Cassidulina subglobosa Brady, var. horizontalis Cushman and Renz*		A													
15	*Cibicides compressus Cushman and Renz*	R	F													
16	*Cibicides crebbsi (Hedberg)*		A													
17	*Honzawaia mantaensis (Galloway and Morrey)*	A	A													
18	*Clavulinoides jarvisi Cushman*		S													
19	*Dentalina isidroensis Cushman and Renz*		S													
20	*Ehrenbergina navotis Hadley*	A	A													
21	*Eponides campester Palmer and Bermúdez*	A	A													
22	*Gaudryina trinitatensis Nuttall*		S													
23	*Globigerina venezuelana Hedberg*	R	A													
24	*Gyroidina parva Cushman and Renz*	A														
25	*Gyroidinoides venezuelanus Renz*	A														
26	*Lagena striata (d'Orbigny), var. basisenta Cushman and Stainforth*		S													
27	*Lagenonodosaria spinicosta (d'Orbigny), var adelinensis (Palmer and Bermúdez)*		R													
28	*Lingulina ponceana Galloway and Heminway*		R													
29	*Marginulina pseudohirsuta Nuttall*		S													
30	*Nodosaria stainfarthi Cushman and Renz*		S													
31	*Nonion costifer (Cushman)*	A	S													
32	*Planularia claro Cushman and Jarvis*		S													
33	*Planularia torrei Palmer*		R													
34	*Planularia venezuelana Hedberg*		F													
35	*Plectofrandicularia floridana Cushman*	A	A													
36	*Plectofrondicularia trinitatensis Cushman and Jarvis*	A	S													
37	*Plectofrondicularia yumuriana Palmer*	R	S													
38	*Pseudoclavulina alazanensis (Nuttall)*	S														
39	*Rectuvigerina multicostata (Cushman and Jarvis)*		A													
40	*Rectuvigerina (Transversigerina) senni (Cushman and Renz)*		A													
41	*Rectuvigerina (Transversigerina) transversa (Cushman)*		A													
42	*Robulus cristobalensis Bermúdez*	S														
43	*Robulus nuttalli Cushman and Renz*		S													
44	*Robulus suteri Cushman and Renz*	R	S													
45	*Sorocenaria senni Hedberg*	R	A													
46	*Sigmomorphina trinitatensis Cushman and Ozawa*		A													
47	*Sphaeroidina chilostomata Galloway and Morrey*	S	A													
48	*Stilostomella gracilis (Palmer and Bermúdez)*	A														
49	*Textularia leuzingeri Cushman and Renz*		S													
50	*Textulariella miocenica Cushman, var. brevis Cushman and Renz*	S	A													
51	*Uvigerina auberiana d'Orbigny, var. attenuata Cushman and Renz*	R														
52	*Uvigerina capayana Hedberg*	A	F													
53	*Uvigerina carapitana Hedberg*	R	A													
54	*Uvigerina gallowayi Cushman*	A														
55	*Uvigerina mantaensis Cushman and Edwards*		A													
56	*Valvulineria venezuelana Hedberg*	F	R													
	NUMBER OF SPECIES	29	47	2	2	3	5	19	31	51	47	43	21	10	2	1

LEGEND

AQ	Mio-Oligocene (Aquitanian)	A	Abundant (10+)
U	Upper	F	Frequent (6—9)
M	Middle	S	Scarce (3—5)
L	Lower	R	Rare (1—2)

Table 3. Number of foraminiferal species common to Mio-Oligocene of Goajira and important Mio-Oligocene and upper Oligocene Localities in the Caribbean area.

LOCALITY, FORMATION and/or ZONE	COLOMBIA	
	Sillamana	Uitpa
VENEZUELA		
AGUA SALADA GROUP		
Robulus wallacei zone	38	52
Siphogenerina transversa zone	37	55
Globorotalia fohsi zone	30	43
CARAPITA FORMATION		
Middle zone	14	21
TRINIDAD		
BRASSO FORMATION		
Esmeralda member (lower zone)	18	31
CIPERO FORMATION		
Globigerinatella insueta zone	10	22
Globorotalia fohsi zone	9	24
STE. CROIX FORMATION	24	48
BARBADOS		
BISSEX HILL MARL	17	24
CUBA		
COJIMAR FORMATION	28	55
MEXICO		
COATZINTLA FORMATION	16	21
ECUADOR		
TOSAGUA FORMATION	10	15

SYSTEMATIC DESCRIPTIONS OF SPECIES

Family RHIZAMMINIDAE

Subfamily BATHYSIPHONINAE

Genus **Bathysiphon** M. Sars, 1872

Bathysiphon sp., cf. **B. cocenicus** Cushman and G. D. Hanna

Plate 1, figure 1

Dimensions of figured specimen: Length of fragment, 2.10 mm.; breadth, 0.90 mm.

Types.—Figured specimen (USNM 624934) from Creole Serial No. 84,037 near Sillamana, Colombia.

Remarks.—Large fragmentary specimens are abundant in the samples from Sillamana, Colombia. This species closely resembles, but is somewhat larger than, *B. eocenicus* Cushman and G. D. Hanna from the middle and upper Eocene of California, and the upper Eocene of Peru and Ecuador. It has the same type of wall, composed of rather soft white amorphous material produced by the alteration of sponge spicules, and is studded with quartz silt grains stained red by iron oxide.

Family TEXTULARIIDAE

Subfamily TEXTULARIINAE

Genus **Textularia** Defrance, 1824

Textularia cubana D. K. Palmer and Bermúdez

Plate 1, figure 8

Textularia mexicana, var. *cubana* D. K. Palmer and Bermúdez, 1936, Soc. Cubana Hist. Nat., Mem., vol. 10, p. 241; pl. 13, fig. 6; pl. 19, figs. 9, 10; lower Oligocene, Tinguaro formation, Cuba.

Textularia leuzingeri Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 3, pl. 1, fig. 2; middle Oligocene to lower Miocene, Agua Salada group, Venezuela.—Cushman and Stain-

FORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 15, pl. 1, figs. 19, 20; upper Oligocene and Mio-Oligocene (Aquitanian), Cipero formation, Trinidad, B.W.I.—CUSHMAN and TODD, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 3, pl. 1, fig. 6; middle Miocene, Buff Bay, Jamaica.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 2; Mio-Oligocene (Aquitanian), St. Croix, Virgin Islands.—RENZ, 1948, Geol. Soc. Amer. Mem. 32, p. 170, pl. 1, figs. 18a-c; middle Oligocene to lower Miocene, Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25. Cushman Lab. Foram. Res., p. 62, pl. 2, figs. 39, 40; middle Oligocene-upper Miocene, Dominican Republic.

Dimensions of plesiotype: Length, 0.35 mm.; breadth, 0.27 mm.; thickness, 0.18 mm.

Types.—Plesiotype (USNM 624935) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—A few specimens from Colombia, when compared with topotype specimens from Finca Adelina, Cuba, seem to belong to this highly variable species. They are somewhat smaller and finer-grained than average specimens.

Textularia granosuturata Becker and Dusenbury, n. sp.

Plate 1, figure 6

Test arenaceous, biserial, compressed, subcordate in lateral view, thickest in center along axis of growth, thence slightly depressed to the subacute periphery; apertural end truncate, chambers gradually increasing in size, about 18 in number, length about twice the height; sutures moderately curved, convex toward apertural end, somewhat elevated above the general surface of the test, ornamented with a single row of large sand grains several times larger than those forming the remainder of the test; each sutural row of large sand grains continued along the periphery to the preceding suture on the same side; aperture a transverse slit at the base of a slight reëntrant on the inner edge of the final chamber.

Dimensions of holotype: Length, 0.41 mm.; breadth, 0.40 mm.; thickness, 0.23 mm.

Type.—Holotype (USNM 624936) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—The row of large sand grains along each suture and the periphery distinguish this species from its nearest relatives, *T. dentimarginata* Nuttall, 1932, and *T.* cf. *mexicana* Cushman and Renz, 1948.

Textularia renzi Becker and Dusenbury, n. sp.

Plate 1, figure 7

Textularia abbreviata RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 168, pl. 1, figs. 10, 11; Mio-Oligocene (Aquitanian) to middle Miocene, Agua Salada group, Venezuela. Not D'ORBIGNY, 1846.

Test arenaceous, biserial, compressed, subcordate in lateral view, rapidly widening and thickening toward apertural end, thickest in center along axis of growth, thence gently convex to the subacute periphery; chambers rapidly increasing in size, about 9 to 13 in number, length about twice the height, upper edge of each chamber prominent, rest of chamber fairly flat; sutures slightly depressed, straight to slightly curved, often indistinct toward initial end of test, oblique, approximately perpendicular to periphery; aperture a transverse slit at the base of a slight reëntrant on the inner edge of the final chamber.

Dimensions of holotype: Length, 0.79 mm.; breadth, 0.75 mm.; thickness, 0.47 mm.

Type.—Holotype (USNM 624937) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Topotype specimens of *T. abbreviata* d'Orbigny from the Miocene of the Vienna Basin, Austria, have more inflated chambers and more depressed sutures producing a more lobulate profile.

Family VERNEUILINIDAE

Genus **Gaudryina** d'Orbigny, 1839

Gaudryina trinitatensis Nuttall

Plate 1, figure 10

Gaudryina trinitatensis NUTTALL, 1928, Quart. Journ. Geol. Soc. London, vol. 84, p. 76, pl. 3, figs. 15, 16; Tertiary, Trinidad, B.W.I.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, p. 242, lower Oligocene, Cuba.—CUSHMAN, 1937, Special Publ. 7, Cushman Lab. Foram. Res., p. 52, pl. 8, figs. 7-11; References.—BERMÚDEZ, 1938, Mem. Soc. Cubana Hist. Nat., vol. 12, p. 9; upper Eocene, Cuba.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 77, pl. 3, figs. 65, 66; middle Oligocene, Sombrerito formation, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 341 (list); upper Eocene to middle Oligocene, Cuba.

Dimensions of plesiotype: Length, 1.36 mm.; breadth, 0.71 mm.

Type.—Plesiotype (USNM 624938) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A few specimens are present in the material collected near Uitpa, Colombia. The figured specimen is close in its characters to those described from the Tertiary of Trinidad, B.W.I.

Genus **Clavulinoides** Cushman, 1936

Clavulinoides jarvisi Cushman

Plate 1, figure 5

Clavulinoides jarvisi CUSHMAN, 1936, Special Publ. 6, Cushman Lab. Foram. Res., p. 23, pl. 3, figs. 18a, b; Mio-Oligocene (Aquitanian), Cipero marl, Trinidad, B.W.I.—1937, Special Publ. 7, Cushman

Lab. Foram. Res., p. 135, pl. 19, figs. 3-5; Mio-Oligocene (Aquitanian), Cipero marl, Trinidad, B.W.I.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 2, p. 120, pl. 18, fig. 13; Mio-Oligocene, (Aquitanian), Cojímar formation, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 548 (list); Mio-Oligocene, (Aquitanian) Cipero marl, Trinidad, B.W.I.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 72, pl. 3, figs. 37, 38; middle Oligocene-upper Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 335 (list); Mio-Oligocene, (Aquitanian) Cojímar formation, Cuba.

Dimensions of plesiotype: Length, 2.05 mm.; diameter, 0.70 mm.

Type.—Plesiotype (USNM 624939) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Several specimens from near Uitpa, Colombia, seem identical with the type specimen described by Cushman from the Cipero section of Trinidad, B.W.I.

Genus **Pseudoclavulina** Cushman, 1936

Pseudoclavulina alazanensis (Nuttall)

Plate 1, figures 9, 11

Clavulina alazanensis Nuttall, 1932, Journ. Pal., vol. 6, p. 8, pl. 2, fig. 10; lower Oligocene, Alazán formation, Mexico.

Pseudoclavulina alazanensis (Nuttall). Cushman, 1937, Special Publ. 7, Cushman Lab. Foram. Res., p. 115, pl. 15, figs. 32, 33; lower Oligocene, Alazán formation, Mexico.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 6, pl. 1, figs. 16, 17, upper Oligocene to Mio-Oligocene (Aquitanian), Ste. Croix formation, Trinidad, B.W.I.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 72; middle Oligocene, Sombrerito formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Nat. Hist., vol. 19, p. 354 (list); Mio-Oligocene (Aquitanian) Cojímar formation, Cuba.

Dimensions of plesiotypes: Length, 1.25 mm.; diameter, 0.29 mm. (fig. 9). Length, 0.42 mm.; diameter, 0.18 mm. (fig. 11).

Types.—Plesiotypes (USNM 624940 and 624941) from Creole Serial No. 64,968, near Uitpa, Colombia, and from No. 84,037, Sillamana, Colombia, respectively.

Remarks.—A few specimens referable to this species occur at Uitpa and Sillamana, Colombia. Figure 9 illustrates a compressed and distorted specimen. Both figures 9 and 11 portray megalospheric individuals, whereas Nuttall figured a microspheric specimen.

Pseudoclavulina sp., cf. **P. bullbrooki** Cushman

Plate 1, figure 2

Dimensions of figured specimen: Length, 1.72 mm.; diameter, 0.45 mm.

Type.—Figured specimen (USNM 624942) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A few specimens from the Goajira Peninsula resemble this species from the Miocene of Trinidad.

Family VALVULINIDAE

Subfamily EGGERELLINAE

Genus **Schenckiella** Thalmann, 1942

Schenckiella nodulosa (Cushman)

Plate 1, figure 3

Clavulina communis Brady (part) (not d'Orbigny), 1884, Rep. Voy. *Challenger*, Zool., vol. 9, pl. 48, figs. 9-13 (not 1-8); Recent, West Indies.—Flint, 1898, Ann. Rep. U. S. Nat. Mus., 1897, p. 288, pl. 34, fig. 3 (part); Recent, North Atlantic, Gulf of Mexico and Panama.

Clavulina communis d'Orbigny, var. *nodulosa* Cushman, 1922, U. S. Nat. Mus. Bull. 104, pt. 3, p. 85, pl. 18, figs. 1-3; Recent, Atlantic Ocean.

Listerella nodulosa (Cushman). Cushman, 1936, Bull. Geol. Soc. America, Vol. 47, p. 428, pl. 4, fig. 6; Tertiary, Georges Bank.—Cushman, 1937, Special Publ. 8, Cushman Lab. Foram. Res., p. 150, pl. 17, figs. 13-19; References.—Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 326, pl. 41, fig. 7, pl. 43, fig. 3; middle Miocene, Port-au-Prince, Haiti.

Schenckiella nodulosa (Cushman). Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 8, pl. 1, fig. 21; middle Miocene, Buff Bay, Jamaica.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 93, pl. 5, figs. 33, 34; upper Miocene, Mao formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 360 (list); Recent, Cuba.

Dimensions of plesiotype: Length, 1.31 mm.; diameter, 0.24 mm.

Type.—Plesiotype (USNM 624943) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Both the adult and early stages of this species occur abundantly in the samples from near Uitpa, Colombia. The species ranges down as far as the middle Oligocene in Venezuela.

Genus **Textulariella** Cushman, 1927

Textulariella miocenica Cushman, var. **brevis** Cushman and Renz

Plate 1, figures 4a, b

Textulariella miocenica Cushman, var. *brevis* Cushman and Renz, 1941, Contr. Cushman Lab. Foram.

Res., vol. 17, p. 9, pl. 1, fig. 15; upper Oligocene to lower Miocene, Agua Salada group, Venezuela. —Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 172, pl. 2, figs. 15a, b; upper Oligocene to lower Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 1.60 mm.; diameter, 0.50 mm.

Type.—Plesiotype (USNM 624944) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—Specimens are present at both Sillamana and Uitpa, Colombia. Externally, this species resembles *Dorothia cylindrica* (Nuttall), described from the lower Oligocene Alazán shale of Mexico, but it is distinguished by the supplementary partitions in its chambers.

Family MILIOLIDAE

Genus **Spiroloculina** d'Orbigny, 1826

Spiroloculina texana Cushman and Ellisor

Plate 1, figures 12, 13

Spiroloculina aff. *depressa* d'Orbigny. Nuttall, 1932, Journ. Pal., vol. 6, p. 8, pl. 1, fig. 3; lower Oligocene, Alazán formation, Mexico.

Spiroloculina texana Cushman and Ellisor, 1944, Contr. Cushman Lab. Foram. Res., vol. 20, p. 51, pl. 8, figs. 14, 15; Mio-Oligocene (Aquitanian), Anahuac formation, *Heterostegina* zone, Texas.—Cushman and Todd, 1944, Special Publ. No. 11, Cushman Lab. Foram. Res., p. 18, pl. 3, fig. 16; Mio-Oligocene (Aquitanian), Anahuac formation, *Heterostegina* zone, Texas.—Cushman and Ellisor, 1945, Journ. Pal., vol. 19, p. 551, pl. 72, figs. 15, 16; Mio-Oligocene (Aquitanian), Anahuac formation, *Heterostegina* zone, Texas.—Cushman and Renz, 1947, Spec. Publ. No. 22, Cushman Lab. Foram. Res., p. 9, pl. 2, figs. 15, 16; Mio-Oligocene (Aquitanian), Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotypes: Length, 0.77 mm.; breadth, 0.62 mm.; thickness, 0.10 mm. (fig. 12). Length, 0.62 mm.; breadth, 0.48 mm.; thickness, 0.08 mm. (fig. 13).

Type.—Plesiotypes (USNM 624945 and 624946) from Creole Serial No. 64,968 near Uitpa, Colombia, and from Creole Serial No. 84,020 near Uitpa, Colombia, respectively.

Remarks.—A number of specimens from Uitpa, Colombia, seems to belong to this species described from the Anahuac formation of Texas. Sand grains from the matrix adhere to the inner depressed portions of the chambers in each of the figured specimens. The specimen illustrated in figure 13 has its final chambers badly rounded by abrasion but seems to be otherwise like the one shown in figure 12.

Family LAGENIDAE

Genus **Robulus** de Montfort, 1808

Robulus americanus (Cushman)

Plate 2, figure 18

Cristellaria americana Cushman, 1918, U. S. Geol. Survey, Bull. 676, p. 50, pl. 10, figs. 5, 6; upper Miocene, Duplin marl, South Carolina.

Robulus americanus (Cushman). Cushman, 1930, Florida Geol. Survey, Bull. No. 4, p. 24, figs. 7a, b; middle Miocene, Choctawhatchee formation, Florida.—Cushman and Ponton, 1932, Florida Geol. Survey, Bull. No. 9, p. 58; middle Miocene, Choctawhatchee formation (*Arca* and *Yoldia* zones) and Shoal River formation, Florida.—Cushman and Cahill, 1933, U. S. Geol. Survey, Prof. Paper 175-A, p. 12, pl. 3, figs. 6a, b; middle Miocene, Choctawhatchee formation, Florida.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 12; Mio-Oligocene (Aquitanian), Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 157, pl. 12, fig. 3; Oligocene and Miocene, Agua Salada group, Venezuela.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 357 (list); upper Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 1.05 mm.; thickness, 0.43 mm.

Type.—Plesiotype (USNM 624947) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Abundant specimens from Sillamana, Colombia, resemble the one figured by Renz from the Agua Salada group, State of Falcón, Venezuela. They have six to seven chambers and distinct raised sutures.

Robulus americanus (Cushman), var. **grandis** (Cushman)

Plate 2, figure 23

Cristellaria americana Cushman, var. *grandis* Cushman, 1920, U. S. Geol. Survey Prof. Paper 128-B, p. 68, pl. 11, fig. 2; lower Miocene, Alum Bluff formation, Florida.

Robulus americanus (Cushman), var. *grandis* (Cushman). Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 554 (list); Miocene, upper Agua Salada formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 12; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 157, pl. 3, fig. 7; Oligocene and Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Diameter, 1.40 mm.; thickness, 0.80 mm.

Type.—Plesiotype (USNM 624948) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—A number of poorly preserved and broken

specimens seem to be similar to that figured by Renz from the Agua Salada group, Venezuela.

Robulus sp., cf. **R. carolinianus** Cushman

Plate 2, figure 24

Dimensions of figured specimen: Diameter, 1.14 mm.; thickness, 0.60 mm.

Type.—Figured specimen (USNM 624949) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Several specimens from the Goajira Peninsula material may be questionably referred to this species. Renz has mentioned its presence in the Agua Salada group of Venezuela.

Robulus brevispinosus (Nuttall)

Plate 2, figure 20

Cristellaria brevispinosa NUTTALL, 1928, Geol. Soc. London, Quart. Journ., vol. 84, p. 88, pl. 5, fig. 13; Tertiary, Trinidad, B.W.I.

Dimensions of plesiotype: Diameter, 1.10 mm.; thickness, 0.70 mm.

Type.—Plesiotype (USNM 624950) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—A number of specimens from near Uitpa, Colombia, are quite similar to the form figured by Nuttall from the Tertiary of Trinidad, B.W.I.

Robulus cristobalensis Bermúdez

Plate 1, figure 19

Robulus cristobalensis BERMÚDEZ, 1949, Special Publ. No. 25, Cushman Lab. Foram. Res., p. 123, pl. 7, figs. 19, 20; middle Oligocene, Sombrerito formation, Dominican Republic.

Dimensions of plesiotype: Diameter, 0.84 mm.; thickness, 0.43 mm.

Type.—Plesiotype (USNM 624951) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Specimens from Sillamana, Colombia, are assigned to this species, after comparison with topotype material.

Robulus dicampylus (Franzenau)

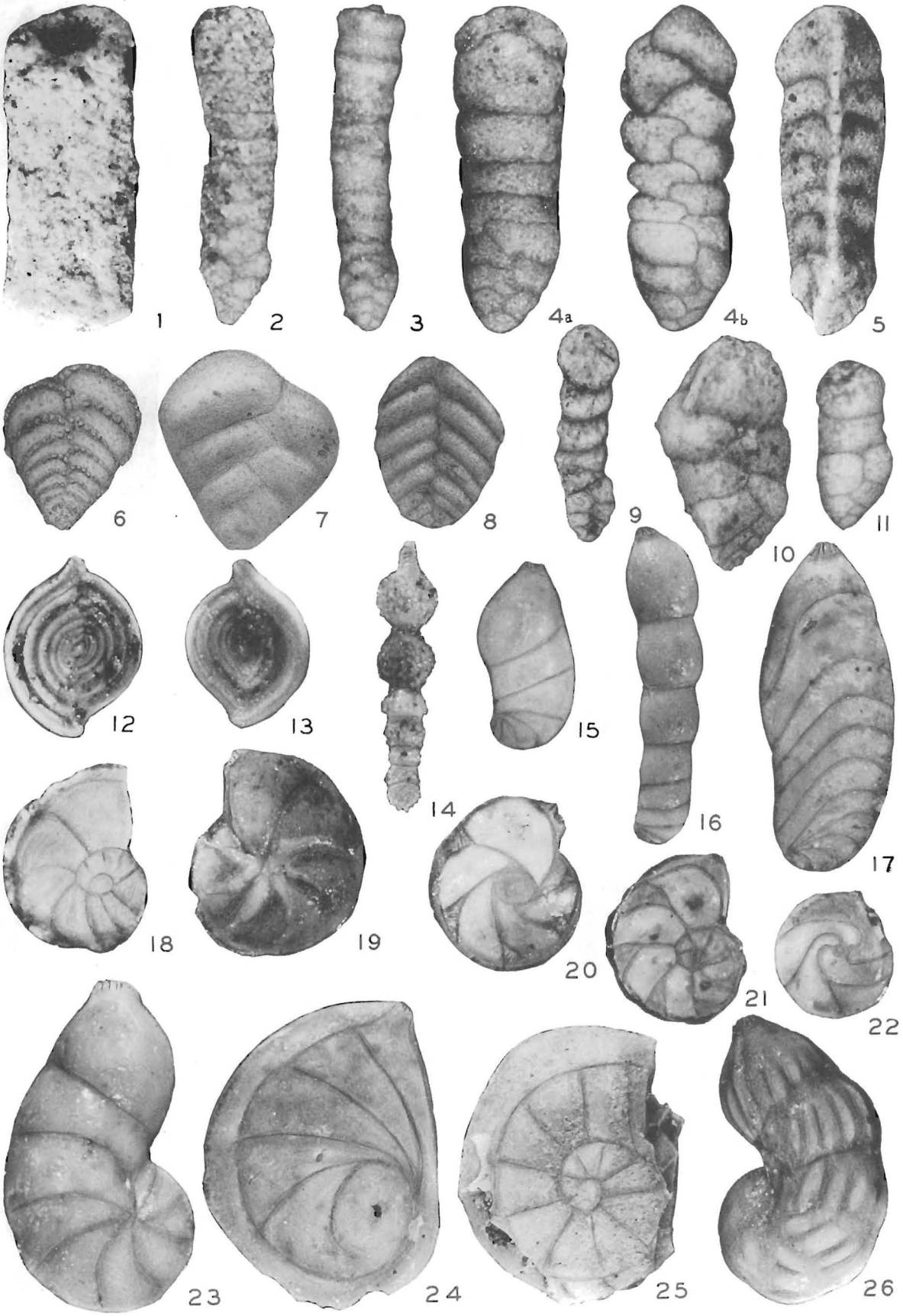
Plate 1, figure 22

Cristellaria dicampyla FRANZENAU, 1894, Math. Term. Közlem Magyar Ak., vol. 26, p. 13, pl. 1, fig. 8; Tertiary, Hungary.

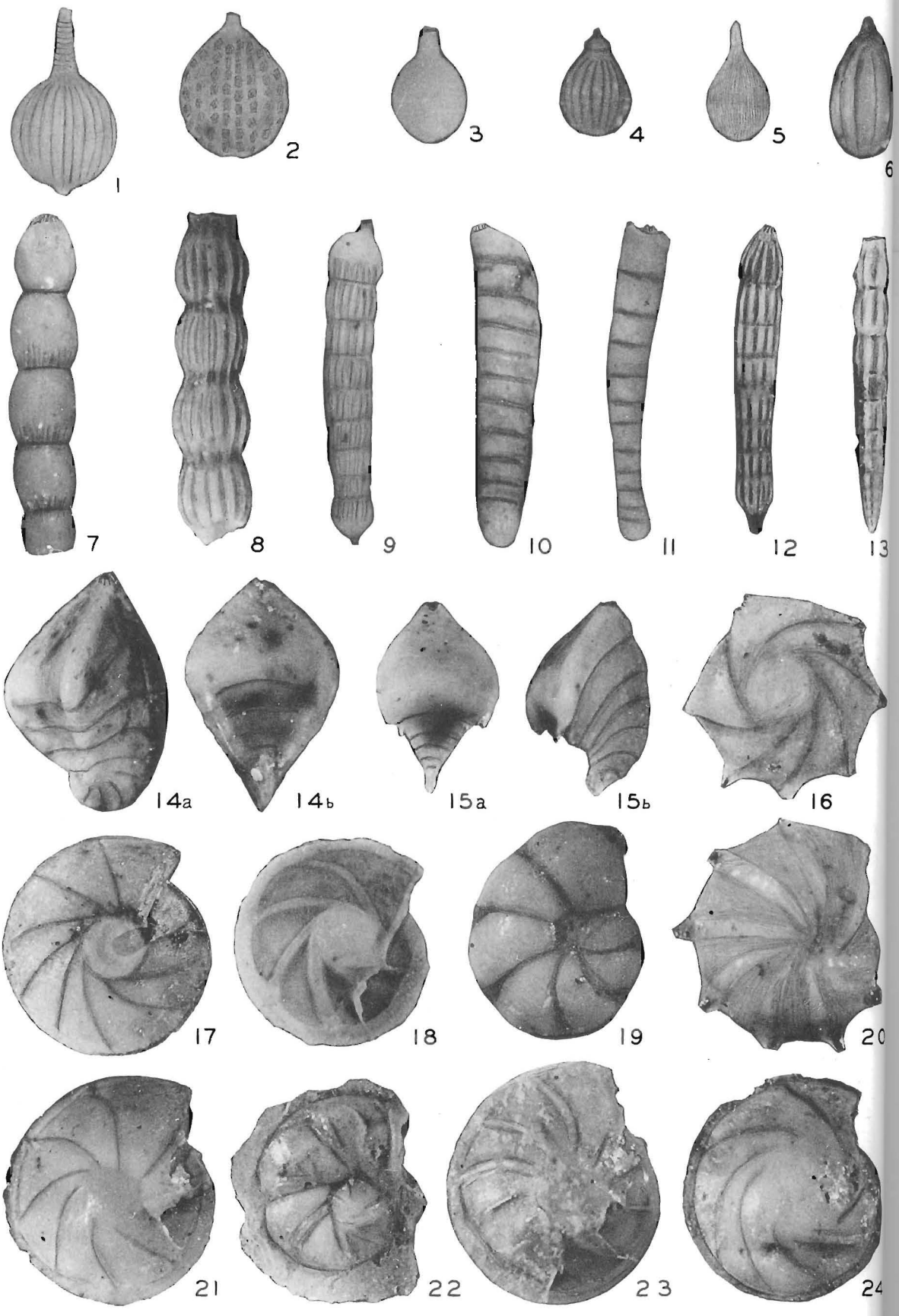
Cristellaria clericii FORNASINI, 1895, *Cristellaria clericii* n. sp., Bologna, Tipografia Gamberini e Parmeggiani, p. [11], text fig.; lower Pliocene, Italy.—NUTTALL, 1928, Quart. Journ. Geol. Soc., vol. 84, p. 87, pl. 5, fig. 10; Tertiary, Trinidad, B.W.I.

Robulus clericii (FORNASINI). CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 84, pl. 12, figs. 16, 17; Tertiary, Ecuador, Venezuela and Trinidad, B.W.I.—DORR, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—HEDBERG, 1937, Journ. Pal., vol. 11, p. 669; upper Oligocene, Carapita formation, Venezuela.—CORYELL and RIVERO, 1940, Journ. Pal., vol. 14, p. 332, pl. 43, figs. 7a, b; middle Miocene, Port-au-Prince, Haiti.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 557 (list); Miocene part of Brasso formation, Trinidad, B.W.I.—FRANKLIN, 1944, Journ. Pal., vol. 18, p. 309, pl. 45, figs. 22a, b; Oligocene, Carapita formation, Venezuela.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram.

EXPLANATION OF PLATE 1



Becker and Dusenbury: Oligo-Miocene Foraminifera from Colombia



Becker and Dusenbury: Oligo-Miocene Foraminifera from Colombia

Res., p. 21, pl. 2, fig. 23; Oligocene, Cipero marl formation, Trinidad, B.W.I.—D. K. PALMER, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 34; Miocene, Bowden formation, Jamaica.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 11, pl. 3, fig. 1; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 158, pl. 3, fig. 8; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Lenticulina clericii (FORNASINI). D. K. PALMER, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, p. 127; upper Oligocene, Cojímar formation, Cuba.

Robulus duracina GALLOWAY and MORREY (not STACHE), 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 21, pl. 2, fig. 13; lower Tertiary, Manta, Ecuador.

Robulus chambersi GALLOWAY and HEMINWAY (not GARRETT), 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 347, pl. 12, figs. 1a, b; upper Oligocene and lower Miocene, Puerto Rico.

Robulus dicampyla (FRANZENAU). BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 124, pl. 7, figs. 23, 24; middle Miocene, Gurabo formation, Dominican Republic.

Robulus dicampylus (FRANZENAU). BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 358 (list); middle Eocene-Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 0.55 mm.; thickness, 0.30 mm.

Type.—Plesiotype (USNM 624952) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, are identical with those of the middle zone of the Carapita formation, Venezuela. Records indicate that this species is widely distributed in the Tertiary of the West Indian region. Franzenau figured an immature specimen, Fornasini a mature one with more chambers in the final whorl.

Robulus formosus (Cushman)

Plate 2, figure 16

Cristellaria formosa CUSHMAN, 1923, U. S. Nat. Mus., Bull. 104, pt. 4, p. 110, pl. 29, fig. 1; pl. 30, fig. 6; Recent, Gulf of Mexico.—NUTTALL, 1932, Journ. Pal., vol. 6, p. 9, pl. 1, fig. 10; lower Oligocene, Alazán formation, Mexico.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, p. 249; lower Oligocene, Cuba.

Robulus formosus (CUSHMAN). CUSHMAN and JARVIS, 1930, Journ. Pal., vol. 4, p. 358, pl. 32, fig. 10; Miocene, Buff Bay, Jamaica.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 553 (list); upper Agua Salada formation, Venezuela.—FRANKLIN, 1944, Journ. Pal., vol. 18, p. 309, pl. 45, fig. 20; Oligocene, Carapita formation, Venezuela.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 158, pl. 3, fig. 9; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 126, pl. 6, figs. 57, 58; middle and upper Oligocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 358 (list); Oligocene to Recent, Cuba.

Lenticulina formosa (CUSHMAN). HADLEY, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 11, pl. 1, fig. 11; Oligocene, Cuba.—D. K. PALMER, 1940, Mem.

EXPLANATION OF PLATE 2

Soc. Cubana Hist. Nat., vol. 14, No. 2, p. 128; upper Oligocene, Cojimar formation, Cuba.

Dimensions of plesiotype: Diameter, 0.82 mm.; thickness, 0.42 mm.

Type.—Plesiotype (USNM 624953) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A single specimen from the Goajira Peninsula, Colombia, is similar to that described by Cushman from the Gulf of Mexico.

Robulus iota (Cushman)

Plate 2, figure 17

Cristellaria iota CUSHMAN, 1923, U. S. Nat Mus., Bull., No. 140, p. 111, pl. 29, fig. 2; pl. 30, fig. 1; Recent, Gulf of Mexico.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 252; lower Oligocene, Cuba.

Robulus iotus (CUSHMAN). CUSHMAN, 1930, Florida Geol. Survey, Bull. 4, p. 25, pl. 4, fig. 1; Miocene, Florida.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 159, pl. 3, fig. 4; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 127, pl. 6, figs. 67, 68; upper Oligocene and Miocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 358 (list); upper Eocene to Recent, Cuba.

Robulus iota (CUSHMAN). GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 349, pl. 12, figs. 7a, b; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.

Robulus cf. *R. iota* (CUSHMAN). D. K. PALMER, 1945, Bull. Amer., Pal., vol. 29, No. 115, p. 35; Miocene, Bowden formation, Jamaica.

Robulus cf. *iotus* (CUSHMAN). CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 13, pl. 3, fig. 8; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotype: Diameter, 1.39 mm.; thickness, 0.45 mm.

Type.—Plesiotype (USNM 624954) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Numerous specimens from both Sillamana and Uitpa, Colombia, appear to be the same as those figured by Renz from the Agua Salada group, Venezuela.

Robulus melvilli Cushman and Renz

Plate 1, figure 20

Robulus melvilli CUSHMAN and RENZ, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 12, pl. 2, fig. 12; lower-middle Miocene, upper Agua Salada formation (Zones 3-4), Venezuela.—CUSHMAN and TODD, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 16, pl. 2, fig. 12; Miocene, Buff Bay, Jamaica.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 159, pl. 3, figs. 11a, b; Oligocene and Miocene, Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 128, pl. 7, figs. 57, 58; upper Oligocene, Dominican Republic.

Dimensions of plesiotype: Diameter, 0.80 mm.; thickness, 0.35 mm.

Type.—Plesiotype (USNM 624955) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with topotypes from the upper part of the Agua Salada formation of Falcón, Venezuela, and appear to be the same.

Robulus nuttalli Cushman and Renz

Plate 2, figure 19

Robulus nuttalli CUSHMAN and RENZ, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 11, pl. 2, fig. 10; upper Oligocene-lowermost Miocene, lower Agua Salada formation (Zones 1-3), Venezuela.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 546 (list); Oligocene part of Brasso formation (Esmeralda member), Trinidad, B.W.I.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 12; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 159, pl. 3, figs. 12a, b; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 128, pl. 7, figs. 45-48; upper Oligocene, Trinchera formation, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 358 (list), Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 1.10 mm.; thickness, 0.24 mm.

Type.—Plesiotype (USNM 624956) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from Uitpa, Colombia, have been compared with topotypes from the District of Zamora, State of Falcón, Venezuela, and are the same.

Robulus occidentalis (Cushman), var. **torrida** (Cushman)

Plate 2, figure 21

Cristellaria occidentalis CUSHMAN, var. *torrida* CUSHMAN, 1923, U. S. Nat. Mus. Bull. 104, pt. 4, p. 105, pl. 25, fig. 1; Recent, Gulf of Mexico.

Robulus occidentalis (CUSHMAN), var. *torridus* (CUSHMAN). CUSHMAN and JARVIS, 1930, Journ. Pal., vol. 4, p. 357, pl. 32, figs. 8a, b; Miocene, Buff Bay, Jamaica.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 349, pl. 12, figs. 4a, b; upper Oligocene and lower Miocene, Ponce forma-

tion, Puerto Rico.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 554 (list); upper Agua Salada formation, Venezuela.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 22, pl. 2, fig. 25; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 11; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 160, pl. 3, fig. 17; Oligocene and Miocene, Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 129, pl. 7, figs. 55, 56; middle and upper Miocene, Dominican Republic.

Robulus occidentalis (Cushman), var. *torrida* (Cushman). D. K. Palmer, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 35; middle Miocene, Bowden formation, Jamaica.

Dimensions of plesiotype: Diameter, 1.70 mm.; thickness, 0.72 mm.

Type.—Plesiotype (USNM 624957) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Several specimens in the material from the Goajira Peninsula, Colombia, resemble this species.

Robulus suteri Cushman and Renz

Plate 2, figure 22

Robulus suteri Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 10, pl. 2, figs. 5-8; upper Oligocene-? upper Miocene, lower and upper Agua Salada formation (Zones 1-6), Venezuela.—Cushman and Ellisor, 1945, Journ. Pal., vol. 19, p. 553, pl. 73, fig. 4; Oligocene, Anahuac formation, Texas.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 12, pl. 3, fig. 5, upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 161, pl. 3, figs. 18a, b, 19; pl. 4, figs. 1, 2; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Dimensions of plesiotype: Diameter, 1.90 mm.; thickness, 0.35 mm.

Type.—Plesiotype (USNM 624958) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Specimens have been compared with topotypes from the District of Zamora, State of Falcón, Venezuela, and are the same. There is considerable variation in this species.

Genus **Planularia** Defrance, 1824

Planularia clara Cushman and Jarvis

Plate 1, figure 18

Planularia clara Cushman and Jarvis, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, pt. 1, p. 7, pl. 2, figs. 14, 15; "*Sagrina* beds," Trinidad, B.W.I.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 556 (list); Miocene part of Brasso formation, Trinidad, B.W.I.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 13, pl. 3, fig. 12; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 150, pl. 4, fig. 4; upper Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Dimensions of plesiotype: Diameter, 0.50 mm.; thickness, 0.08 mm.

Type.—Plesiotype (USNM 624959) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—A few specimens from the material from the Goajira Peninsula, Colombia, have been compared with those from the Ste. Croix formation, Trinidad, B.W.I., and appear to be the same.

Planularia torrei D. K. Palmer

Plate 1, figure 25

Planularia torrei D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 277, pl. 51, figs. 5, 6; upper Oligocene, Cojímar formation, Cuba.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 352 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Diameter, 4.22 mm.; thickness, 0.58 mm.

Type.—Plesiotype (USNM 624960) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A single poorly preserved specimen from the Goajira Peninsula material seems very similar to this species described from the Cojímar formation of Cuba.

Planularia sp., cf. **P. trinae** Bermúdez

Plate 1, figure 24

Dimensions of figured specimen: Length, 2.95 mm.; thickness, 0.85 mm.

Type.—Figured specimen (USNM 624961) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A single specimen was found in the Colombia material. It has fewer chambers than the topotypes from the upper Oligocene of the Dominican Republic.

Planularia venezuelana Hedberg

Plate 1, figure 21

Planularia venezuelana Hedberg, 1937, Journ. Pal., vol. 11, p. 670, pl. 90, figs. 14a, b; upper Oligocene, Carapita formation, Venezuela.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 546 (list); Oligocene part of Brasso formation (Esmeralda member), Trinidad, B.W.I.—Franklin, 1944, Journ. Pal., vol. 18, p. 310, pl. 45, fig. 13; Oligocene, Carapita formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p.

13, pl. 3, fig. 11; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 150, pl. 4, figs. 5a, b; Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 138, pl. 8, figs. 51, 52; middle Oligocene, Sombrerito formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 352 (list); middle Oligocene, Cuba.

Planularia cf. *P. venezuelana* Hedberg. Cushman, 1946, U. S. Geol. Surv. Prof. Paper 210-A, p. 4; Tertiary, St. Croix, Virgin Islands.

Dimensions of plesiotype: Diameter, 0.65 mm.; thickness, 0.17 mm.

Type.—Plesiotype (USNM 624962) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with the topotypes of this species from the Carapita formation of eastern Venezuela. The specimens from Colombia are slightly larger but otherwise typical.

Genus **Marginulina** d'Orbigny, 1826

Marginulina alazanensis Nuttall

Plate 1, figure 16

Marginulina alazanensis Nuttall, 1932, Journ. Pal., vol. 6, p. 13, pl. 3, figs. 3, 7; lower Oligocene, Alazán formation, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 260; lower Oligocene, Cuba.—Barker, 1936, Am. Assoc. Petroleum Geologists Bull., vol. 20, p. 452 (list); lower Oligocene, upper Alazán, Mexico.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 278; upper Oligocene, Cojímar formation, Cuba.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 20, pl. 3, fig. 11; Miocene, Buff Bay, Jamaica.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 348 (list); Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Length, 1.85 mm.; maximum diameter, 0.42 mm.

Type.—Plesiotype (USNM 624963) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—A few specimens from near Uitpa, Colombia, seem close to this species described from the Alazán formation of Mexico.

Marginulina hantkeni Bandy

Plate 1, figure 15

Marginulina subbullata Hantken, 1875 (1876), Magyar kir. földt. int. evkön., vol. 4, p. 39, pl. 4, figs. 9, 10; pl. 5, fig. 9; lower Oligocene, Hungary (not *M. subbullata* Gümbel, 1861).—Cushman, 1925, Contr. Cushman Lab. Foram. Res., vol. 1, p. 62, pl. 10, figs. 3a, b; Tertiary, Mexico.—Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 85, pl. 12, fig. 20; Tertiary, Venezuela.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—Nuttall, 1935, Journ. Pal., vol. 9, p. 125, pl. 14, fig. 16; Eocene, Paují shale, Venezuela.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 260; lower Oligocene, Cuba.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 279; upper Oligocene, Cojímar formation, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 553 (list); upper Agua Salada formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 13, pl. 4, fig. 1; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 145, pl. 4, figs. 13, 14; Oligocene and Miocene, Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 141, pl. 9, figs. 19, 20; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 348 (list); upper Eocene and Oligocene, Cuba.

Marginulina hantkeni Bandy, Bull. Amer. Pal., vol. 32, No. 131, 1949, p. 76, 77, pl. 6, figs. 9a, b; upper Eocene, Jackson group.

Dimensions of plesiotype: Length, 0.45 mm.; maximum diameter, 0.20 mm.

Type.—Plesiotype (USNM 624964) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Typical specimens of this species are abundant at Sillamana, Colombia.

Marginulina pseudohirsuta Nuttall

Plate 1, figure 14

Marginulina pseudohirsuta Nuttall, 1932, Journ. Pal., vol. 6, p. 13, pl. 3, figs. 1, 2; lower Oligocene, Alazán formation, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 258; lower Oligocene, Cuba.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 348 (list); upper Eocene and lower Oligocene, Cuba.

Marginulina cf. *pseudohirsuta* Nuttall. Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 23, pl. 16, fig. 13; Oligocene, Cipero marl formation, Trinidad, B.W.I.

Dimensions of plesiotype: Length, 1.56 mm.; maximum diameter, 0.35 mm.

Type.—Plesiotype (USNM 624965) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Both megalospheric and microspheric forms of this species are present in the material from the Goajira Peninsula, Colombia.

Genus **Astacolus** de Montfort, 1808

Astacolus sublituus (Nuttall), var. **multicamerata** (Cushman and Stainforth)

Plate 1, figure 17

Marginulina sublituus (Nuttall), var. *multicamerata* Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 23, pl. 3, figs. 6, 7; Oligocene, Cipero marl formation, Trinidad, B.W.I. —Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 14, pl. 4, figs. 5, 7; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotype: Length 1.60 mm.; maximum width, 0.66 mm.

Type.—Plesiotype (USNM 624966) from Creole Serial No. 84,021, near Uitpa, Colombia.

Remarks.—Specimens from Colombia have been compared with the topotypes from the Oligocene Cipero marl formation of Trinidad and seem identical.

Marginulinopsis Silvestri, 1904

Marginulinopsis goajiraensis Becker and Dusenbury, n. sp.

Plate 1, figure 23

Test elongate, early portion close-coiled, later portion uncoiled, early portion slightly compressed, later portion circular in transverse section; periphery of early portion narrowly rounded, broadly rounded and slightly lobate in later portion; 8 to 10 chambers increasing gradually in size and becoming inflated; sutures distinct, curved, later ones slightly depressed; wall smooth, very finely perforate; aperture terminal, radiate, on a short projecting neck. Length, 1.53 mm.; thickness, 0.62 mm.

Type.—Holotype (USNM 624967) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—This species differs from *Marginulina wallacei* Hedberg in the larger size and the lack of ornamentation of the test.

Marginulinopsis uitpaensis Becker and Dusenbury, n. sp.

Plate 1, figure 26

Test elongate, early portion close-coiled, later portion uncoiled, early portion slightly compressed, later portion circular in transverse section; periphery of early portion slightly keeled, rounded and lobate in later portion; 8 to 10 chambers increasing gradually in size and becoming inflated; sutures curved, depressed; wall ornamented by parallel costae, usually broken at the sutures, with their long axes in the direction of chamber growth; aperture, terminal, on a short projecting neck. Length, 1.30 mm.; thickness, 0.60 mm.

Type.—Holotype (USNM 624968) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—This species differs from *Marginulina wallacei* Hedberg in the larger size, non-beaded sutures and more elongate costae developed on the chambers.

Genus **Dentalina** d'Orbigny, 1826

Dentalina sp., aff. **D. consobrina** d'Orbigny

Plate 3, figure 2

Dimensions of figured specimen: Length (broken specimen), 0.82 mm.; diameter, 0.10 mm.

Type.—Figured specimen (USNM 624969) from Creole Serial No. 84,021, near Uitpa, Colombia.

Remarks.—A single fragmentary specimen is the only one found in the Goajira material. Similar specimens have been figured by Renz from the upper Oligocene of Falcón, Venezuela.

Dentalina sp., cf. **D. dusenburyi** Beck

Plate 2, figure 7

Dimensions of immature form: Length, 2.50 mm.; diameter, 0.70 mm.

Type.—Figured specimen (USNM 624970) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Colombian specimens indicate that this species belongs to the genus *Dentalina* rather than *Siphonodosaria* or *Nodosaria*. Most of the specimens are broken, and it is difficult to find a complete mature form.

Dentalina isidroensis Cushman and Renz

Plate 2, figure 9

Dentalina isidroensis Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 15, pl. 3, figs. 2, 3; upper Oligocene-lower to middle Miocene, lower and upper Agua Salada formation (Zones 1-3), Venezuela.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 130, pl. 4, figs. 28, 29; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 336 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Length, 2.55 mm.; maximum diameter, 0.47 mm.

Type.—Plesiotype (USNM 624971) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—A few specimens from the Goajira Peninsula, Colombia, seem to be very close to this species described by Cushman and Renz, from Falcón, Venezuela. A somewhat similar form is that described by Nuttall as *Marginulina* sp. (Journ. Pal., vol. 6, 1932, p. 13, pl. 3, fig. 4) from the lower Oligocene, Alazán formation, Mexico.

Dentalina mucronata Neugeboren

Plate 3, figure 7

Dentalina mucronata Neugeboren, 1856, Denkschr. Akad. Wiss. Wien, vol. 12, p. 83, pl. 3, figs. 8-11;

Tertiary, Rumania.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 21, pl. 3, figs. 14, 15; Miocene, Buff Bay, Jamaica.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 143, pl. 9, fig. 47; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 336 (list); lower and middle Oligocene, Cuba.

Dentalina aff. *D. mucronata* Neugeboren. D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 262, pl. 15, figs. 5, 6, 11; lower Oligocene, Cuba.

Dentalina cf. *mucronata* Neugeboren. Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 24, pl. 3, figs. 11, 12; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 5; Tertiary, St. Croix, Virgin Islands.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 15, pl. 4, fig. 12; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotype: Length, 0.70 mm.; diameter, 0.16 mm.

Type.—Plesiotype (USNM 624972) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Rare specimens from Sillamana, Colombia, are similar to that figured by Cushman and Stainforth from the Cipero marl formation, Trinidad, B.W.I.

Dentalina vertebralis (Batsch)

Plate 2, figure 12

Nautilus (Orthoceras) vertebralis Batsch, 1791, Conch. des Seesandes, p. 3, No. 6, pl. 2, fig. 6; Recent, Adriatic Sea.

Nodosaria vertebralis (Batsch). Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 14, pl. 1, fig. 10; Tertiary, Manta, Ecuador.—Cushman and Jarvis, 1930, Journ. Pal., vol. 4, p. 360; Miocene, Buff Bay, Jamaica.—Nuttall, 1932, Journ. Pal., vol. 6, p. 15, pl. 3, fig. 9; lower Oligocene, Alazán formation, Mexico.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—Hedberg, 1937, Journ. Pal., vol. 11, p. 671, pl. 91, fig. 2; upper Oligocene, Carapita formation, Venezuela.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 283; upper Oligocene, Cojímar formation, Cuba.—Renz, Proc. 8th Amer. Sci. Congress, 1942, p. 553 (list); upper Agua Salada formation, Venezuela.—Franklin, 1944, Journ. Pal., vol. 18, p. 312, pl. 46, fig. 6; Oligocene, Carapita formation, Venezuela.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 5; Tertiary, St. Croix, Virgin Islands.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 147, pl. 5, figs. 8-11; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 149, pl. 9, fig. 54; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 350 (list); Paleocene-Oligocene, Cuba.

Dentalina vertebralis (Batsch). Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 327, pl. 42, figs. 1, 3; middle Miocene, Port-au-Prince, Haiti.—D. K. Palmer, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 38; middle Miocene, Bowden formation, Jamaica.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 21, pl. 3, fig. 20; Miocene, Buff Bay, Jamaica.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 15, pl. 4, fig. 14; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotype: Length, 1.80 mm.; diameter, 0.29 mm.

Type.—Plesiotype (USNM 624973) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—The above synonymy indicates that this species has been referred to the genus *Nodosaria* by many paleontologists. The Goajiran specimens have an eccentric aperture that suggests the genus *Dentalina* rather than *Nodosaria*.

Genus Nodosaria Lamarck, 1812

Nodosaria longiscata d'Orbigny

Plate 3, figure 6

Nodosaria longiscata d'Orbigny, 1846, Foram. Foss. Bass. Tert. Vienne, p. 32, pl. 1, figs. 10-12; Tertiary, Austria.—Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 86, pl. 12, figs. 25, 26; Tertiary, Venezuela and Trinidad, B.W.I.—Cole and Gillespie, 1930, Bull. Amer. Pal., vol. 15, No. 57b, p. 8, pl. 4, fig. 1; pl. 3, fig. 9; Oligocene, Mesón formation, Mexico.—Cushman and Jarvis, 1930, Journ. Pal., vol. 4, p. 359, pl. 32, figs. 15, 16; Miocene, Buff Bay, Jamaica.—Nuttall, 1932, Journ. Pal., vol. 6, p. 15; lower Oligocene, Alazán formation, Mexico.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 264, pl. 15, figs. 7, 13; lower Oligocene, Cuba.—Hedberg, 1937, Journ. Pal., vol. 11, p. 671, pl. 91, figs. 3, 4; upper Oligocene, Carapita formation, Venezuela.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 342, pl. 11, fig. 8; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 281; upper Oligocene, Cojímar formation, Cuba.—Franklin, 1944, Journ. Pal., vol. 18, p. 311, pl. 46, figs. 1, 2; Oligocene, Carapita

formation, Venezuela.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 25, pl. 4, figs. 8, 10; Miocene, Buff Bay, Jamaica.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 15, pl. 4, figs. 17, 18; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 146, pl. 5, figs. 1-4; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 145, pl. 9, fig. 57; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 350 (list); Paleocene to Recent, Cuba.

Dimensions of plesiotype: Length (fragmentary specimen), 0.92 mm.; diameter, 0.10 mm.

Type.—Plesiotype (USNM 624974) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from both Uitpa and Sillamana, Colombia, closely resemble this widely recorded species.

Nodosaria pyrula d'Orbigny

Plate 3, figure 4

Nodosaria pyrula d'Orbigny, 1826, Ann. Sci. Nat., vol. 7, p. 253; Fossil, Siena, Italy.—Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 16, pl. 1, fig. 16; Tertiary, Manta, Ecuador.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 14, p. 282; upper Oligocene, Cojímar formation, Cuba.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 28, pl. 4, figs. 17, 18; Miocene, Buff Bay, Jamaica.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 147, pl. 9, fig. 55; middle and upper Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 350 (list); Oligocene to Recent, Cuba.

Nodosaria aff. *N. pyrula* d'Orbigny. D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 265, pl. 14, fig. 2; lower Oligocene, Cuba.

Nodosaria cf. *pyrula* d'Orbigny. Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 25, pl. 3, fig. 22; Oligocene, Cipero marl formation, Trinidad, B.W.I.

Dimensions of plesiotype: Length (broken specimen), 1.20 mm.; diameter, 0.32 mm.

Type.—Plesiotype (USNM 624975) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Several specimens from Uitpa, Colombia, may be assigned to this species. They have spherical chambers separated by long slender necks.

Nodosaria raphanistrum (Linné), var. caribbeana Hedberg

Plate 2, figure 8

Nodosaria raphanistrum (Linné), var. *caribbeana* Hedberg, 1937, Journ. Pal., vol. 11, p. 671, pl. 91, fig. 1; upper Oligocene, Carapita formation, Venezuela.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 282; upper Oligocene, Cojímar formation, Cuba.—Franklin, 1944, Journ. Pal., vol. 18, p. 311, pl. 46, fig. 5; Oligocene, Carapita formation, Venezuela.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 26, pl. 4, figs. 12, 13; Miocene, Buff Bay, Jamaica.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 16; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 147, pl. 5, figs. 6, 7; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 147, pl. 9, fig. 49; upper Oligocene, Trinchera formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 350 (list); middle and upper Oligocene, Cuba.

Dimensions of plesiotype: Length (broken specimen), 2.60 mm.; diameter, 0.90 mm.

Type.—Plesiotype (USNM 624976) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—Large fragmentary specimens occur in all of the samples from the Goajira Peninsula. The chambers have constricted sutures and from 16 to 18 strong costae.

Nodosaria sp., cf. N. rudis d'Orbigny

Plate 3, figure 3

Dimensions of figured specimen: Length, 0.58 mm.; diameter, 0.20 mm.

Type.—Figured specimen (USNM 624977) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A single specimen is present in the material from the Goajira Peninsula. It has spherical chambers and a finely papillate surface. The species may be referred to a similar form figured by Cushman and Todd from the Miocene of Buff Bay, Jamaica.

Nodosaria stainforthi Cushman and Renz

Plate 2, figure 13

Nodosaria stainforthi Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 15, pl. 3, fig. 4; upper Oligocene and lower Miocene, lower and upper Agua Salada formation (Zones 1-4), Venezuela.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 556 (list); Miocene part of Brasso formation, Trinidad, B.W.I.—Cushman and Stain-

FORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 25, pl. 3, fig. 25; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 16, pl. 4, fig. 20; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 147, pl. 4, figs. 31a, b; Oligocene and Miocene, Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 148, pl. 9, fig. 50; middle and upper Oligocene, Dominican Republic.

Dimensions of plesiotype: Length, 1.70 mm.; diameter, 0.22 mm.

Type.—Plesiotype (USNM 624978) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Numerous specimens from the Goajira Peninsula, Colombia, seem identical with this species described from Falcón, Venezuela.

Nodosaria sp.

Plate 3, figure 11

Nodosaria sp. GALLOWAY and MORREY, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 15, pl. 1, fig. 12; Tertiary, Manta, Ecuador.

Dimensions of figured specimen: Length, 0.65 mm.; diameter, 0.25 mm.

Type.—Figured specimen (USNM 624979) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A single specimen from the Goajiran material seems identical with *N.* sp. described by Galloway and Morrey. A somewhat similar form is figured by Cole from the Eocene Guayabal formation of Mexico.

Genus **Lagenonodosaria** Silvestri, 1900

Lagenonodosaria spinicosta (d'Orbigny), var. **adelinensis** (D. K. Palmer and Bermúdez)

Plate 3, figure 5

Nodosaria spinicosta D'ORBIGNY, var. *adelinensis* D. K. PALMER and BERMÚDEZ, 1940, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 4, p. 269, pl. 15, figs. 9, 10; lower Oligocene, Cuba.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 148, pl. 9, fig. 65; middle Oligocene, Sombrerito formation, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 267 (list); lower Oligocene, Tinguaro formation, Cuba.

Dimensions of plesiotype: Length, 0.72 mm.; diameter, 0.34 mm.

Type.—Plesiotype (USNM 624980) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Rare specimens from Uitpa, Colombia, seem to be identical with this variety described from the Finca Adelina fauna of Cuba.

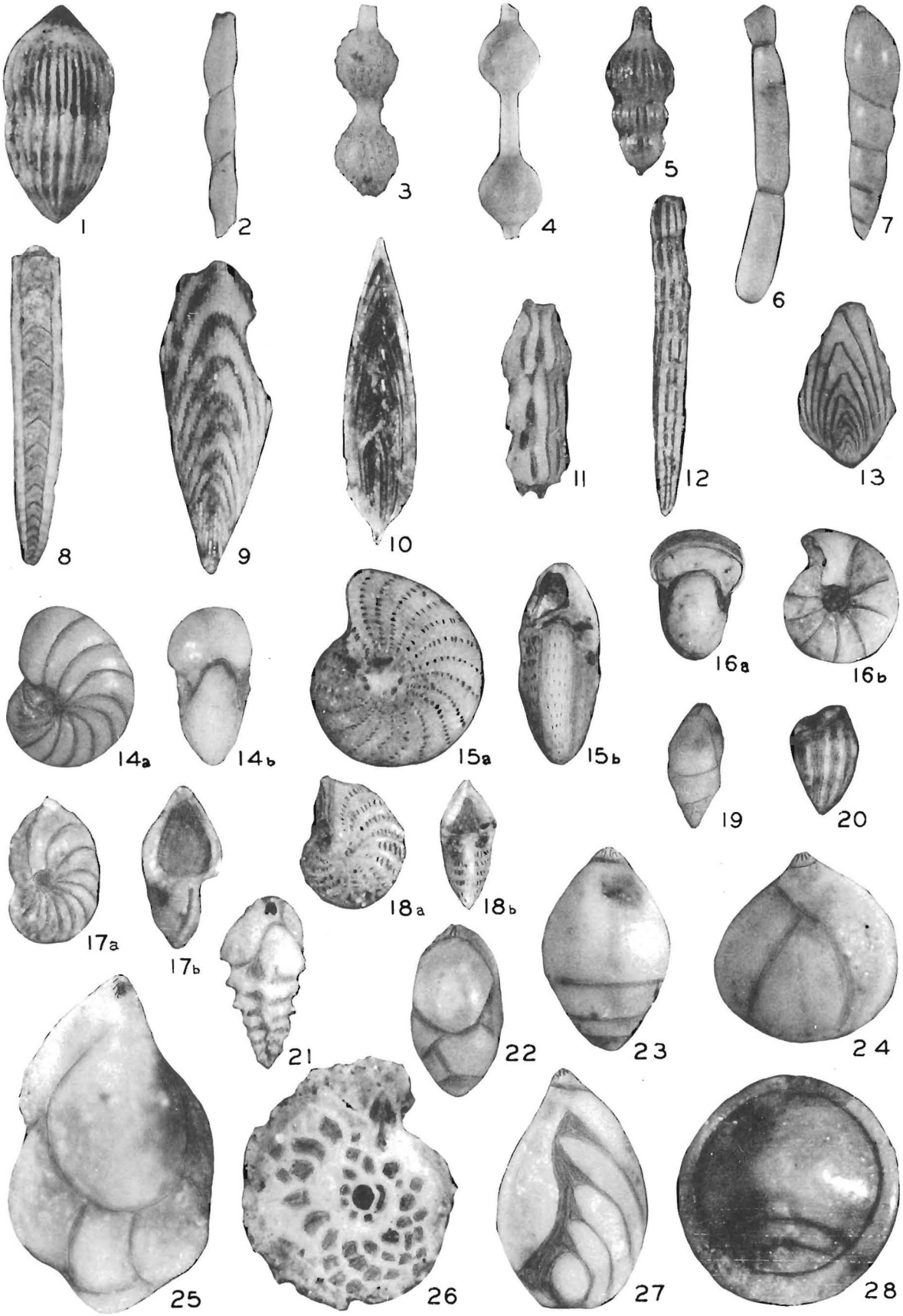
Genus **Pseudonodosaria** Boomgaart, 1949

Pseudonodosaria comatula (Cushman)

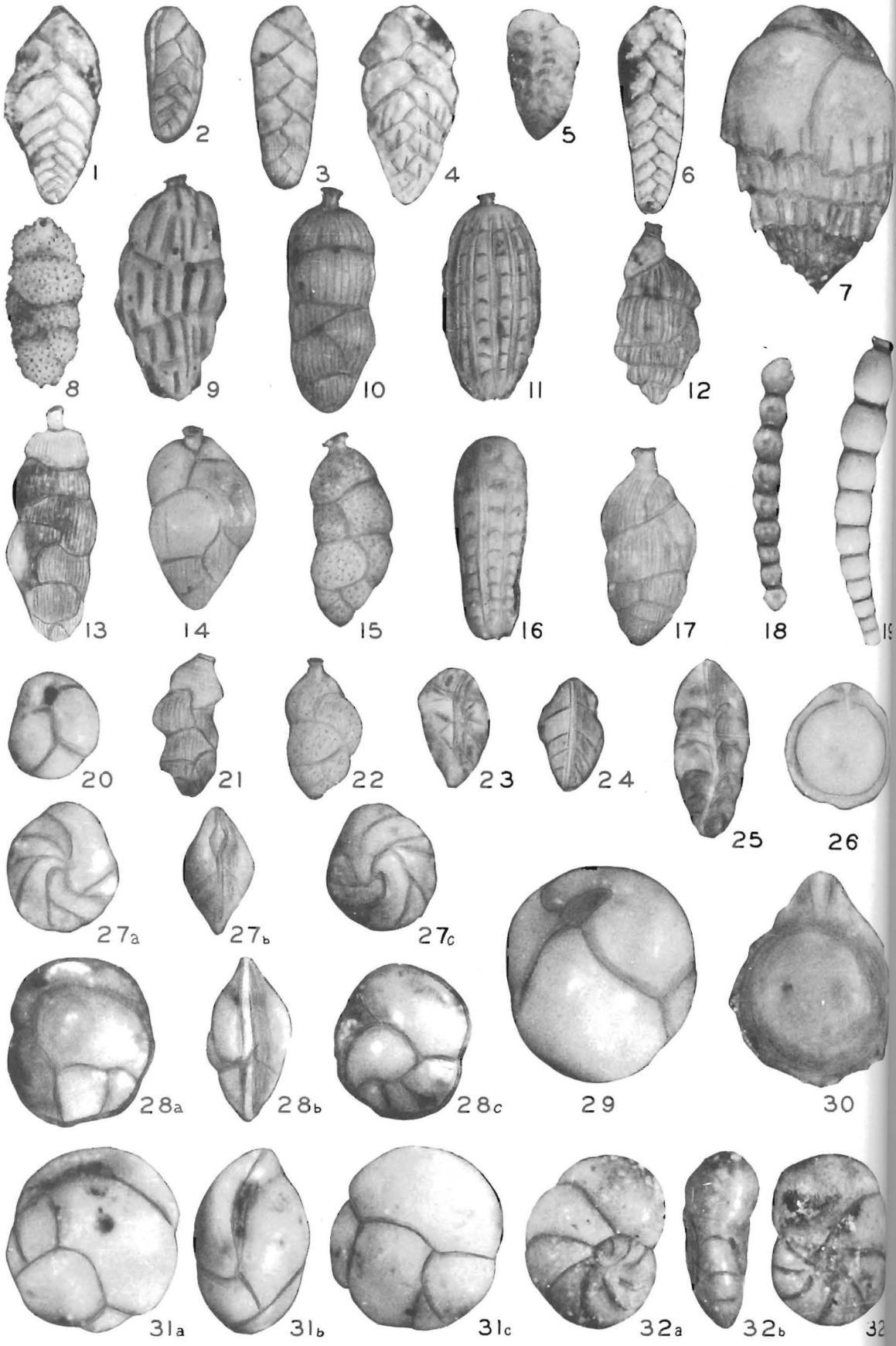
Plate 3, figure 1

Nodosaria comata (BATSCH). BRADY, 1884, Rep. Voy. *Challenger*, Zool., vol. 9, p. 509, pl. 64, figs. 1-5;

EXPLANATION OF PLATE 3



Becker and Dusenbury: Oligo-Miocene Foraminifera from Colombia



Becker and Dusenbury: Oligo-Miocene Foraminifera from Colombia

Recent, Bermuda Islands and West Indies. Not *Nautilus (Orthoceras) comatus* BATSCH, 1791.

Nodosaria radicula (LINNAEUS), var. *raphanus* Goës, 1882, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, pl. 1, figs. 9, 10; Recent, Caribbean. Not *Nautilus raphanus* LINNAEUS, 1758 (=*Nodosaria*).

Nodosaria comata Goës, 1896, Bull. Mus. Comp. Zoöl., vol. 29, p. 60; Recent, Caribbean.—FLINT, 1899, Rep. U. S. Nat. Mus., 1897, p. 311, pl. 57, fig. 3; Recent, Gulf of Mexico and coast of Georgia. Not *Nautilus (Orthoceras) comatus* BATSCH, 1791.

Nodosaria comatula CUSHMAN, 1923, U. S. Nat. Mus., Bull. 104, pt. 4, p. 83, pl. 14, fig. 5; Recent, Gulf of Mexico.

Pseudoglandulina comatula (CUSHMAN). NUTTALL, 1932, Journ. Pal., vol. 6, p. 16; lower Oligocene, Alazán formation, Mexico.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 274; lower Oligocene, Cuba.—HEDBERG, 1937, Journ. Pal., vol. 11, p. 673, pl. 91, figs. 9, 10; upper Oligocene, Carapita formation, Venezuela.—D. K. PALMER, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 284; upper Oligocene, Cojímar formation, Cuba.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 546 (list); Oligocene part of Brasso formation (Esmeralda member), Trinidad, B.W.I.—FRANKLIN, 1944, Journ. Pal., vol. 18, p. 312, pl. 45, fig. 16; Oligocene, Carapita formation, Venezuela.—CUSHMAN and TODD, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 29, pl. 4, fig. 25; Miocene, Buff Bay, Jamaica.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 17; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 153, pl. 5, fig. 12; Oligocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 161, pl. 10, fig. 41; middle Oligocene-Miocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 354 (list); Eocene to Recent, Cuba.

Glandulina comatula (CUSHMAN). GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 338, pl. 11, fig. 1; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.

Dimensions of plesiotype: Length, 0.95 mm.; diameter, 0.48 mm.

Type.—Plesiotype (USNM 624981) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—This species belongs to the genus *Pseudonodosaria,* which was erected by Boomgaart in 1949. It has early embracing chambers, but the later ones are considered to be nodosarian. Specimens of this species are common in the samples from both Uitpa and Sillamana, Colombia.

EXPLANATION OF PLATE 4

Genus **Saracenaria** Defrance, 1824

Saracenaria italica Defrance, var. **carapitana** Franklin

Plate 2, figures 14a, b

Saracenaria italica Defrance (?). Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 88, pl. 13, fig. 14; Tertiary, Venezuela. Not Defrance, 1824.

Cristellaria italica (Defrance). Nuttall, 1932, Journ. Pal., vol. 6, p. 11; lower Oligocene, Alazán formation, Mexico. Not *Saracenaria italica* Defrance.

Saracenaria italica Defrance, var. Cushman. D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 276; lower Oligocene, Cuba.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 284; upper Oligocene, Cojímar formation, Cuba.

Saracenaria italica Defrance, var. *carapitana* Franklin, 1944, Journ. Pal., vol. 18, p. 312, pl. 45, fig. 14; Oligocene, Carapita formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 18; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 162, pl. 5, fig. 18; Oligocene and Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 1.30 mm.; breadth, 0.95 mm.

Type.—Plesiotype (USNM 624982) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—The specimens from the Goajira Peninsula closely resemble the form figured by Renz from the Agua Salada group, Venezuela.

Saracenaria senni Hedberg

Plate 2, figures 15a, b

Saracenaria senni Hedberg, 1937, Journ. Pal., vol. 11, p. 674, pl. 90, figs. 18a, b; upper Oligocene, Carapita formation, Venezuela.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 545 (list); Agua Salada formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 18; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 163, pl. 5, fig. 21; Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 359 (list); middle and upper Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.92 mm.; breadth, 0.60 mm.

Type.—Plesiotype (USNM 624983) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—Specimens from both Uitpa and Sillamana, Colombia, are identical with this species, which is believed to range from the middle Oligocene to Mio-Oligocene.

Genus **Lingulina** d'Orbigny, 1826

Lingulina ponceana Galloway and Heminway

Plate 3, figure 28

Lingulina ponceana Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 352, pl. 11, figs. 11a, b; middle Oligocene, Ponce formation, Puerto Rico.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 17, pl. 5, fig. 1; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotype: Length, 1.20 mm.; width, 1.15 mm.; thickness, 0.55 mm.

Type.—Plesiotype (USNM 624984) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A single specimen from the Goajira Peninsula material seems to belong to this species described from the Ponce formation of Puerto Rico.

Genus **Vaginulina** d'Orbigny, 1826

Vaginulina sp., cf. **V. clavata** Costa

Plate 2, figure 11

Dimensions of figured specimen: Length, 3.12 mm.; diameter, 0.49 mm.

Type.—Figured specimen (USNM 624985) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A number of specimens in the Colombian material resemble *Vaginulina clavata* Costa, 1855. They are closer to the figure depicted by Bermúdez (1949) of a specimen from the middle Oligocene Sombrerito formation of the Dominican Republic than they are to the original figures of Costa, but this may be due to the poor quality of Costa's drawing.

Vaginulina mexicana Nuttall

Plate 2, figure 10

Vaginulina elegans d'Orbigny, var. *mexicana* Nuttall, 1932, Journ. Pal., vol. 6, p. 16, pl. 3, figs. 12, 16; lower Oligocene, Alazán formation, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 277, pl. 14, figs. 23, 24; lower Oligocene, Cuba.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 285; upper Oligocene, Cojímar formation, Cuba.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 366 (list); upper Eocene and Oligocene, Cuba.

Vaginulina mexicana Nuttall. Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 336, pl. 9, fig. 4; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 156, pl. 9, fig. 38; middle Miocene, Gurabo formation, Dominican Republic.

Dimensions of plesiotype: Length, 3.40 mm.; breadth, 0.60 mm.

Type.—Plesiotype (USNM 624986) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—A few specimens from the Goajira material seem to be very similar to this species described from Mexico. The Colombian species has been compared with topotypes of *V. elegans* d'Orbigny, var. *mexicana* Nuttall of Cushman and Stainforth (1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 5) from the Flat Rock silt (Bamboo Clay) member of the Cipero formation of Trinidad, B.W.I., and is identical with them.

Genus **Frondicularia** Defrance, 1824

Frondicularia tenuissima Hantken

Plate 3, figure 10

Frondicularia tenuissima Hantken, 1875 (1876), Magyar kir. földt. int. evkön, vol. 4, p. 36, pl. 13, fig. 11; *Clavulina-szaboi* beds, Hungary.—Nuttall, 1932, Journ. Pal., vol. 6, p. 17; lower Oligocene, Alazán formation, Mexico; 1935, vol. 9, p. 125, pl. 14, fig. 21; upper Eocene, Paují shale, Venezuela.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 278; lower Oligocene, Cuba.—Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 237, pl. 41, fig. 16; middle Miocene, Port-au-Prince, Haiti.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 340 (list); upper Eocene-middle Oligocene, Cuba.

Dimensions of plesiotype: Length, 1.20 mm.; breadth, 0.26 mm.

Type.—Plesiotype (USNM 624987) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Typical specimens of this species are abundant in the material from Sillamana, Colombia.

Genus **Fissurina** Reuss, 1850

Fissurina flintiana (Cushman)

Plate 4, figure 30

Lagena flintiana Cushman, 1923, U. S. Nat. Mus., Bull. 104, pt. 4, p. 18, pl. 3, figs. 11-13; Recent, Caribbean Sea.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 117, pl. 11, fig. 1; upper Oligocene, Trinchera formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 345 (list); Recent, Cuba.

Entosolenia flintiana (Cushman). Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 42, pl. 6, fig. 13; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 41, pl. 6, fig. 19; Miocene, Buff Bay, Jamaica.

Dimensions of plesiotype: Length, 0.76 mm.; width, 0.53 mm.

Type.—Plesiotype (USNM 624988) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—Specimens from Colombia seem very close to the forms figured by Cushman and Stainforth from the Cipero marl formation of Trinidad, B.W.I.

Fissurina sp., cf. **F. marginata** (Walker and Boys)

Plate 4, figure 26

Dimensions of figured specimen: Length, 0.24 mm.; breadth, 0.22 mm.

Type.—Figured specimen (USNM 624989) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have an internal tube and are referred to the genus *Fissurina*. They appear to be the same as *Entosolenia* cf. *marginata* (Walker and Boys) of Cushman and Stainforth (1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 42, pl. 6, figs. 8-10) from the Oligocene, Cipero marl formation, Trinidad, B.W.I. A somewhat similar form has been figured by Cushman and Todd from the Miocene, Buff Bay, Jamaica.

When our paper was already in press, we learned that Dr. Henning Lemche (1957, Bull. Zool. Nomencl., vol. 13, p. 228) had proposed placing the booklet "Testacea Minuta Rariora" by Boys and Walker (1784) on the "Official Index of Rejected and Invalid Works in Zoological Nomenclature" because it does not use strictly binominal nomenclature. If and when this proposal is adopted by the International Commission on Zoological Nomenclature, the specific name will have to be attributed to Montagu, 1803, instead of Boys and Walker, 1784.

Genus **Lagena** Walker and Jacob, 1798

Lagena acuticosta Reuss

Plate 2, figure 4

Lagena acuticosta Reuss, 1861 (1862), Sitz. Akad. Wiss. Wien, vol. 44, pt. 1, p. 305, pl. 1, fig. 4; Upper Cretaceous, Netherlands.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 281; lower Oligocene, Cuba.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 28, pl. 4, fig. 7; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 115, pl. 10, fig. 47; middle Miocene, Gurabo formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 345 (list); upper Eocene and lower Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.15 mm.; diameter, 0.12 mm.

Type.—Plesiotype (USNM 624990) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—The specimens from the Goajira Peninsula, Colombia, may be referred to this species.

Lagena sp., cf. **L. ampulla** Galloway and Heminway

Plate 2, figure 6

Dimensions of figured specimen: Length, 0.24 mm.; diameter, 0.10 mm.

Type.—Figured specimen (USNM 624991) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—The specimens from the Goajira Peninsula closely resemble those described by Galloway and Heminway from the San Sebastián formation of Puerto Rico. The test of the San Sebastián species is ornamented by 10 costae, whereas the Sillamana forms generally have 8 costae.

Lagena hexagona (Williamson)

Plate 2, figure 2

Entosolenia squammosa Montagu, var. *hexagona* Williamson, 1848, Ann. Mag. Nat. Hist., ser. 2, vol. 1, p. 20, pl. 2, fig. 23; Recent, British Isles.

Lagena hexagona (Williamson). D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 280; lower Oligocene, Cuba.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 33, pl. 5, fig. 14; Miocene, Buff Bay, Jamaica.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 117; middle and upper Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 346 (list); Pliocene, Cuba.—Redmond, 1953, Journ. Pal., vol. 27, p. 717; Miocene, Tubará beds, Colombia.

Dimensions of plesiotype: Length, 0.24 mm.; diameter, 0.19 mm.

Type.—Plesiotype (USNM 624992) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Typical specimens are present in the material from Sillamana, Colombia.

Lagena sp., cf. **L. laevis** (Montagu)

Plate 2, figure 3

Dimensions of figured specimen: Length, 0.19 mm.; diameter, 0.14 mm.

Type.—Figured specimen (USNM 624993) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—A single globular, non-ornamented specimen is compared with this species.

Lagena striata (d'Orbigny), var. **basisenta** Cushman and Stainforth

Plate 2, figure 1

Lagena striata (d'Orbigny), var. *basisenta* Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 29, pl. 4, fig. 15; Oligocene, Cipero marl formarion, Trinidad, B.W.I.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 19; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotype: Length, 0.47 mm.; diameter, 0.27 mm.

Type.—Plesiotype (USNM 624994) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A few specimens present in the material from the Goajira Peninsula, Colombia, seem to be the same as the variety described from Zone III of the Cipero marl formation, Trinidad, B.W.I.

Lagena sp., cf. **L. substriata** Williamson

Plate 2, figure 5

Dimensions of figured specimen: Length, 0.19 mm.; diameter, 0.11 mm.

Type.—Figured specimen (USNM 624995) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—A few small specimens similar to *L. substriata Williamson* (Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 33, pl. 5, fig. 15) from the Miocene of Buff Bay, Jamaica, are present in the material from Sillamana, Colombia.

Family POLYMORPHINIDAE

Subfamily POLYMORPHININAE

Genus **Guttulina** d'Orbigny, 1839

Guttulina irregularis (d'Orbigny)

Plate 3, figure 24

Globulina irregularis d'Orbigny, 1846, Foram. Foss. Bass. Tertiaire Vienne, p. 226, pl. 13, figs. 9, 10; Tertiary, Austria.

Guttulina irregularis (d'Orbigny). Cole and Gillespie, 1930, Bull. Amer. Pal., vol. 15, No. 57b, p. 9; Oligocene, Meson formation, Mexico.—Cushman, 1928, Contr. Cushman Lab. Foram. Res., vol. 5, p. 89, pl. 13, figs. 15, 16; Tertiary, Venezuela, Ecuador and Trinidad, B.W.I.—Nuttall, 1932, Journ. Pal., vol. 6, p. 18; lower Oligocene, Alazán formation, Mexico.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 282; lower Oligocene, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 553 (list); upper Agua Salada formation, Venezuela.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 5; Tertiary, St. Croix, Virgin Islands.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 138, pl. 6, fig. 1; Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 343 (list); upper Eocene and lower Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.70 mm.; breadth, 0.72 mm.; thickness, 0.37 mm.

Type.—Plesiotype (USNM 624996) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—Typical specimens are abundant at Uitpa, Colombia.

Guttulina jarvisi Cushman and Ozawa

Plate 3, figure 25

Guttulina jarvisi CUSHMAN and OZAWA, 1930, U. S. Nat. Mus. Proc., vol. 77, Art. 6, p. 39, pl. 7, figs. 4, 5; Eocene, Cipero section, Trinidad, B.W.I.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 32, pl. 4, figs. 27, 28; Oligocene, Cipero marl, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 138, pl. 6, fig. 2; Oligocene part of Agua Salada group, Venezuela.—CUSHMAN and RENZ, 1948, Special Publ. 24, Cushman Lab. Foram. Res., p. 21, pl. 4, fig. 18; Eocene, Trinidad.

Dimensions of plesiotype: Length, 1.40 mm.; breadth, 0.90 mm.

Type.—Plesiotype (USNM 624997) from Creole Serial No. 84,021 near Uitpa, Colombia.

Remarks.—A single specimen seems very similar to the types described from the Tertiary of Trinidad, B.W.I.

Genus **Glandulina** d'Orbigny, 1826

Glandulina laevigata (d'Orbigny)

Plate 3, figure 23

Nodosaria (*Glandulina*) *laevigata* D'ORBIGNY, 1826, Tabl. méth., Annales Sci. nat., sér. 1, vol. 7, p. 252, pl. 10, figs. 1-3; Pliocene to Recent.

Glandulina laevigata D'ORBIGNY, 1846, Foram. Foss. Bass. Tert. Vienne, p. 29, pl. 1, figs. 4, 5; Tertiary, Austria.—CUSHMAN and TODD, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 34, pl. 5, fig. 19; Miocene, Buff Bay, Jamaica.

Glandulina cf. *laevigata* D'ORBIGNY. CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 34, pl. 5, fig. 4; Oligocene, Cipero marl formation, Trinidad, B.W.I.

Pseudoglandulina laevigata (D'ORBIGNY). CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 17; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 154, pl. 5, figs. 14, 15; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 0.72 mm.; diameter, 0.47 mm.

Type.—Plesiotype (USNM 624998) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—This species occurs frequently in the samples from the Goajira Peninsula. Thin sections indicate that the initial chambers are biserial; the specimens therefore should be referred to the genus *Glandulina*.

Genus **Sigmomorphina** Cushman and Ozawa, 1928

Sigmomorphina trinitatensis Cushman and Ozawa

Plate 3, figure 27

Sigmomorphina trinitatensis CUSHMAN and OZAWA, 1930, Proc. U. S. Nat. Mus., vol. 77, p. 134, pl. 36, figs. 1, 2; Eocene, Trinidad, B.W.I.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 34, pl. 5, fig. 5; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 20; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 163, pl. 11, figs. 8, 9; middle Oligocene, Sombrerito formation, Dominican Republic.

Dimensions of plesiotype: Length, 0.97 mm.; breadth, 0.62 mm.; thickness, 0.27 mm.

Type.—Plesiotype (USNM 624999) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with topotypes of *S. trinitatensis* Cushman and Ozawa from Zone II of the Cipero marl formation of Trinidad and seem identical.

Family NONIONIDAE

Genus **Nonion** de Montfort, 1808

Nonion costifer (Cushman)

Plate 3, figures 17a, b

Nonionina costifera CUSHMAN, 1926, Contr. Cushman Lab. Foram. Res., vol. 1, p. 90, pl. 13, figs. 2a-c; Miocene, Monterey shale, California.

Nonion mediocostatum RENZ (not *Nonionina mediocostata* CUSHMAN), 1942, Proc. 8th Amer. Sci. Congress, p. 553 (list); upper Agua Salada formation, Venezuela.

Nonion costiferum (CUSHMAN). RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 148, pl. 6, figs. 5a, b; pl. 12, figs. 6a, b; Oligocene-Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 0.38 mm.; breadth, 0.26 mm.; thickness, 0.20 mm.

Type.—Plesiotype (USNM 625000) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Numerous specimens from the Goajira Peninsula are assigned to this species.

Nonion incisus (Cushman), var. **kernensis** Kleinpell

Plate 3, figures 14a, b

Nonion incisum (CUSHMAN). CUSHMAN and PARKER, 1931, Contr. Cushman Lab. Foram. Res., vol. 7, p. 7, pl. 1, figs. 26a, b; Miocene, Temblor formation, California. Not *Nonionina incisa* CUSHMAN.

Nonion incisum (CUSHMAN), var. *kernensis* KLEIN-

PELL, 1938, Miocene Stratigraphy of California, p. 232; Miocene, Temblor formation, California.

Nonion beltridgensis HEDBERG (not BARBAT and JOHNSON), 1937, Journ. Pal., vol. 11, p. 674, pl. 91, figs. 11a, b; upper Oligocene, Carapita formation, Venezuela.

Nonion incisum (CUSHMAN), var. *kernensis* KLEINPELL, RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 148, pl. 6, figs. 4a, b; Oligocene and Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 0.62 mm.; breadth, 0.45 mm.; thickness, 0.33 mm.

Type.—Plesiotype (USNM 625001) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens occur abundantly in the material from the Goajira Peninsula. This species has been compared with *N. beltridgensis* Hedberg (not Barbat and Johnson) from the Carapita formation of eastern Venezuela and seems identical.

Nonion pompilioides (Fichtel and Moll)

Plate 3, figures 16a, b

Nautilus pompilioides FICHTEL and MOLL, 1798, Test. Micr., p. 31, pl. 2, figs. a-c; Recent, Mediterranean Sea.

Nonion pompilioides (FICHTEL and MOLL). CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 89, pl. 13, figs. 25a, b; Tertiary, Ecuador, Venezuela and Trinidad, B.W.I.—GALLOWAY and MORREY, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 43, pl. 6, fig. 15; Tertiary, Manta, Ecuador.—NUTTALL, 1932, Journ. Pal., vol. 6, p. 18; lower Oligocene, Alazán formation, Mexico.—DORR, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—HADLEY, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 14, pl. 2, figs. 1, 2; Oligocene, Cuba.—CORYELL and RIVERO, 1940, Journ. Pal., vol. 14, p. 333; middle Miocene, Port-au-Prince, Haiti.—D. K. PALMER, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 289; upper Oligocene, Cojímar formation, Cuba.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 357, pl. 14, figs. 1a, b; upper Oligocene and lower Miocene, Ponce formation; upper Oligocene, Cibao formation, Puerto Rico.—D. K. PALMER, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 42; Miocene, Bowden formation, Jamaica.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 35, pl. 5, fig. 8; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 5; Tertiary, St. Croix, Virgin Islands.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 149, pl. 5, figs. 31a, b, 32; Oligocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 167; Miocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 351 (list); middle Oligocene-lower Miocene, Cuba.

Dimensions of plesiotype: Length, 0.40 mm.; breadth, 0.34 mm.; thickness, 0.29 mm.

Type.—Plesiotype (USNM 625002) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—As the synonymy indicates, this species is common in the Tertiary of the Caribbean area. Hofker split *Nonion* in 1951 and assigned *N. pompilioides* to his new genus *Gavelinonion*, which has so far received little acceptance.

Genus **Pullenia** Parker and Jones, 1862

Pullenia bulloides (d'Orbigny)

Plate 7, figures 2a, b

Nonionina bulloides D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 293, (*nomen nudum*); 1846, Foram. Foss. Bass. Tert. Vienne, p. 107, pl. 5, figs. 9, 10; Tertiary, Austria and Italy.

Pullenia bulloides (D'ORBIGNY). GALLOWAY and MORREY, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 43, pl. 6, fig. 16; Tertiary, Manta, Ecuador.—DORR, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 554 (list); upper Agua Salada formation, Venezuela.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 360, pl. 15, figs. 4a, b; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 66, pl. 12, fig. 10; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN and TODD, 1945, Special Publ 15, Cushman Lab. Foram. Res., p. 64, pl. 11, fig. 5; Miocene, Buff Bay, Jamaica.—CUSHMAN, 1946, U. S. Geol. Survey, Prof. Paper 210-A, p. 12; Tertiary, St. Croix, Virgin Islands.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 39; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 154, pl. 10, fig. 2; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 276, pl. 21, figs. 28, 29; Miocene, Dominican Republic.

Dimensions of plesiotype: Diameter, 0.29 mm.; thickness, 0.20 mm.

Type.—Plesiotype (USNM 625003) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Numerous typical specimens occur both at Sillamana and Uitpa, Colombia.

Pullenia quinqueloba (Reuss)

Plate 6, figures 3a, b

Nonionina quinqueloba Reuss, 1851, Zeitschr. deutsch. geol. Ges., vol. 3, p. 71, pl. 5, fig. 31; Oligocene, Germany.

Pullenia quinqueloba (Reuss). Brady, 1884, Rep. Voy. *Challenger*, Zool., vol. 9, p. 617, pl. 84, figs. 14, 15; Recent, Atlantic and Pacific.—Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 44, pl. 6, fig. 17; Tertiary, Manta, Ecuador.—Nuttall, 1932, Journ. Pal., vol. 6, p. 28; lower Oligocene, Alazán formation, Mexico.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 309; lower Oligocene, Cuba.—Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 333; middle Miocene, Port-au-Prince, Haiti.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 3, p. 284; upper Oligocene, Cojímar formation, Cuba.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 66, pl. 12, fig. 9; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 13; Tertiary, St. Croix, Virgin Islands.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 276, pl. 21, figs. 32, 33; Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 355 (list); Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 0.42 mm.; thickness, 0.28 mm.

Type.—Plesiotype (USNM 625004) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Rare specimens of this species occur near Uitpa, Colombia.

Family ELPHIDIIDAE

Genus **Elphidium** de Montfort, 1808

Elphidium sp., cf. **E. lens** Galloway and Heminway

Plate 3, figures 15a, b

Dimensions of figured specimen: Length, 0.60 mm.; breadth, 0.54 mm.; thickness, 0.22 mm.

Type.—Figured specimen (USNM 625005) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—A number of specimens from the Goajira Peninsula are similar to *E. lens* Galloway and Heminway (New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, 1941, p. 361, pl. 14, figs. 10a, b) from the middle Oligocene San Sebastián formation of Puerto Rico. However, the periphery is slightly more rounded, and there are only 20 chambers in the final whorl instead of 28-30.

Elphidium owenianum (d'Orbigny)

Plate 3, figures 18a, b

Polystomella oweniana d'Orbigny, 1839, Voy. Amér. Mérid., vol. 5, pt. 5, p. 30, figs. 3, 4; Recent, coast of Patagonia, to the south of Río Negro.

Elphidium owenianum (d'Orbigny). Cushman, 1930, U. S. Nat. Mus., Bull. 104, pt. 7, p. 21, pl. 8, figs. 10-12; Recent, Falkland Islands.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 363, pl. 14, figs. 9a, b; middle Oligocene-lower Miocene, Puerto Rico.

Dimensions of plesiotype: Diameter, 0.51 mm.; thickness, 0.23 mm.

Type.—Plesiotype (USNM 625006) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A single specimen from Uitpa, Colombia, seems to belong to this species recorded from Puerto Rico.

Family NUMMULITIDAE

Subfamily HETEROSTEGININAE

Genus **Heterostegina** d'Orbigny, 1826

Heterostegina (?) sp.

Plate 3, figure 26

Dimensions of specimen: Diameter, 1.40 mm.; maximum thickness, 0.55 mm.

Specimen (USNM 625007) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A single specimen was found in the material from the Goajira Peninsula. Additional specimens are necessary to make a more definite determination.

Family BULIMINIDAE

Subfamily TURRILININAE

Genus **Buliminella** Cushman, 1911

Buliminella basistriata Cushman and Jarvis, var. **nuda** Howe and Wallace

Plate 3, figure 19

Buliminella basistriata Cushman and Jarvis, var. *nuda* Howe and Wallace, 1932, Louisiana Dept. Cons. Geol. Bull., No. 2, p. 60, pl. 11, fig. 4; upper Eocene, Jackson, Louisiana.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 23; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Buliminella cf. *basistriata* Cushman and Jarvis, var. *nuda* Howe and Wallace. Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 123, pl. 6, fig. 10; Oligocene and Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 0.23 mm.; diameter, 0.10 mm.

Type.—Plesiotype (USNM 625008) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Numerous specimens from the material from Sillamana, Colombia, seem very close to this variety described from the Eocene of Louisiana.

Subfamily BULIMININAE

Genus **Bulimina** d'Orbigny, 1826

Bulimina alazanensis Cushman

Plate 3, figure 20

Bulimina alazanensis CUSHMAN, 1927, Journ. Pal., vol. 1, p. 161, pl. 25, fig. 4; Alazán clay, Mexico.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 286; lower Oligocene, Cuba.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 40, pl. 6, fig. 2; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 7; Tertiary, St. Croix, Virgin Islands.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 23; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—CUSHMAN and RENZ, 1948, Special Publ. 24, Cushman Lab. Foram. Res., p. 25, pl. 5, figs. 14, 15; upper Eocene, Hospital Hill formation, Trinidad, B.W.I.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 180, pl. 12, fig. 1; middle and upper Oligocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 331 (list); upper Eocene and Oligocene, Cuba.

Bulimina cf. *alazanensis* CUSHMAN. RENZ, Geol. Soc. Amer., Mem. 32, 1948, p. 120, pl. 6, fig. 14; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 0.20 mm.; diameter, 0.13 mm.

Type.—Plesiotype (USNM 625009) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with those from the Ste. Croix and Cipero marl formations of southern Trinidad and appear to be the same.

Bulimina alligata Cushman and Laiming

Plate 3, figure 21

Bulimina inflata SEGUENZA, var. *alligata* CUSHMAN and LAIMING, 1931, Journ. Pal., vol. 5, p. 107, pl. 11, figs. 17a, b; Miocene, "Temblor clay shale," California.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 122, pl. 6, fig. 13; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Bulimina alligata CUSHMAN and LAIMING. CUSHMAN and PARKER, 1947, U. S. Geol. Surv., Prof. Paper 210-D, p. 112, pl. 26, fig. 14; Miocene and Pliocene, California.

Dimensions of plesiotype: Length, 0.51 mm.; diameter, 0.25 mm.

Type.—Plesiotype (USNM 625010) from Creole Serial No. 84,037, Sillamana, Colombia.

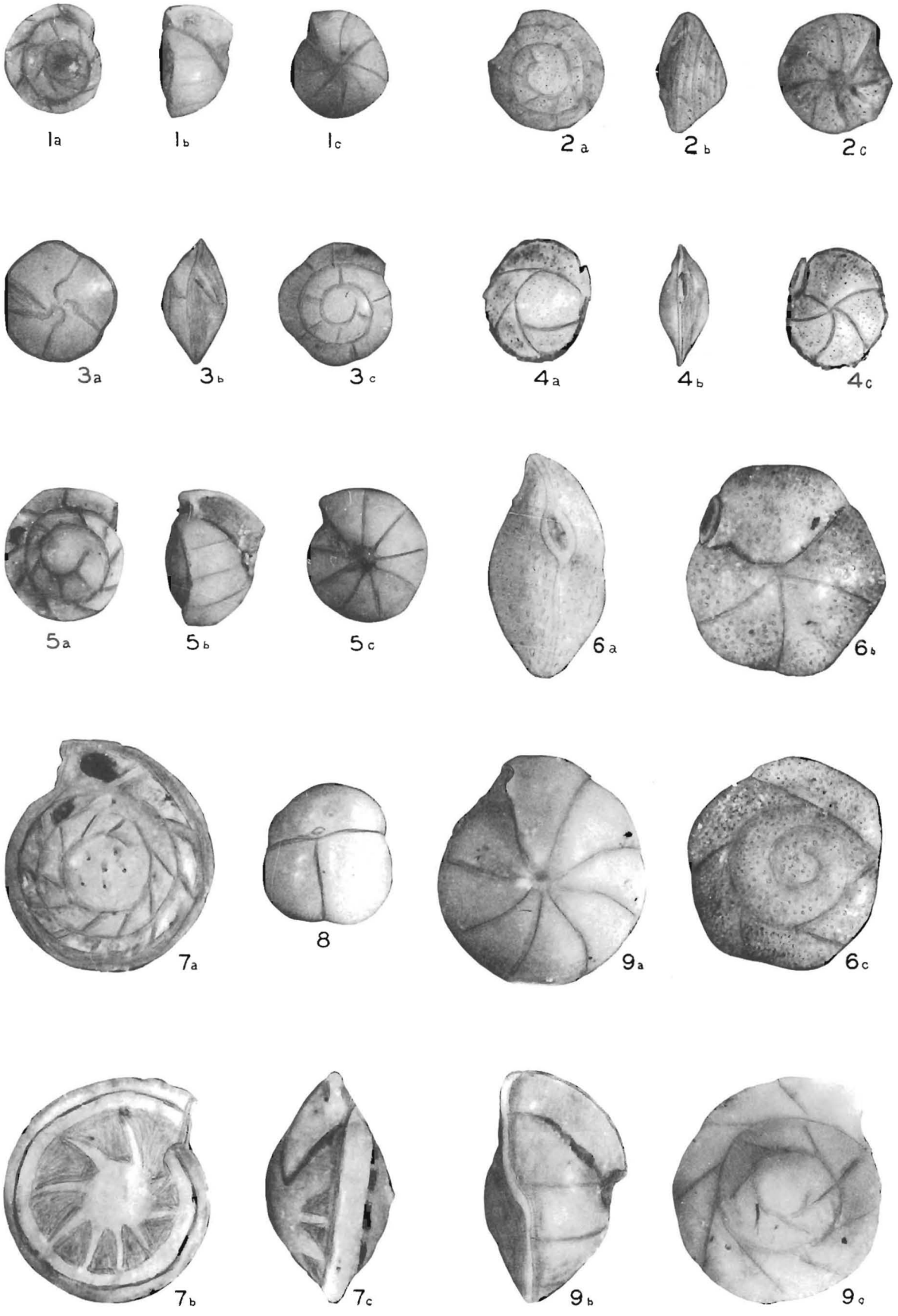
Remarks.—Abundant specimens are present in the material from Sillamana, Colombia. The figured specimen is very similar to the species illustrated by Renz from the Agua Salada group of Venezuela.

Bulimina bleeckeri Hedberg

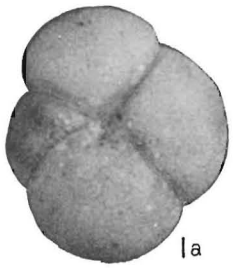
Plate 4, figure 7

Bulimina bleeckeri HEDBERG, 1937, Journ. Pal., vol. 11, p. 675, pl. 91, figs. 12, 13; upper Oligocene, Carapita formation, Venezuela.—D. K. PALMER, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 295; upper Oligocene, Cojímar formation, Cuba.—FRANKLIN, 1944, Journ. Pal., vol. 18, p. 314, pl. 46, fig. 14; Oligocene, Carapita formation, Venezuela.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 41, pl. 6, fig. 4; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 24; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 180, pl. 12, fig. 7; middle and upper Oligocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 331 (list); middle and upper Oligocene, Cuba.

EXPLANATION OF PLATE 5



Becker and Dusenbury: Oligo-Miocene Foraminifera from Colombia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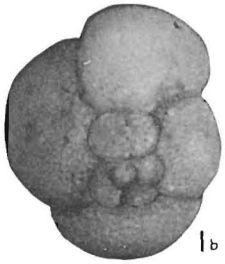
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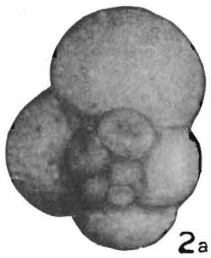
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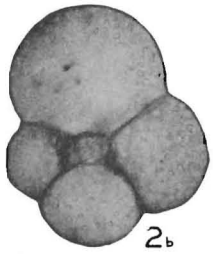
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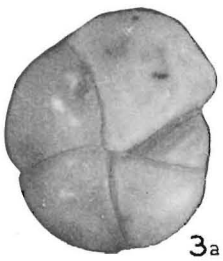
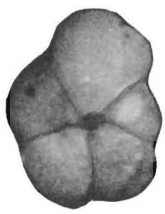
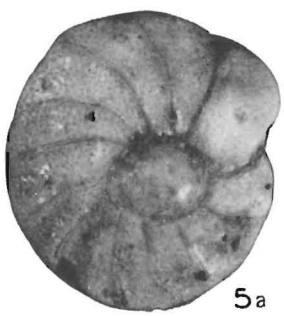

3a


3b


4a

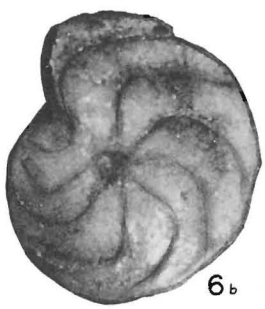

4b


6c


5a


5b


6a


6b


5c

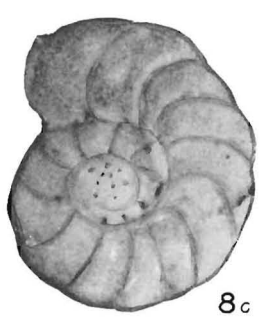

7a


7b


7c


8a


8b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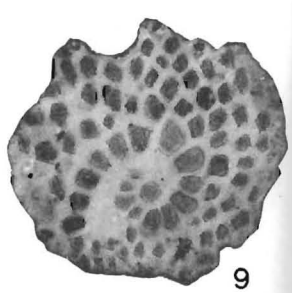

9

Becker and Dusenbury: Oligo-Miocene Foraminifera from Colombia

Dimensions of plesiotype: Length, 0.68 mm.; diameter, 0.44 mm.

Type.—Plesiotype (USNM 625011) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens, which occur abundantly near Uitpa, Colombia, are very similar to those described from the Carapita formation of eastern Venezuela.

Bulimina pupoides d'Orbigny

Plate 3, figure 22

Bulimina pupoides d'Orbigny, 1846, Foram. Foss. Bass. Tert. Vienne, p. 185, pl. 11, figs. 11, 12; Tertiary, Austria.—Nuttall, 1932, Journ. Pal., vol. 6, p. 19, pl. 2, fig. 9; lower Oligocene, Alazán formation, Mexico.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 296; upper Oligocene, Cojímar formation, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 548 (list); Oligocene, Cipero formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 122, pl. 6, figs. 11, 12; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 183, pl. 11, fig. 67; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 331 (list); Eocene and Oligocene, Cuba.

Bulimina cf. *B. pupoides* d'Orbigny. D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 287; lower Oligocene, Cuba.

Bulimina pupoides d'Orbigny?. Hedberg, 1937, Journ. Pal., vol. 11, p. 676; upper Oligocene, Carapita formation, Venezuela.

Dimensions of plesiotype: Length, 0.70 mm.; diameter, 0.35 mm.

Type.—Plesiotype (USNM 625012) from Creole Serial No. 64,962 near Uitpa, Colombia.

Remarks.—A few specimens from near Uitpa, Colombia, seem to belong to this species described from the Miocene of Nussdorf and Baden, Vienna Basin, Austria.

Subfamily VIRGULININAE

Genus **Bolivina** d'Orbigny, 1839

Bolivina byramensis Cushman

Plate 4, figure 4

Bolivina caelata Cushman (part), 1923, U. S. Geol. Survey Prof. Paper 133, p. 19 (not pl. 2, fig. 2); Oligocene, Vicksburg, Alabama.—Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 93, pl. 13, fig. 28; Tertiary, Venezuela.—Nuttall, 1932, Journ. Pal., vol. 6, p. 20, pl. 5, fig. 3; lower Oligocene, Alazán formation, Mexico.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.

Bolivina caelata Cushman, var. *byramensis* Cushman, 1923, U. S. Geol. Survey Prof. Paper 133, p. 19, pl. 1, fig. 9; Oligocene, Vicksburg group, Mississippi.

Bolivina byramensis Cushman, 1937, Special Publ. 9, Cushman Lab. Foram. Res., p. 69, pl. 8, figs. 18-20; References.—Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 341, pl. 44, figs. 17a-c; middle Miocene, Port-au-Prince, Haiti.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 416, pl. 30, figs. 11a, b; upper Oligocene, Cibao formation, Puerto Rico.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 548 (list); Oligocene, Cipero formation, Trinidad, B.W.I.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 47, pl. 7, fig. 20; Miocene, Buff Bay, Jamaica.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 26; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 117, pl. 6, fig. 22; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 187, pl. 12, fig. 29; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 329, (list); upper Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.44 mm.; breadth, 0.21 mm.

Type.—Plesiotype (USNM 625013) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Numerous specimens are found in the Goajira Peninsula material. They have been compared with *B. byramensis* Cushman from Pearl River Bridge, Hinds County, Mississippi, and are thought to be identical.

EXPLANATION OF PLATE 6

Bolivina caudriae Cushman and Renz

Plate 4, figure 6

Bolivina caudriae Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 19, pl. 3, figs. 13, 14; upper Oligocene-lowermost Miocene, lower Agua Salada formation (Zones 1, 2), Venezuela.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 117, pl. 7, figs. 1a, 1b, 2; Oligocene part of Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 0.65 mm.; width, 0.22 mm.

Type.—Plesiotype (USNM 625014) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A few typical specimens of this species, known only from the Agua Salada group of Venezuela, occur near Uitpa, Colombia.

Bolivina isidroensis Cushman and Renz

Plate 4, figure 3

Bolivina isidroensis Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 17, pl. 3, fig. 8; lower to middle-middle to ? upper Miocene, upper Agua Salada formation, Venezuela.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 43, pl. 6, fig. 30; Miocene, Buff Bay, Jamaica.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 118, pl. 7, figs. 5a, b; upper Oligocene and Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 330 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Length, 0.35 mm.; breadth, 0.14 mm.

Type.—Plesiotype (USNM 625015) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A few typical specimens are present in the material from near Uitpa, Colombia.

Bolivina pisciformis Galloway and Morrey

Plate 4, figure 1

Bolivina pisciformis Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 36, pl. 5, fig. 10; Tertiary, Manta, Ecuador.—Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 15, p. 93, pl. 13, fig. 26; Tertiary, Ecuador, Venezuela and Trinidad, B.W.I.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 289; lower Oligocene, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 546 (list); Oligocene part of Brasso formation (Esmeralda member), Trinidad, B.W.I.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 8; Tertiary, St. Croix, Virgin Islands.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 25, pl. 6, fig. 6; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 119, pl. 7, figs. 11, 12; Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 193, pl. 12, fig. 27; lower Miocene, Arroyo Blanco formation (Higuerito member), Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 330 (list); Oligocene, Cuba.

Bolivina pisciformis Galloway and Morrey, var., Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 43, pl. 6, fig. 29; Miocene, Buff Bay, Jamaica.

Dimensions of plesiotype: Length, 0.48 mm.; breadth, 0.20 mm.

Type.—Plesiotype (USNM 625016) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Abundant specimens occur in the material from the Goajira Peninsula, Colombia. This species is widely recorded in the Oligocene of the Caribbean area.

Bolivina plicatella Cushman

Plate 4, figure 5

Bolivina plicatella Cushman, 1930, Florida Geol. Survey Bull. 4, p. 46, pl. 8, figs. 10a, b; Miocene, Choctawhatchee marl, Florida.—Cushman, 1937, Special Publ. 9, Cushman Lab. Foram. Res., p. 89, pl. 11, figs. 3, 4; Miocene to Recent.—Cushman and Todd, 1945, Special Publ. 15, Cusbman Lab. Foram. Res., p. 46, pl. 7, fig. 10; Miocene, Buff Bay, Jamaica.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 330 (list); Pliocene, Cuba.—Redmond, 1953, Journ. Pal., vol. 27, p. 721, pl. 75, figs. 13a, b; Miocene, Tubará beds, Colombia.

Dimensions of plesiotype: Length, 0.48 mm.; breadth, 0.20 mm.

Type.—Plesiotype (USNM 625017) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with topotypes of this species from the Choctawhatchee marl of Florida and are believed to be identical.

Bolivina tongi Cushman

Plate 4, figure 2

Bolivina tongi Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 93, pl. 13, figs. 29a, b; Tertiary, Venezuela.—Nuttall, 1932, Journ. Pal., vol. 6, p. 21, pl. 5, fig. 4; lower Oligocene, Alazán formation, Mexico.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—D. K.

PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 290; lower Oligocene, Cuba.—D. K. PALMER, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 300; upper Oligocene, Cojímar formation, Cuba.—CUSHMAN and TODD, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 46, pl. 7, fig. 18; Miocene, Buff Bay, Jamaica.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 9; Tertiary, St. Croix, Virgin Islands.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 120, pl. 6, figs. 24, 25; Oligocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 330 (list); Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.27 mm.; breadth, 0.10 mm.

Type.—Plesiotype (USNM 625018) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—This species is common both at Uitpa and Sillamana, Colombia. The types are from the Tertiary of a sea cliff S. 55° E. of the Cemetery of Agüide, District of Zamora, State of Falcón, Venezuela.

Subfamily PLECTOFRONDICULARIINAE

Genus **Plectofrondicularia** Liebus, 1903

Plectofrondicularia floridana Cushman

Plate 3, figure 8

Plectofrondicularia floridana CUSHMAN, 1930, Florida State Geol. Survey, Bull. 4, p. 41, pl. 8, fig. 1; Miocene, Choctawhatchee marl, Florida.—D. K. PALMER, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 45; middle Miocene, Bowden formation, Jamaica.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 22, upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 152, pl. 6, fig. 19; Oligocene and Miocene, Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 175, pl. 11, fig. 42, upper Oligocene, Trinchera formation, Dominican Republic.—REDMOND, 1953, Journ. Pal., vol. 27, p. 719, pl. 75, figs. 1a, b; Miocene, Tubará beds, Colombia.

Dimensions of plesiotype: Length, 1.29 mm.; width, 0.29 mm.

Type.—Plesiotype (USNM 625019) from Creole Serial No. 84,037 near Sillamana, Colombia.

Remarks.—Specimens agreeing closely with the description and figure given by Cushman are present in the material from the Goajira Peninsula, Colombia. The Colombian species show considerable variation in the development of the median costae.

Plectofrondicularia trinitatcusis Cushman and Jarvis

Plate 3, figure 12

Plectofrondicularia trinitatensis CUSHMAN and JARVIS, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 11, pl. 2, fig. 16; Eocene, Mount Moriah beds, Trinidad, B.W.I.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 285; lower Oligocene, Cuba.—D. K. PALMER, 1941, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 293; upper Oligocene, Cojímar formation, Cuba.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 421, pl. 31, figs. 6a, b; middle Oligocene, Ponce formation, Puerto Rico.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 541 (list); Eocene, San Fernando formation, Trinidad, B.W.I.—CUSHMAN and RENZ, 1948, Special Publ. 24, Cushman Lab. Foram. Res., p. 24; upper Eocene, San Fernando formation, Trinidad, B.W.I.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 177, pl. 11, fig. 41; middle and upper Oligocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 353 (list); upper Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Length, 2.03 mm.; breadth, 0.23 mm.

Type.—Plesiotype (USNM 625020) from Creole Serial No. 84,037 near Sillamana, Colombia.

Remarks.—This species is present in samples from Sillamana and Uitpa, Colombia. It was originally described from the Eocene of Trinidad, B.W.I. Records indicate that it is present in the Oligocene of the Caribbean area.

Plectofrondicularia vaughani Cushman

Plate 3, figure 13

Plectofrondicularia vaughani CUSHMAN, 1927, Contr. Cushman Lab. Foram. Res., vol. 3, p. 112, pl. 23, fig. 3; Alazán clay, Mexico.—CUSHMAN, 1929, Journ. Pal., vol. 1, pl. 25, fig. 11; Alazán clay, Mexico.—CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 92, pl. 13, figs. 21, 22; Tertiary, Ecuador, Venezuela and Trinidad, B.W.I.—NUTTALL, 1932, Journ. Pal., vol. 6, p. 19; lower Oligocene, Alazán formation, Mexico.—DORR, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—HADLEY, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 15, pl. 2, figs. 5, 6; Oligocene, Cuba.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 285; lower Oligocene, Cuba.—HEDBERG, 1937, Journ. Pal., vol. 11, p. 675, pl. 91, fig. 17; upper Oligocene, Carapita formation, Venezuela.—CORYELL and RIVERO, 1940, Journ. Pal., vol. 14, p. 341, pl. 42, fig. 28; middle Miocene, Port-au-Prince, Haiti.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci.,

Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 422, pl. 31, figs. 7a, b; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 554 (list); Agua Salada formation, Venezuela.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 36, pl. 5, fig. 13; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 22; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 152, pl. 6, fig. 20; Oligocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 177, pl. 11, figs. 46, 47; middle and upper Oligocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 353 (list); Eocene and lower Oligocene, Cuba.

Flabellina budensis GALLOWAY and MORREY (not HANTKEN), 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 11, pl. 1, fig. 3; Tertiary, Manta, Ecuador.

Dimensions of plesiotype: Length, 0.55 mm.; breadth, 0.34 mm.

Type.—Plesiotype (USNM 625021) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens are very common at both Uitpa and Sillamana, Colombia. This species has a wide distribution in the Tertiary of the Caribbean area.

Plectofrondicularia yumuriana D. K. Palmer

Plate 3, figure 9

Plectofrondicularia? yumuriana D. K. PALMER, 1940, Mem. Soc. Cubana Hist. Nat., vol. 14, No. 4, p. 294, pl. 53, figs. 3, 4; upper Oligocene, Cojímar formation, Cuba.

Plectofrondicularia yumuriana D. K. PALMER, BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 177, pl. 11, fig. 43; middle and upper Oligocene, Dominican Republic.

Dimensions of plesiotype: Length, 1.57 mm.; breadth, 0.55 mm.

Type.—Plesiotype (USNM 625022) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Typical specimens of this species are present in the material from the Goajira Peninsula, Colombia.

Subfamily REUSSELLINAE

Genus **Reussella** Galloway, 1933

Reussella glabrata (Cushman)

Plate 4, figure 23

Verneuilina glabrata CUSHMAN, 1918, U. S. Geol. Survey, Bull. 676, p. 9, pl. 1, fig. 2; Pliocene, Waccamaw formation, South Carolina.

Reussella glabrata (CUSHMAN). CUSHMAN, 1937, Special Publ. 7, Cushman Lab. Foram. Res., p. 20.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 423, pl. 31, figs. 8a, b; middle Oligocene-lower Miocene, Puerto Rico.—CUSHMAN, 1945, Contr. Cushman Lab. Foram. Res., vol. 21, p. 37, pl. 6, figs. 21-23; References.—CUSHMAN and TODD, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 49, pl. 7, fig. 23; Miocene, Buff Bay, Jamaica.

Dimensions of plesiotype: Length, 0.23 mm.; greatest breadth, 0.14 mm.

Type.—Plesiotype (USNM 625023) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Only a single specimen of this species was found in the Goajira Peninsula material.

Subfamily UVIGERININAE

Genus **Uvigerina** d'Orbigny, 1826

Uvigerina auberiana d'Orbigny, var. **attenuata** Cushman and Renz

Plate 4, figure 15

Uvigerina auberiana D'ORBIGNY, var. *attenuata* CUSHMAN and RENZ, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 21, pl. 3, fig. 17; lowermost to middle Miocene, lower and upper Agua Salada formation (Zones 2-6), Venezuela.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 49, pl. 7, fig. 18; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 28; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 173, pl. 7, figs. 20a, b; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Dimensions of plesiotype: Length, 0.36 mm.; diameter, 0.15 mm.

Type.—Plesiotype (USNM 625024) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Rare specimens from Sillamana, Colombia, resemble the figured specimen from the Agua Salada group of Venezuela.

Uvigerina capayana Hedberg

Plate 4, figure 12

Uvigerina pigmaea D'ORBIGNY, var. *capayana* HEDBERG, 1937, Journ. Pal., vol. 11, p. 677, pl. 91, fig. 19; upper Oligocene, Carapita formation, Venezuela.—D. K. PALMER, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 183; upper Oligocene, Cojímar formation, Cuba.

Uvigerina capayana Hedberg. Cushman and Edwards, 1938, Contr. Cushman Lab. Foram. Res., vol. 14, p. 80, pl. 14, fig. 1; Oligocene, Carapita formation, Venezuela.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 48, pl. 7, fig. 15; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 173, pl. 12, fig. 15; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 202, pl. 13, figs. 35, 36; middle and upper Oligocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 365 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Length, 0.40 mm.; diameter, 0.19 mm.

Type.—Plesiotype (USNM 625025) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with topotype material from the Carapita formation of eastern Venezuela and are judged to be identical.

Uvigerina carapitana Hedberg

Plate 4, figure 14

Uvigerina carapitana Hedberg, 1937, Journ. Pal., vol. 11, p. 677, pl. 91, fig. 20; upper Oligocene, Carapita formation, Venezuela.—Cushman and Edwards, 1938, Contr. Cushman Lab. Foram. Res., vol. 14, p. 82, pl. 14, fig. 2; Oligocene, Carapita formation, Venezuela.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 182; upper Oligocene, Cojímar formation, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, pp. 546, 557 (lists); Oligocene and Miocene Brasso formation, Trinidad, B.W.I.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 9; Tertiary, St. Croix, Virgin Islands.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 29, pl. 6, fig. 15; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 174, pl. 7, fig. 21; Oligocene and Miocene, Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 202, pl. 13, fig. 1; middle and upper Oligocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 365 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Length, 0.74 mm.; diameter, 0.51 mm.

Type.—Plesiotype (USNM 625026) from Creole Serial No. 84,020 near Uirpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with topotypes of this species and are somewhat larger but otherwise typical.

Uvigerina gallowayi Cushman

Plate 4, figure 9

Uvigerina alata Galloway and Morrey (not Cushman and Applin), 1929, Bull. Amer. Pal., vol. 15, p. 38, pl. 6, fig. 1; Tertiary, Manta, Ecuador.

Uvigerina gallowayi Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 94, pl. 13, figs. 33, 34; Tertiary, Ecuador and Venezuela.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 429, pl. 33, fig. 8; upper Oligocene, Cibao formation, Puerto Rico.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res. p. 48, pl. 7, fig. 14; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 49, pl. 7, fig. 24; Miocene, Buff Bay, Jamaica.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 9, Tertiary, St. Croix, Virgin Islands.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 204, pl. 13, fig. 7; middle Oligocene, Sombrerito formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 365 (list); lower Oligocene, Cuba.

Dimensions of plesiotype: Length, 1.05 mm.; diameter, 0.56 mm.

Type.—Plesiotype (USNM 625027) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Numerous specimens from Sillamana, Colombia, are typical of this species described from the Tertiary of Ecuador.

Uvigerina mantaensis Cushman and Edwards

Plate 4, figure 22

Uvigerina proboscidea Galloway and Morrey (not Schwager), 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 39, pl. 6, fig. 4; Tertiary, Manta, Ecuador.

Uvigerina mantaensis Cushman and Edwards, 1938, Contr. Cushman Lab. Foram. Res., vol. 14, p. 84, pl. 14, fig. 8; Oligocene (?), Manta, Ecuador.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, p. 430, pl. 33, fig. 7; middle Oligocene, Ponce formation, Puerto Rico.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 47, pl. 7, fig. 17; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Renz, 1947, Special Publ. 22, Cusbman Lab. Foram. Res., p. 27; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Cushman and

Renz, 1948, Special Publ. 24, Cushman Lab. Foram. Res., p. 27; middle Eocene, Penitence Hill, Fitt Trace and Navet River marls, Trinidad.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 207, pl. 13, fig. 48; middle and upper Oligocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 365 (list); middle and upper Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.30 mm.; diameter, 0.13 mm.

Type.—Plesiotype (USNM 625028) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Numerous specimens from the Goajira Peninsula, Colombia, have been compared with topotypes from the Tertiary of Manta, Ecuador, and are the same.

Uvigerina sp., cf. **U. postica** Galloway and Heminway

Plate 4, figure 17

Dimensions of figured specimen: Length, 0.40 mm.; diameter, 0.18 mm.

Type.—Figured specimen (USNM 625029) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula are similar to *U. postica* Galloway and Heminway (New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, 1941, p. 431, pl. 33, figs. 3, 4) from the upper Oligocene, Cibao formation, Puerto Rico.

Uvigerina rustica Cushman and Edwards

Plate 4, figure 8

Uvigerina auberiana Nuttall (not d'Orbigny), 1928, Quart. Journ. Geol. Soc. London, vol. 84, pl. 6, fig. 16; Tertiary, Trinidad, B.W.I.

Uvigerina hispida Galloway and Morrey (not Schwager), 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 39, pl. 6, fig. 13; Tertiary, Manta, Ecuador.—Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 95, pl. 13, fig. 35; Tertiary, Ecuador, Venezuela, and Trinidad, B.W.I.

Uvigerina rustica Cushman and Edwards, 1938, Contr. Cushman Lab. Foram. Res., vol. 14, p. 83, pl. 14, fig. 6; Oligocene (?), Venezuela.—D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 184, pl. 15, fig. 19; upper Oligocene, Cojímar formation, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 546 (list); Oligocene part of Brasso formation (Esmeralda member), Trinidad, B.W.I.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 47, pl. 7, fig. 13; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 50, pl. 7, fig. 26; Miocene, Buff Bay, Jamaica.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 9; Tertiary, St. Croix, Virgin Islands.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 27; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 175, pl. 7, figs. 23, 24; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 211, pl. 13, figs. 41-43; upper Oligocene and Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 366 (list); upper Eocene to Recent, Cuba.

Dimensions of plesiotype: Length, 0.78 mm.; diameter, 0.35 mm.

Type.—Plesiotype (USNM 625030) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Several specimens from the Goajira Peninsula, Colombia, are considered identical with this widely recorded species of the Tertiary and Recent sediments in the Caribbean area.

Genus **Rectuvigerina** Mathews, 1945

Rectuvigerina multicostata (Cushman and Jarvis)

Plate 4, figure 10

Siphogenerina multicostata Cushman and Jarvis, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 14, pl. 3, fig. 6; "Green Clay," Cipero section, Trinidad, B.W.I.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—Hadley, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 17, pl. 2, fig. 8; Oligocene, Cuba.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 435, pl. 34, figs. 3, 4; middle Oligocene, Ponce formation, Puerto Rico.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 546 (list); Oligocene part of Brasso formation (Esmeralda member), Trinidad, B.W.I.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 49, pl. 8, fig. 1; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 10; Tertiary, St. Croix, Virgin Islands.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 165, pl. 7, fig. 26; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 222, pl. 14, figs. 14, 15; middle Oligocene, Sombrerito formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 360 (list); middle Oligocene, Cuba.

Rectuvigerina multicostata (Cushman and Jarvis), Mathews, 1945, Journ. Pal., vol. 19, p. 593, pl. 82, fig. 6.

Dimensions of plesiotype: Length, 0.68 mm.; diameter, 0.28 mm.

Type.—Plesiotype (USNM 625031) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula have been compared with topotypes from Zone 11 of the Cipero marl formation of Trinidad, B.W.I., and are very similar. There is some variation in the number of longitudinal costae.

Rectuvigerina tenuicostata Becker and Dusenbury, n. sp.

Plate 4, figure 13

Test elongate, about 2½ times as long as broad, greatest diameter near the middle portion; triserial portion less than one-half of total length, followed by an intermediate biserial stage, and one to three uniserial chambers; chambers distinct, inflated; sutures distinct, depressed; wall ornamented by numerous, very fine longitudinal costae, which are continuous from chamber to chamber; aperture rounded, terminal, with a slender, cylindrical neck and slight lip. Length, 0.80 mm.; diameter, 0.30 mm.

Type.—Holotype (USNM 625032) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—This species differs from *R. multicostata* (Cushman and Jarvis) in the finer-developed costae, which are continuous from chamber to chamber, and in the lack of short spines on the early chambers. It is closely related to *R. optima* (Cushman), but differs in the continuous costae from chamber to chamber and the lack of short spines on the early chambers.

Subgenus Transversigerina Mathews, 1945

Rectuvigerina (Transversigerina) senni (Cushman and Renz)

Plate 4, figure 16

Siphogenerina senni Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 22, pl. 3, figs. 21, 22; upper Oligocene-lower to middle Miocene, lower and upper Agua Salada formation (Zones 1-3), Venezuela.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 3, p. 304; upper Oligocene, Cojímar formation, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, pp. 546, 557 (lists); Oligocene and Miocene, Brasso formation, Trinidad, B.W.I.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 30, pl. 7, fig. 5; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 165, pl. 7, figs. 29a, b, 30; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 222, pl. 14, figs. 11-13; middle and upper Oligocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 360 (list); middle and upper Oligocene, Cuba.

Siphogenerina cf. *S. senni* Cushman and Renz. Cushman, 1946, U. S. Geol. Surv. Prof. Paper 210-A, p. 10; Tertiary, St. Croix, Virgin Islands.

Siphogenerina cumingsi Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 433, pl. 34, figs. 6, 7; middle Oligocene, Ponce formation, Puerto Rico.

Siphogenerina yumuriana D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, p. 185, pl. 15, figs. 3, 4; upper Oligocene, Cojímar formation, Cuba.

Rectuvigerina (Transversigerina) senni (Cushman and Renz). Mathews, 1945, Journ. Pal., vol. 19, pp. 596, 599, pl. 83, figs. 12-14.

Dimensions of plesiotype: Length, 0.83 mm.; diameter, 0.30 mm.

Type.—Plesiotype (USNM 625033) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Thin sections indicate that in the megalospheric forms the early chambers are uniserial. If these uniserial megalospheric specimens were not found together with triserial microspheric individuals, there would be danger of misidentifying them as *Unicosiphonia* Cushman, 1945. See remarks under *Rectuvigerina transversa*.

Rectuvigerina (Transversigerina) transversa (Cushman)

Plate 4, figure 11

Siphogenerina raphanus (Parker and Jones), var. *transversus* Cushman, 1918, U. S. Nat. Mus., Bull. 103, p. 64, pl. 22, fig. 8; Oligocene, Culebra formation, Panama.

Siphogenerina raphana (Parker and Jones), var. *transversa* Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 95; Tertiary, Venezuela.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 546 (list); Oligocene part of Brasso formation (Esmeralda member), Trinidad, B.W.I.

Siphogenerina transversa Cushman. Cushman and Laiming, 1931, Journ. Pal., vol. 5, p. 112, pl. 12, fig. 13; Miocene, "Temblor clay shale," California.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—Hadley, 1934, Bull. Amer. Pal., vol. 20, No. 70-A, p. 18, pl. 2, fig. 15; Oligocene, Cuba.—Hedberg, 1937, Journ. Pal., vol. 11, p. 677, pl. 91, fig. 18; upper Oligocene, Carapita formation, Venezuela.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 185, pl. 15, figs. 5, 6; upper Oligocene, Cojímar formation, Cuba.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 30, pl. 7, figs. 2, 3; upper Oligocene, Ste. Croix

formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 166, pl. 7, figs. 27, 28; pl. 12, fig. 9; Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 224, pl. 14, figs. 1-3; middle and upper Oligocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 360 (list); middle and upper Oligocene, Cuba.

Rectuvigerina (Transversigerina) transversa (Cushman). Mathews, 1945, Journ. Pal., vol. 19, pp. 598, 599, pl. 83, fig. 7.

Dimensions of plesiotype: Length, 1.02 mm.; diameter, 0.48 mm.

Type.—Plesiotype (USNM 625034) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Abundant specimens are present in the samples collected near Uitpa, Colombia. The species is widely recorded in the Oligocene of the Caribbean area. Thin sections reveal that the megalospheric forms are uniserial throughout, while the microspheric forms are initially triserial but soon become uniserial. Consequently, the megalospheric forms fall under the definition of *Unicosiphonia* Cushman, 1935, whereas the microspheric forms would be classified as *Rectuvigerina* Mathews, 1945. Cushman (1948, Foraminifera, their classification and economic use, 4th ed., p. 52, 53), when confronted with a similar situation, where the microspheric forms resembled *Marginulina* and the megalospheric ones *Nodosaria*, decided in favor of *Marginulina* because "the microspheric form is the only one that shows the full characteristics." In accordance with this precedent, the species *senni* and *transversa* are here referred to *Rectuvigerina*, the genus in which their microspheric forms belong.

Genus **Angulogerina** Cushman, 1927

Angulogerina illingi Cushman and Renz

Plate 4, figure 24

Angulogerina illingi Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 21, pl. 3, figs. 19, 20; upper Oligocene (?) - middle Miocene, ? lower and upper Agua Salada formation (Zones 1 [?1-4), Venezuela.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 52, pl. 8, fig. 2; Miocene, Buff Bay, Jamaica.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 29; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 114, pl. 7, figs. 31, 32a, b; lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 216, pl. 13, fig. 25; middle Oligocene, Sombrerito formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 327 (list); upper Oligocene, Cojímar formation, Cuba.

Angulogerina yumuriana D. K. Palmer, 1940, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 186, pl. 15, fig. 8; upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Length, 0.22 mm.; breadth, 0.11 mm.

Type.—Plesiotype (USNM 625035) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Typical specimens of this species are present in the material from Sillamana, Colombia.

Angulogerina porrecta (Brady), var. **fimbriata** (Sidebottom)

Plate 4, figure 21

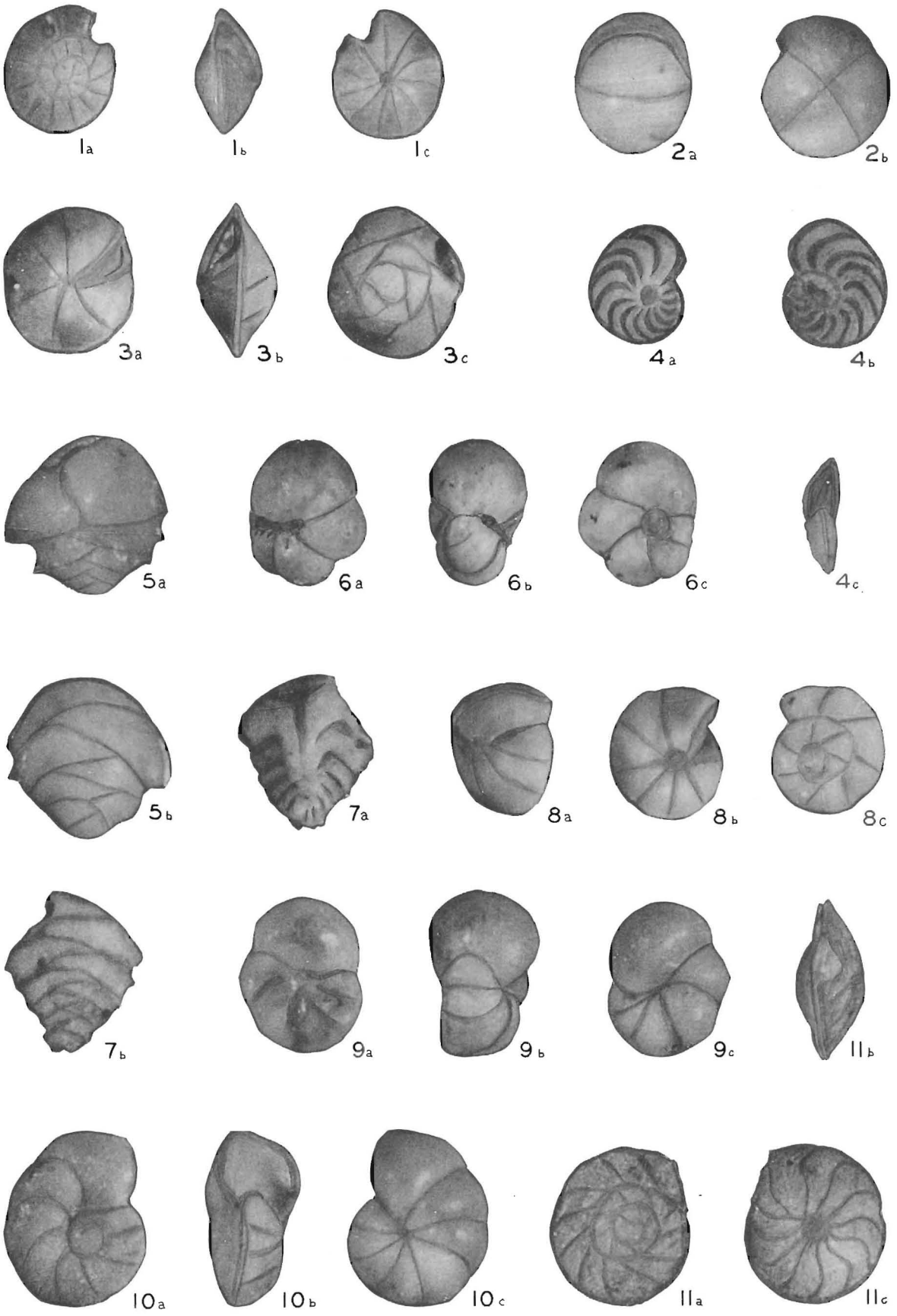
Uvigerina porrecta Brady, var. *fimbriata* Sidebottom, 1918, Journ. Roy. Micr. Soc., p. 147, pl. 5, fig. 23; Recent, New South Wales.—Bermúdez, 1935, Mem. Soc. Cubana Hist. Nat., vol. 9, p. 198; Recent, Cuba.

Angulogerina porrecta (Brady), var. *fimbriata* (Sidebottom). Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 218, pl. 13, fig. 56; Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 327 (list); Pliocene to Recent, Cuba.

Dimensions of plesiotype: Length, 0.29 mm.; breadth, 0.14 mm.

Type.—Plesiotype (USNM 625036) from Creole Serial No. 84,020 near Uitpa, Colombia.

EXPLANATION OF PLATE 7



Becker and Dusenbury: Oligo-Miocene Foraminifera from Colombia

Remarks.—Several specimens from the Goajira Peninsula may be referred to this species.

Genus **Trifarina** Cushman, 1923

Trifarina bradyi Cushman

Plate 4, figure 25

Rhabdogonium tricarinatum (D'ORBIGNY). BRADY, 1884, Rep. Voy. *Challenger*, Zool., vol. 9, p. 525, pl. 67, figs. 1-3; Recent, Atlantic Ocean. Not *Vaginulina tricarinata* D'ORBIGNY.

Trifarina bradyi CUSHMAN, 1923, U. S. Nat. Mus., Bull. 104, pt. 4, p. 99, pl. 22, figs. 3-9; Recent, Gulf of Mexico and Caribbean Sea.—CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 96, pl. 13, fig. 39; Tertiary, Venezuela.—DORR, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—D. K. PALMER, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 187; upper Oligocene, Cojímar formation, Cuba.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 437, pl. 35, figs. 4a, b; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 50, pl. 8, fig. 4; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 10; Tertiary, St. Croix, Virgin Islands. CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 31; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 172, pl. 7, fig. 33; upper Oligocene part of Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 225, pl. 13, fig. 75; middle Oligocene-Miocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 366 (list); upper Oligocene to Recent, Cuba.

Trifarina aff. *T. bradyi* CUSHMAN. D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 293; lower Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.36 mm.; breadth, 0.15 mm.

Type.—Plesiotype (USNM 625037) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Records indicate that this species is widely distributed in the Tertiary of the Caribbean area.

Genus **Stilostomella** Guppy, 1894

Stilostomella gracilis (D. K. Palmer and Bermúdez)

Plate 4, figure 18

Ellipsonodosaria gracilis D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 296, pl. 18, figs. 8, 9; lower Oligocene, Cuba.

Siphonodosaria gracilis (D. K. PALMER and BERMÚDEZ). BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 225, pl. 14, fig. 27; middle Oligocene, Sombrerito formation, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 361 (list); upper Eocene and lower Oligocene, Cuba.

Dimensions of plesiotype: Length, 1.14 mm.; diameter, 0.11 mm.

Type.—Plesiotype (USNM 625038) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—A number of specimens from Sillamana, Colombia, belong to this species described from the lower Oligocene, Finca Adelina, Cuba.

Stilostomella verneuilii (d'Orbigny)

Plate 4, figure 19

Dentalina verneuilii D'ORBIGNY, 1846, Foram. Foss. Bass. Tert. Vienne, p. 48, pl. 2, figs. 7, 8; Tertiary, Austria.

Nodosaria verneuili (D'ORBIGNY). NUTTALL, 1928, Quart. Journ. Geol. Soc. London, vol. 84, p. 81, pl. 4, figs. 14, 15; Tertiary, Trinidad, B.W.I.

Nodosarella camerani GALLOWAY and MORREY (not *Nodosaria camerani* DERVIEUX), 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 41, pl. 6, figs. 9-11; Tertiary, Manta, Ecuador.

Ellipsonodosaria verneuili (D'ORBIGNY). CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 96, pl. 14, figs. 1-3; Tertiary, Ecuador, Venezuela and Trinidad, B.W.I.—DORR, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—HADLEY, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 124, pl. 3, figs. 4-6; Oligocene, Cuba.—D. K. PALMER, 1940, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 189; upper Oligocene, Cojímar formation, Cuba.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, p. 553 (list); upper Agua Salada formation, Venezuela.—FRANKLIN, 1944, Journ. Pal., vol. 18, p. 315, pl. 46, fig. 11; Oligocene, Carapita formation, Venezuela.—CUSHMAN and STAINFORTH, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 54, pl. 9, fig. 11; Oligocene, Cipero marl formation, Trinidad, B.W.I.—CUSHMAN and TODD, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 54, pl. 8, fig. 9; Miocene, Buff Bay, Jamaica.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 11; Tertiary, St. Croix, Virgin Islands.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 32; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Ellipsonodosaria? *verneuili* (D'ORBIGNY). HEDBERG, 1937, Journ. Pal., vol. 11, p. 678, pl. 91, fig. 8; upper Oligocene, Carapita formation, Venezuela.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 131,

pl. 8, figs. 3-5; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Ellipsonodosaria verneuilii (d'Orbigny). Nuttall, 1935, Journ. Pal., vol. 9, p. 127, pl. 14, fig. 20; upper Eocene, Paují formation, Venezuela.

Nodosarella verneuili (d'Orbigny). Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 344, pl. 42, figs. 18-20, 26; middle Miocene, Port-au-Prince, Haiti.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 440, pl. 35, figs. 10a, b; upper Oligocene, Cibao formation, Puerto Rico.

Siphonodosaria verneuili (d'Orbigny). Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 227, pl. 14, fig. 24; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 361 (list); Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Length, 1.77 mm.; diameter, 0.23 mm.

Type.—Plesiotype (USNM 625039) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens are abundant in the material from Uitpa, Colombia. A study of the apertural characteristics of this species is difficult because the specimens are usually incomplete.

Family DISCORBIDAE
Subfamily VALVULINERIINAE
Genus **Valvulineria** Cushman, 1926

Valvulineria venezuelana Hedberg

Plate 4, figure 32

Valvulineria venezuelana Hedberg, 1937, Journ. Pal., vol. 11, p. 678, pl. 91, figs. 21a-c; upper Oligocene, Carapita formation, Venezuela.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 545 (list); lower Agua Salada formation, Venezuela.—Franklin, 1944, Journ. Pal., vol. 18, p. 315, pl. 46, figs. 24a, b; Oligocene, Carapita formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 34, pl. 7, fig. 16; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 178, pl. 8, figs. 9a-c; Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 259, pl. 18, figs. 10-12; middle Oligocene, Tabera formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 367 (list); middle and upper Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 0.88 mm.; thickness of last chamber, 0.36 mm.

Type.—Plesiotype (USNM 625040) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Specimens from the Goajira Peninsula have been compared with topotypes from the Carapita formation (middle zone) of eastern Venezuela. In general, the Colombian specimens have sutures not as pronounced as those of the types; however, they are very similar in all other respects.

Genus **Gyroidinoides** Brotzen, 1942

Gyroidinoides altiformis (R. E. and K. C. Stewart)

Plate 5, figures 1a, b, c

Gyroidina soldanii d'Orbigny, var. *altiformis*, R. E. and K. C. Stewart, 1930, Journ. Pal., vol. 4, p. 67, pl. 9, figs. 2a-c; Pliocene, California.—Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 337, pl. 43, figs. 19a-c; middle Miocene, Port-au-Prince, Haiti.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 192; upper Oligocene, Cojímar formation, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 553 (list); upper Agua Salada formation, Venezuela.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 57, pl. 9, fig. 3; Miocene, Buff Bay, Jamaica.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 11; Tertiary, St. Croix, Virgin Islands.

Gyroidinoides soldanii (d'Orbigny), var. *altiformis* (R. E. and K. C. Stewart). Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 140, pl. 8, figs. 13a-c; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Gyroidina altiformis R. E. and K. C. Stewart. Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 251, pl. 17, figs. 64-66; upper Oligocene and Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 343 (list); middle Oligocene to Recent, Cuba.

Dimensions of plesiotype: Diameter, 0.55 mm.; height, 0.30 mm.

Type.—Plesiotype (USNM 625041) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—This species occurs commonly and in typical form in all of the samples collected in the vicinity of Uitpa, Colombia.

Gyroidinoides sp., cf. **G. soldanii** (d'Orbigny)

Plate 5, figures 5a, b, c

Dimensions of figured specimen: Diameter, 0.70 mm.; height, 0.48 mm.

Type.—Figured specimen (USNM 625042) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Abundant specimens from the Goajira Peninsula may be compared with this species. It has been widely recorded, but the descriptions and figures suggest that more than one species may be represented. The Colombian specimens may be the same as *Gy-*

roidinoides cf. *soldanii* (d'Orbigny) (Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 140, pl. 8, figs. 14a-c) from the Oligocene part of the Agua Salada group, Venezuela.

Gyroidinoides venezuelanus Renz

Plate 7, figures 1a, b, c

Gyroidinoides venezuelana Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 141, pl. 12, figs. 21a-c; Oligocene and Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Diameter, 0.24 mm.; height, 0.12 mm.

Type.—Plesiotype (USNM 625043) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—The holotype of this species is from the Agua Salada group of Venezuela. Specimens are common in the material from Sillamana, Colombia.

Genus **Gyroidina** d'Orbigny, 1826

Gyroidina parva Cushman and Renz

Plate 7, figures 8a, b, c

Gyroidina parva Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., p. 23, pl. 4, fig. 2; upper Oligocene-middle Miocene, lower and upper Agua Salada formation (Zones 1-4), Venezuela.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 139, pl. 8, figs. 12a-c; Oligocene and Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Diameter, 0.25 mm.; maximum height, 0.25 mm.

Type.—Plesiotype (USNM 625044) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Abundant specimens from Sillamana, Colombia, are very similar to this species described from the Agua Salada formation of Venezuela.

Genus **Eponides** de Montfort, 1808

Eponides campester D. K. Palmer and Bermúdez

Plate 5, figures 9a, b, c

Eponides byramensis (Cushman), var. *cubensis* D. K. Palmer and Bermúdez, 1936, (Not *Eponides cubensis* D. K. Palmer and Bermúdez, 1936), Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 302, pl. 20, figs. 4-6; lower Oligocene, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, pp. 546, 556 (lists); Oligocene and Miocene, Brasso formation, Trinidad, B.W.I.

Eponides byramensis (Cushman), var. *campester* D. K. Palmer and Bermúdez, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 192; upper Oligocene, Cojímar formation, Cuba.

Gyroidinoides byramensis (Cushman), var. *campester* (Palmer and Bermúdez). Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 139, pl. 8, figs. 15a, b; pl. 9, fig. 1; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Eponides campester Palmer and Bermúdez. Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 245, pl. 16, figs. 40-42; middle Oligocene, Sombrerito formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 339 (list); Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 1.55 mm.; thickness, 0.98 mm.

Type.—Plesiotype (USNM 625045) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Abundant specimens from both Sillamana and Uitpa, Colombia, closely resemble this species described from the lower Oligocene of Cuba.

Eponides umbonatus (Reuss), var. **ecuadorensis** (Galloway and Morrey)

Plate 5, figures 3a, b, c

Rotalia ecuadorensis Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 26, pl. 3, fig. 13; Tertiary, Manta, Ecuador.

Eponides umbonata (Reuss). Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 98, pl. 14, figs. 8a-c; Tertiary, Venezuela and Ecuador.—Nuttall, 1932, Journ. Pal., vol. 6, p. 26, pl. 6, figs. 4, 5; lower Oligocene, Alazán formation, Mexico. Not *Rotalina umbonata* Reuss.

Eponides umbonatus (Reuss). Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 303; lower Oligocene, Cuba.—Coryell and Rivero, 1940, Journ. Pal., vol. 14, p. 336, pl. 43, figs. 21a-c; middle Miocene, Port-au-Prince, Haiti.—Franklin, 1944, Journ. Pal., vol. 18, p. 316, pl. 47, figs. 5a-c; Oligocene, Carapita formation, Venezuela. Not *Rotalina umbonata* Reuss.

Eponides umbonatus (Reuss), var. *ecuadorensis* (Galloway and Morrey). Hedberg, 1937, Journ. Pal., vol. 11, p. 679, pl. 91, fig. 22, upper Oligocene, Carapita formation, Venezuela.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 195; upper Oligocene, Cojímar formation, Cuba.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 133, pl. 12, figs. 25a, b; Oligocene and Miocene, Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 249, pl. 17, figs. 25-27; middle Miocene, Gurabo formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 340 (list); Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 0.32 mm.; thickness, 0.11 mm.

Type.—Plesiotype (USNM 625046) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Abundant specimens are assigned to this

variety. Most of the forms from the Goajira Peninsula are small and poorly preserved. Uchio (1953, Jap. Jour. Geol. Geog., vol. 23, pp. 157-158, pl. 14, figs. 8a-c) has transferred *E. umbonatus* (Reuss) to the genus *Pseudoeponides* Uchio, 1950. Since the writers are unable to observe either the dorsal or ventral supplementary apertures characteristic of *Pseudoeponides*, they prefer to retain the species in *Eponides*.

Eponides umbonatus (Reuss), var. **multisepta** Koch

Plate 5, figures 2a, b, c

Pulvinulina umbonata (Reuss), var. *multisepta* Koch, 1926, Eclogae Geol. Helvetiae, vol. 19, p. 749, text fig. 25; Tertiary, Borneo, Netherlands Indies.

Eponides umbonatus (Reuss), var. *multisepta* Koch. Cushman, 1934, Bernice P. Bishop Mus., Bull. 119, p. 130, pl. 17, fig. 4; Tertiary, Vitilevu, Fiji. —D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 303, pl. 20, figs. 7-9; lower Oligocene, Cuba.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 195; upper Oligocene, Cojímar formation, Cuba.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 250, pl. 17, figs. 28-30; middle and upper Oligocene, Dominican Republic. —Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 340 (list); upper Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 0.30 mm.; thickness, 0.12 mm.

Type.—Plesiotype (USNM 625047) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Rare specimens of this species occur in the material collected near Uitpa, Colombia.

Subfamily EPISTOMININAE

Genus **Höglundina** Brotzen, 1948

Höglundina elegans (d'Orbigny)

Plate 5, figures 7a, b, c

Epistomina elegans (d'Orbigny). Cushman, 1931, U. S. Nat. Mus., Bull. 104, pt. 8, p. 65, pl. 13, fig. 6; References, Recent.—Cushman and Jarvis, 1930, Journ. Pal., vol. 4, p. 365, pl. 34, figs. 1a-c; Miocene, Buff Bay, Jamaica.—Nuttall, 1932, Journ. Pal., vol. 6, p. 26; lower Oligocene, Alazán formation, Mexico.—D. K. Palmer, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 61; Miocene, Bowden formation, Jamaica.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 59; Miocene, Buff Bay, Jamaica.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 36; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Höglundina elegans (d'Orbigny). Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 250, pl. 17, figs. 34-36; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 345 (list); upper Eocene to Recent, Cuba.

Dimensions of plesiotype: Diameter, 0.92 mm.; thickness, 0.50 mm.

Type.—Plesiotype (USNM 625048) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Abundant specimens are present in the material collected near Uitpa, Colombia. The known range of the species in the Caribbean area is from Eocene to Recent.

Genus **Alabamina** Toulmin, 1941

Alabamina polita Becker and Dusenbury, n. sp.

Plate 7, figures 3a, b, c

Test trochoid, closely coiled, subcircular in side view, almost equally biconvex; periphery subcarinate; five to seven chambers in the last-formed whorl; wall smooth, very finely perforate; sutures flush with the surface; on the dorsal side straight, oblique to the periphery, on the ventral side radial, slightly curved; aperture long and narrow at the base of the septal face, extending from about midway between the umbilical region and the periphery outward towards the periphery and terminating at the indentation paralleling the periphery.

Diameter of holotype, 0.35 mm.; thickness, 0.14 mm.

Type.—Holotype (USNM 625049) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Specimens are abundant at Sillamana, Colombia. The final chamber of the holotype is broken off. This species resembles *A. scitula* Bandy (1949, Bull. Amer. Pal., vol. 32, No. 131, p. 89, pl. 14, fig. 6) from the lower Oligocene, Red Bluff formation, Jackson, Alabama. It differs from this species in its straight, oblique dorsal sutures and subcarinate periphery.

Subfamily SIPHONININAE

Genus **Siphonina** Reuss, 1850

Siphonina advena Cushman

Plate 5, figures 6a, b, c

Siphonina advena Cushman, 1922, U. S. Geol. Survey Prof. Paper 129-E, p. 98, pl. 22, figs. 1, 2; Oligocene, Byram calcareous marl, Mississippi.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 402, pl. 26, figs. 1a-c; middle Oligocene-lower Miocene, Puerto Rico.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 360 (list); upper Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 0.67 mm.; thickness, 0.27 mm.

Type.—Plesiotype (USNM 625050) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Frequent specimens from the Goajira Peninsula belong to this species described from the Oligocene of Mississippi.

Siphonina tenuicarinata Cushman

Plate 5, figures 4a, b, c

Siphonina tenuicarinata CUSHMAN, 1927, Journ. Pal., vol. 1, p. 166, pl. 26, figs. 11, 12; Oligocene, Alazán formation, Mexico.—CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 100; Tertiary, Venezuela and Trinidad, B.W.I.—NUTTALL, 1932, Journ. Pal., vol. 6, p. 26; lower Oligocene, Alazán formation, Mexico.—DORR, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—HADLEY, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 23; Oligocene, Cuba.—D. K. PALMER and BERMÚDEZ, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 304; lower Oligocene, Cuba.—HEDBERG, 1937, Journ. Pal., vol. 11, p. 679, pl. 92, figs. 4a, b; upper Oligocene, Carapita formation, Venezuela.—CORYELL and RIVERO, 1940, Journ. Pal., vol. 14, p. 337, pl. 43, figs. 22, 29; middle Miocene, Port-au-Prince, Haiti.—GALLOWAY and HEMINWAY, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 402, pl. 26, figs. 2a-c; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.—FRANKLIN, 1944, Journ. Pal., vol. 18, p. 316, pl. 47, figs. 7a, b; Oligocene, Carapita formation, Venezuela.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 12; Tertiary, St. Croix, Virgin Islands.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 244, pl. 16, figs. 37-39; middle Oligocene-Miocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 361 (list); Oligocene to Recent, Cuba.

Dimensions of plesiotype: Diameter, 0.40 mm.; thickness, 0.16 mm.

Type.—Plesiotype (USNM 625051) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—This species has been widely recorded in the Caribbean area, as the above references indicate. It is common at both Uitpa and Sillamana, Colombia.

Subfamily BAGGININAE

Genus **Baggina** Cushman, 1926

Baggina cojimarensis Palmer

Plate 7, figures 6a, b, c

Baggina cojimarensis D. K. PALMER, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 2, p. 198, pl. 16, figs. 13, 14; upper Oligocene, Cojímar formation, Cuba.—D. K. PALMER, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 62; Miocene, Bowden formation, Jamaica.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 37, pl. 7, fig. 22; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 260, pl. 18, figs. 34-36; middle and upper Oligocene, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 328 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Diameter, 0.70 mm.; thickness, 0.47 mm.

Type.—Plesiotype (USNM 625052) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A number of specimens from the Goajira Peninsula appear to belong to this species described from the upper Oligocene of Cuba.

Family CASSIDULINIDAE

Subfamily CASSIDULININAE

Genus **Cassidulina** d'Orbigny, 1826

Cassidulina carapitana Hedberg

Plate 4, figures 27a, b, c

Cassidulina carapitana HEDBERG, 1937, Journ. Pal., vol. 11, p. 680, pl. 92, figs. 6a, b; upper Oligocene, Carapita formation, Venezuela.—D. K. PALMER, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 3, p. 281; upper Oligocene, Cojímar formation, Cuba.—RENZ, 1942, Proc. 8th Amer. Sci. Congress, pp. 546, 556 (lists); Oligocene and Miocene, Brasso formation, Trinidad, B.W.I.—FRANKLIN, 1944, Journ. Pal., vol. 18, p. 317, pl. 47, figs. 4a, b; Oligocene, Carapita formation, Venezuela.—CUSHMAN, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 12; Tertiary, St. Croix, Virgin Islands.—CUSHMAN and RENZ, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 38, pl. 8, fig. 3; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—RENZ, 1948, Geol. Soc. Amer., Mem. 32, p. 124, pl. 9, figs. 8a, b; Oligocene and Miocene, Agua Salada group, Venezuela.—BERMÚDEZ, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 267, pl. 20, figs. 7-9; middle Oligocene, Sombrerito formation, Dominican Republic.—BERMÚDEZ, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 332 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Diameter, 0.25 mm.; thickness, 0.11 mm.

Type.—Plesiotype (USNM 625053) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Rather typical specimens of this species occur commonly in the material from the Goajira Peninsula.

Cassidulina sp., cf. C. **delicata** Cushman

Plate 4, figures 28a, b, c

Dimensions of figured specimen: Diameter, 0.34 mm.; thickness, 0.16 mm.

Type.—Figured specimen (USNM 625054) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A few specimens from the Goajira Peninsula, Colombia, are compared with this Recent species from the Pacific Ocean which already has been reported by Cushman and Todd (1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 62, pl. 10, fig. 12) from the Miocene of Buff Bay, Jamaica.

Cassidulina havanensis Cushman and Bermúdez

Plate 4, figure 31

Cassidulina havanensis Cushman and Bermúdez, 1936, Contr. Cushman Lab. Foram. Res., vol. 12, p. 36, pl. 6, fig. 11; upper Eocene, Cuba.—Bermúdez, 1937, Mem. Soc. Cubana Hist. Nat., vol. 11, p. 343.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 64, pl. 11, fig. 7; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 332 (list); upper Eocene and lower Oligocene, Cuba.

Cassidulina tricamerata Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 425, pl. 32, fig. 3; upper Oligocene, Ponce formation, Puerto Rico.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 270, pl. 20, figs. 10-12; middle and upper Oligocene, Dominican Republic.

Dimensions of plesiotype: Diameter, 0.40 mm.; thickness, 0.26 mm.

Type.—Plesiotype (USNM 625055) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A few specimens of this species have been compared with topotypes from the Eocene of Cuba and are believed to be identical.

Cassidulina subglobosa Brady

Plate 4, figure 20

Cassidulina subglobosa Brady, 1884, Rep. Voy. *Challenger*, Zool., vol. 9, p. 430, pl. 54, fig. 17; Recent.—Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 40, pl. 6, fig. 6; Tertiary, Manta, Ecuador.—Cushman, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 100, pl. 14, figs. 11a, b; Tertiary, Ecuador, Venezuela and Trinidad, B.W.I.—Nuttall, 1932, Journ. Pal., vol. 6, p. 28; lower Oligocene, Alazán formation, Mexico.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.—Hadley, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 23; Oligocene, Cuba.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5; lower Oligocene, Cuba.—Hedberg, 1937, Journ. Pal., vol. 11, p. 680, pl. 92, fig. 5; upper Oligocene, Carapita formation, Venezuela.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 3, p. 282; upper Oligocene, Cojímar formation, Cuba.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 425, pl. 32, figs. 2a, b; upper Oligocene and lower Miocene, Ponce formation, Puerto Rico.—Franklin, 1944, Journ. Pal., vol. 18, p. 317, pl. 48, fig. 1; Oligocene, Carapita formation, Venezuela.—D. K. Palmer, 1945, Bull. Amer. Pal., vol. 29, No. 115, p. 66, middle Miocene, Bowden formation, Jamaica.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 63, pl. 12, fig. 1; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 61, pl. 10, fig. 8; Miocene, Buff Bay, Jamaica.—Cushman, 1946, U. S. Geol. Surv., Prof. Paper 210-A, p. 12; Tertiary, St. Croix, Virgin Islands.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 38, pl. 8, fig. 2; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 125, pl. 9, figs. 11, 12; Oligocene and Miocene, Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 269, pl. 20, figs. 1-3; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 332 (list); upper Eocene to Recent, Cuba.

Cassidulina cf. *subglobosa* Brady. Cushman and Jarvis, 1930, Journ. Pal., vol. 4, p. 366, pl. 34, figs. 3a, b; Miocene, Buff Bay, Jamaica.

Dimensions of plesiotype: Diameter, 0.19 mm.; thickness, 0.16 mm.

Type.—Plesiotype (USNM 625056) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Abundant specimens from the Goajira Peninsula possess the typical form of this species. From the records this is a widely distributed species, both fossil and living.

Cassidulina subglobosa Brady, var. horizontalis Cushman and Renz

Plate 4, figure 29

Cassidulina subglobosa H. B. Brady, var. *horizontalis* Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 26, pl. 4, fig. 8; upper Oligocene-lower to middle Miocene, lower and upper Agua Salada formation (Zones 1-3), Venezuela.—Renz, 1942, Proc. 8th Amer. Sci. Congress, p. 548 (list); Oligocene, Cipero formation, Trinidad, B.W.I.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 63, pl. 11, fig. 9; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Renz,

1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 38; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 126, pl. 9, figs. 14a, b; Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 332 (list); middle and upper Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.59 mm.; diameter, 0.45 mm.

Type.—Plesiotype (USNM 625057) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Typical specimens are common in the material collected near Uitpa, Colombia. The holotype is from the Agua Salada group of Falcón, Venezuela.

Subfamily EHRENBERGININAE

Genus **Ehrenbergina** Reuss, 1850

Ehrenbergina navalis Hadley

Plate 7, figures 5a, b

Ehrenbergina navalis Hadley, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 23, pl. 5, figs. 4, 5; Oligocene, Cuba.—D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 3, p. 283; upper Oligocene, Cojímar formation, Cuba.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 338 (list); upper Eocene and Oligocene, Cuba.

Dimensions of plesiotype: Length, 0.44 mm.; width, 0.41 mm.

Type.—Plesiotype (USNM 625058) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Numerous specimens occur in the material from both Uitpa and Sillamana, Colombia. They appear to be identical with the topotypes from the Oligocene of Cuba.

Ehrenbergina sp.,

cf. **E. trinitatensis** Cushman and Renz

Plate 7, figures 7a, b

Dimensions of figured specimen: Length, 0.40 mm.; breadth, 0.34 mm.; thickness, 0.29 mm.

Type.—Figured specimen (USNM 625059) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—A single specimen from the Goajira Peninsula is comparable to *E. trinitatensis* Cushman and Renz (1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 38, pl. 8, fig. 4) from the upper Oligocene, Ste. Croix formation of Trinidad, B.W.I.

Family CHILOSTOMELLIDAE

Subfamily SPHAEROIDININAE

Genus **Sphaeroidina** d'Orbigny, 1826

Sphaeroidina chilostomata Galloway and Morrey

Plate 5, figure 8

Sphaeroidina bulloides d'Orbigny, var. *chilostomata* Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 32, pl. 5, fig. 1; Tertiary, Manta, Ecuador.

Sphaeroidina variabilis Cushman (not Reuss), 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 101, pl. 14, fig. 15; Tertiary, Ecuador, Venezuela and Trinidad, B.W.I.—Hedberg, 1937, Journ. Pal., vol. 11, p. 681, pl. 92, fig. 9; upper Oligocene, Carapita formation, Venezuela.—Franklin, 1944, Journ. Pal., vol. 18, p. 317, pl. 48, fig. 3; Oligocene, Carapita formation, Venezuela.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 167, pl. 9, figs. 18a, b; Oligocene and Miocene, Agua Salada group, Venezuela.

Sphaeroidina bulloides Cushman and Todd (not d'Orbigny), 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 65, pl. 11, fig. 9; Miocene, Buff Bay, Jamaica.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 40; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Sphaeroidina chilostomata Galloway and Morrey. Cushman and Todd, 1949, Contr. Cushman Lab. Foram. Res., vol. 25, p. 18, pl. 4, figs. 10-12; References.

Dimensions of plesiotype: Diameter, 0.49 mm.

Type.—Plesiotype (USNM 625060) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Abundant specimens from the Goajira Peninsula, Colombia, have been compared with topotypes of this species from the Tertiary of Manta, Ecuador, and are the same.

Family GLOBIGERINIDAE

Subfamily GLOBIGERININAE

Genus **Globigerina** d'Orbigny, 1826

Globigerina sp., cf. **G. bulloides** d'Orbigny

Plate 6, figures 2a, b

Diameter of figured specimen, 0.44 mm.

Type.—Figured specimen (USNM 625061) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Abundant specimens from the Goajira Peninsula are compared with this species, which has been recorded many times from the West Indies and South America. Many of the records are without figures. From the records accompanied by figures, it is evident that several species have been included under the name *G. bulloides* d'Orbigny.

Globigerina sp., cf. **G. concinna** Reuss

Plate 6, figures 4a, b

Diameter of figured specimen, 0.32 mm.

Type.—Figured specimen (USNM 625062) from Creole Serial No. 64,962 near Uitpa, Colombia.

Remarks.—Numerous specimens resembling this species but with a much smaller umbilicus occur in all

of the samples examined from the Goajira Peninsula, Colombia.

Globigerina venezuelana Hedberg

Plate 6, figures 1a, b

Globigerina venezuelana Hedberg, 1937, Journ. Pal., vol. 11, p. 681, pl. 92, fig. 7; upper Oligocene, Carapita formation, Venezuela.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 67, pl. 12, fig. 13; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 40; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 280, pl. 21, figs. 39, 40; upper Oligocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 342 (list); upper Eocene and Oligocene, Cuba.

Globigerina cf. *G. venezuelana* Hedberg. D. K. Palmer, 1941, Mem. Soc. Cubana Hist. Nat., vol. 15, No. 3, p. 286; upper Oligocene, Cojímar formation, Cuba.

Diameter of plesiotype, 0.70 mm.

Type.—Plesiotype (USNM 625063) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens are abundant in the material from Uitpa, Colombia. The specimens have been compared with topotypes of this species from the Carapita formation of eastern Venezuela and are thought to be identical. Some authors place this species in the genus *Globoquadrina* Finlay, 1947.

Family ANOMALINIDAE

Subfamily ANOMALININAE

Genus **Anomalinoides** Brotzen, 1942

Anomalinoides trinitatensis (Nuttall)

Plate 6, figures 5a, b, c

Truncatulina trinitatensis Nuttall, 1928, Geol. Soc. London, Quart. Journ., vol. 84, p. 97, pl. 7, figs. 3, 5, 6; Tertiary, Trinidad, B.W.I.

Cibicides trinitatensis (Nuttall). Nuttall, 1932, Journ. Pal., vol. 6, p. 33, pl. 7, fig. 9; lower Oligocene, Alazán formation, Mexico.—Hadley, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 29, pl. 4, figs. 10, 11; Oligocene, Cuba.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 315; lower Oligocene, Cuba.—Renz, 1942, Proc. 8th Amer. Sci. Congress, pp. 546, 556 (lists); Oligocene and Miocene, Brasso formation, Trinidad, B.W.I.—Cushman, 1946, Special Publ. 16, Cushman Lab. Foram. Res., p. 40, pl. 8, figs. 9-11; upper Eocene, Jackson formation (Cocoa sand member), Alabama.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab Foram. Res., p. 44, pl. 8, fig. 6; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 307, pl. 24, figs. 19-21; middle Oligocene-Miocene, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 334 (list); upper Eocene-middle Oligocene, Cuba.

Anomalinoides trinitatensis (Nuttall). Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 115, pl. 10, figs. 11a-c; Oligocene and lower Miocene part of Agua Salada group, Venezuela.

Dimensions of plesiotype: Diameter, 0.88 mm.; thickness, 0.37 mm.

Type.—Plesiotype (USNM 625064) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Numerous typical specimens occur near Uitpa, Colombia. This species has been recorded in beds ranging in age from upper Eocene through Miocene.

Genus **Planulina** d'Orbigny, 1826

Planulina sp., cf. **P. limbata** Natland

Plate 6, figures 8a, b, c

Dimensions of figured specimen: Diameter, 0.85 mm.; thickness, 0.16 mm.

Type.—Figured specimen (USNM 625065) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Numerous specimens from the Goajira Peninsula are similar to but less strongly limbate than *P. limbata* Natland (1938, Scripps Inst. Oceanography Bull., vol. 4, No. 5, p. 151, pl. 7, figs. 4a-c, 5) from Recent sediments off the Pacific coast of Costa Rica.

Planulina marialana Hadley

Plate 6, figures 7a, b, c

Planulina marialana Hadley, 1934, Bull. Amer. Pal., vol. 20, No. 70A, p. 27, pl. 4, figs. 4-6; Oligocene, Cuba.—D. K. Palmer and Bermúdez, 1936, Mem. Soc. Cubana Hist. Nat., vol. 10, No. 5, p. 313, pl. 20, figs. 10-12; lower Oligocene, Cuba.—Galloway and Heminway, 1941, New York Acad. Sci., Sci. Survey Porto Rico and Virgin Ids., vol. 3, pt. 4, p. 399, pl. 25, figs. 4a-c; upper Oligocene, Ponce formation, Puerto Rico.—Cushman and Stainforth, 1945, Special Publ. 14, Cushman Lab. Foram. Res., p. 72, pl. 14, fig. 3; Oligocene, Cipero marl formation, Trinidad, B.W.I.—Cushman and Todd, 1945, Special Publ. 15, Cushman Lab. Foram. Res., p. 69, pl. 12, fig. 4; Miocene, Buff Bay, Jamaica.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 151, pl. 10, figs. 5a, b; upper Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 291, pl. 23, figs. 28-30; middle Oligocene, Sombrerito formation, Dominican Re-

public.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 353 (list); upper Eocene and Oligocene, Cuba.

Planulina cf. *marialana* Hadley. Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 42; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.

Dimensions of plesiotype: Diameter, 1.11 mm.; thickness, 0.14 mm.

Type.—Plesiotype (USNM 625066) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens, which occur abundantly near Uitpa, Colombia, are believed to be identical with topotypes from the Oligocene of Cuba.

Subfamily CIBICIDINAE

Genus **Cibicides** de Montfort, 1808

Cibicides compressus Cushman and Renz

Plate 6, figures 6a, b, c

Cibicides floridanus (Cushman), var. *compressa* Cushman and Renz, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 26, pl. 4, fig. 9; upper Oligocene-? upper Miocene, lower and upper Agua Salada formation (Zones 1-3), Venezuela.—Renz, 1942, Proc. 8th Amer. Sci. Congress, pp. 546, 556 (lists); Oligocene and Miocene, Brasso formation, Trinidad, B.W.I.

Cibicides compressus Cushman and Renz. Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 127, pl. 10, figs. 9a-c; Oligocene and Miocene, Agua Salada group, Venezuela.

Dimensions of plesiotype: Diameter, 0.87 mm.; thickness, 0.28 mm.

Type.—Plesiotype (USNM 625067) from Creole Serial No. 64,968 near Uitpa, Colombia.

Remarks.—Rare specimens of this species described from the Agua Salada formation of Falcón, Venezuela, occur in the material from both Sillamana and Uitpa, Colombia.

Cibicides crebbsi (Hedberg)

Plate 7, figures 11a, b, c

Eponides crebbsi Hedberg, 1937, Journ. Pal., vol. 11, p. 679, pl. 92, figs. 1a-c; upper Oligocene, Carapita formation, Venezuela.—Franklin, 1944, Journ. Pal., vol. 18, p. 316, pl. 47, fig. 2; Oligocene, Carapita formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 36, pl. 7, fig. 19; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 133, pl. 12, figs. 26a, b; upper Oligocene and lower Miocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 246, pl. 17, figs. 19-21; upper Oligocene, Trinchera formation (Quita Coraza zone), Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 339 (list); upper Oligocene, Cojímar formation, Cuba.

Dimensions of plesiotype: Diameter, 0.40 mm.; thickness, 0.17 mm.

Type.—Plesiotype (USNM 625068) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Specimens from the Goajira Peninsula, Colombia, have been compared with topotypes from the Carapita formation, eastern Venezuela, and are the same. The coarse perforation of the test and the position of the aperture at the base of the apertural face extending from the periphery only a short distance ventrally necessitate the assignment of this species to *Cibicides* rather than to *Eponides*.

Cibicides sp. A

Plate 7, figures 10a, b, c

Dimensions of figured specimen: Diameter, 0.40 mm.; thickness, 0.21 mm.

Type.—Figured specimen (USNM 625069) from Creole Serial No. 84,037, Sillamana, Colombia.

Remarks.—Numerous specimens are present in the material from Sillamana, Colombia.

Genus **Hanzawaia** Asano, 1944

Hanzawaia mantaensis (Galloway and Morrey)

Plate 7, figures 4a, b, c

Anomalina mantaensis Galloway and Morrey, 1929, Bull. Amer. Pal., vol. 15, No. 55, p. 28, pl. 4, figs. 5a-c; Tertiary, Manta, Ecuador.—Dorr, 1933, Journ. Pal., vol. 7, p. 435 (list); Papantla fauna, Mexico.

Cibicides mantaensis (Galloway and Morrey). Hedberg, 1937, Journ. Pal., vol. 11, p. 683, pl. 92, figs. 12a-c; upper Oligocene, Carapita formation, Venezuela.—Franklin, 1944, Journ. Pal., vol. 18, p. 319, pl. 48, figs. 14a-c; Oligocene, Carapita formation, Venezuela.—Cushman and Renz, 1947, Special Publ. 22, Cushman Lab. Foram. Res., p. 44, pl. 8, fig. 7; upper Oligocene, Ste. Croix formation, Trinidad, B.W.I.—Renz, 1948, Geol. Soc. Amer., Mem. 32, p. 128, pl. 11, figs. 8a, b; Oligocene part of Agua Salada group, Venezuela.—Bermúdez, 1949, Special Publ. 25, Cushman Lab. Foram. Res., p. 302, pl. 25, figs. 22-24; middle Oligocene, Sombrerito formation, Dominican Republic.—Bermúdez, 1950, Mem. Soc. Cubana Hist. Nat., vol. 19, p. 334 (list); lower and middle Oligocene, Cuba.

Dimensions of plesiotype: Diameter, 0.40 mm.; thickness, 0.09 mm.

Type.—Plesiotype (USNM 625070) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Abundant specimens from the Goajira Peninsula, Colombia, seem to be identical with the topotypes of this species from the Tertiary of Manta, Ecuador. The species has been transferred from *Cibicides* to *Hanzawaia* because in complete specimens the umbilical area on the dorsal side is covered by the "valvular flaps" of Galloway and Morrey, which are equivalent to the "supplementary lobes" of Asano.

Genus **Cibicidina** Bandy, 1949

Cibicidina cajiranensis Becker and Dusenbury, n. sp.

Plate 7, figures 9a, b, c

Test plano-convex, periphery of early chambers nonlobate, that of later chambers slightly lobate, dorsal side flat, ventral side very convex, involute on both sides, chambers distinct, five to seven, increasing in size, last two chambers strongly inflated and making up half the test; umbilical region depressed ventrally; ventral sutures distinct, limbate, later ones depressed; dorsal sutures distinct, flush, curved; wall perforate; aperture peripheral and extending along the inner dorsal margin of the last chamber. Diameter 0.43 mm.; thickness, 0.26 mm.

Type.—Holotype (USNM 625071) from Creole Serial No. 84,020 near Uitpa, Colombia.

Remarks.—Several specimens of this new species occur in the material from Uitpa, Colombia. The most closely related species appears to be *Cibicidina involuta* (Cushman and Dusenbury), originally described as a *Valvulineria* with the dorsal and ventral sides reversed in orientation in the text but correctly oriented in the plate explanation. This Eocene species from the Poway conglomerate of southern California is slightly smaller, less inflated ventrally and more rounded peripherally at a more acute peripheral angle. Its dorsal sutures are sinuate instead of simply curved. *"Valvulineria" japonica* Asano and *"Cibicides" megalocephalus* Pijpers show less distinct resemblances.

Family MIOGYPSINIDAE Tan

Genus **Heterosteginoides** Cushman, 1918

Heterosteginoides ecuadorensis (Tan)

Plate 6, figure 9

Miogypsina aff. *panamensis* (Cushman). Barker, 1932, Geol. Mag., vol. 69, p. 280, pl. 16, fig. 7, text fig. 1; upper Oligocene or lower Miocene, San Pedro, Ecuador.

Miolepidocyclina ecuadorensis Tan, 1936, De Ingenieur in Ned. Indië, jaarg. 3, pt. 4, p. 59; upper Oligocene or lower Miocene, San Pedro, Ecuador.

Heterosteginoides panamensis Hanzawa (not Cushman), 1947, Journ. Pal., vol. 21, no. 3, pp. 260-263, pl. 41, figs. 1-13; upper Oligocene or lower Miocene, San Pedro, Ecuador.

Miogypsina ecuadorensis (Tan). Drooger, 1952, Study of American Miogypsinidae, Doct. Thesis Utrecht, pp. 19-21, 25, 49, pl. 1, figs. 16-28 (not fig. 29 = *Miolepidocyclina burdigalensis* (Gümbel)), text fig. 11; middle Oligocene to lower Miocene, San Pedro, Ecuador; upper Oligocene, south of Portola, San Mateo County, California; middle Oligocene, San Sebastian formation, Puerto Rico.

Miogypsina (Miolepidocyclina) ecuadorensis (Tan). Graham and Drooger, 1952, Contr. Cushman Found. Foram. Res., vol. 3, pt. 1, pp. 21-22, text fig. 2, upper Oligocene or lower Miocene, south of Portola, San Mateo County, California. —Drooger, 1953, Bol. Soc. Geol. Peru, vol. 26, pp. 9, 12-15, text fig. 3 (3 figs. at left, not 2 figs. at right which = *Miolepidocyclina burdigalensis* (Gümbel)); middle or upper Oligocene, Camana formation, Peru.—Drooger, 1956, Micropal., vol. 2, No. 2, pp. 187-188.

Diameter of incomplete specimen, 0.97 mm.

Plesiotype (USNM 625072) from Creole Serial No. 64.968 near Uitpa, Colombia.

Remarks.—A single microspheric specimen with average development of intercalary chambers was found in the Goajira material and was ground into a thin section. The subcentric spiral juvenarium necessitates its generic classification as *Heterosteginoides*.

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