Planktonic foraminifera found in the Cipero and Carapita **Plate 18**

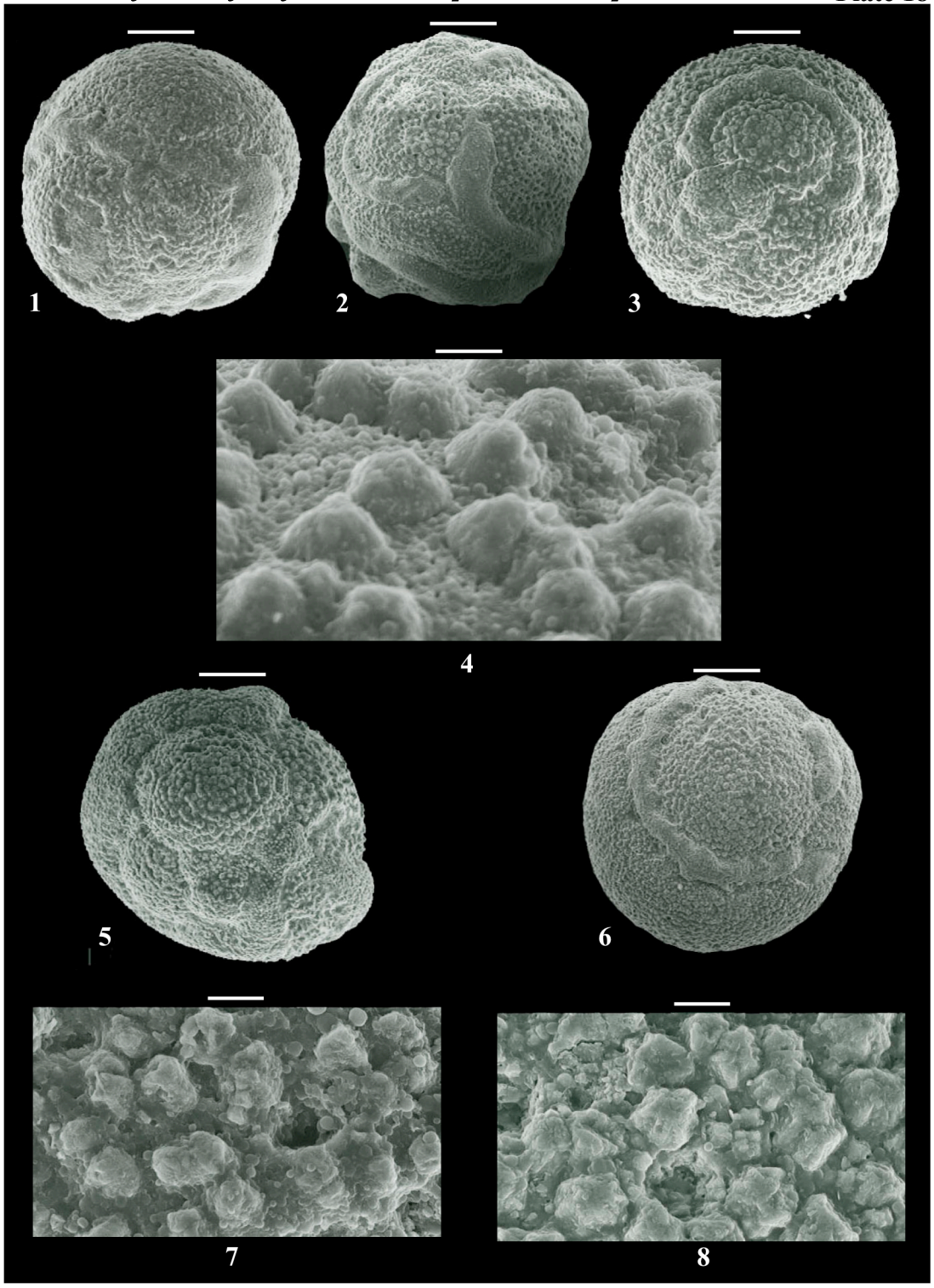

Plate 18. **1-8.** *Globigerinatella insueta*; Sample RDL-563, Cipero Formation. Figures 1-3,5-6: bars= 200 μm; Figures 4,7-8: bars= 100 μm.

Benthic foraminifera found in the Cipero and Carapita **Plate 19**

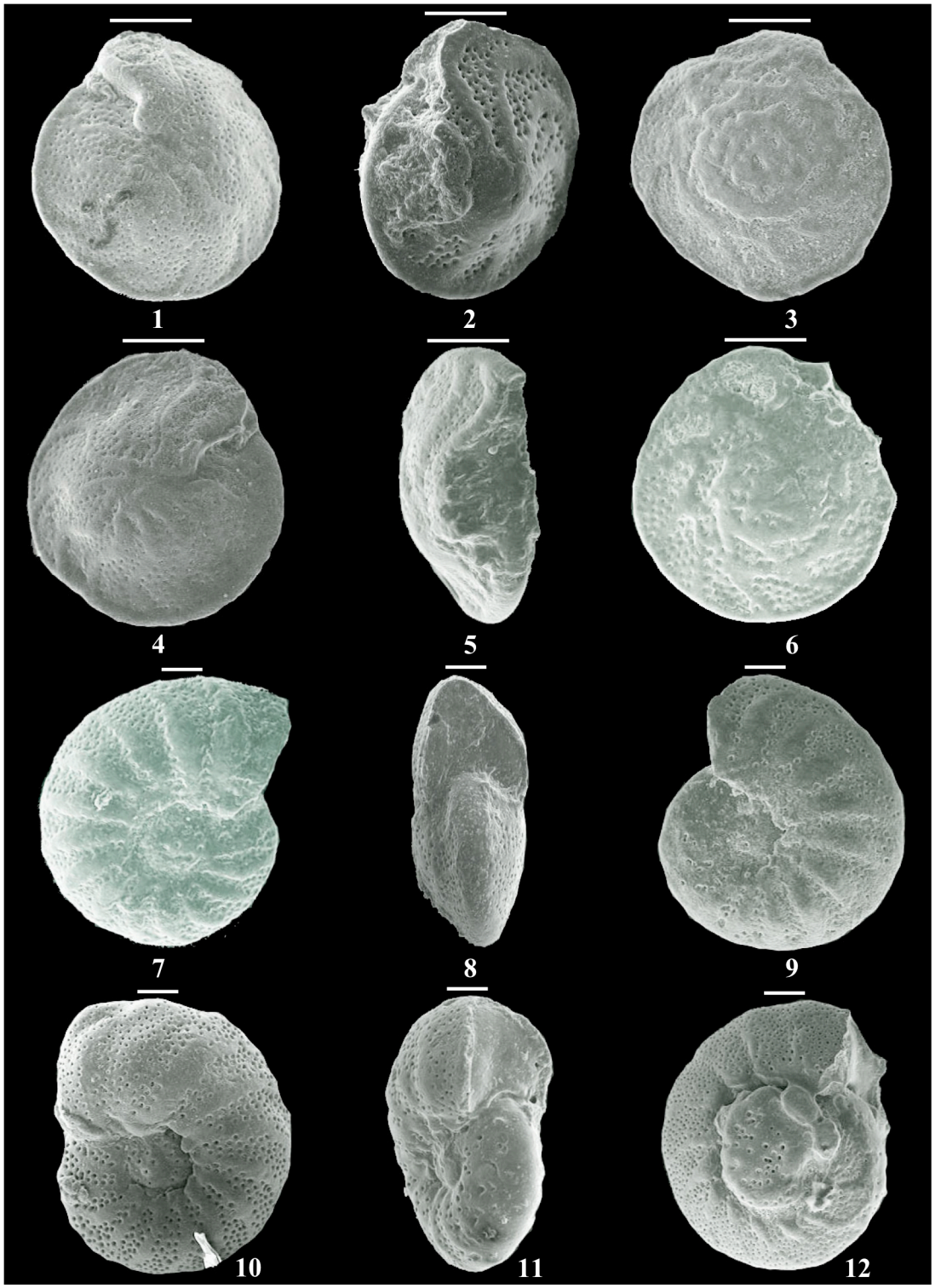

Plate 19. **1-3.** *Cibicidoides crebbsi*; Sample BO 287, Cipero Formation (LO). **4-6.** *Cibicidoides crebbsi*; Sample RO-1, Carapita Formation (LO). **7-9.** *Cibicidoides incrassatus*; Sample BO-287, Cipero Formation (LO). **10-12.** *Cibicidoides incrassatus*; Sample RO-29, Carapita Formation. Figures 1-12: bars= 200 μm.

Benthic foraminifera found in the Cipero and Carapita **Plate 20**

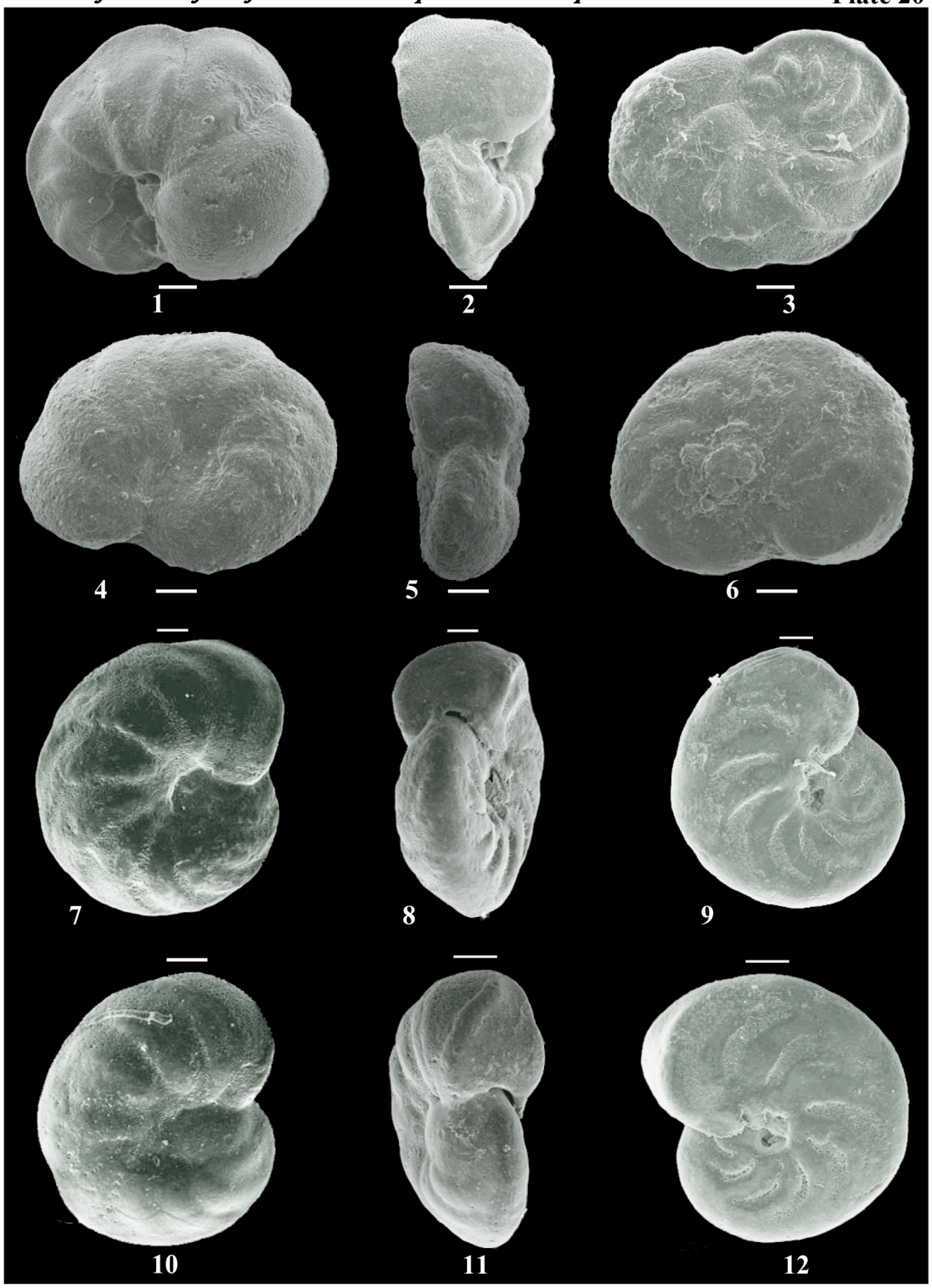

Plate 20. **1-3.** *Hanzawaia concentrica*; Sample BO-287, Cipero Formation (LO). **4-6.** *Hanzawaia concentrica*; Sample RO-11, Carapita Formation (LO) **7-9.** *Hanzawaia mantaensis*; Sample RDL 2865, Cipero Formation (LO). **10-12.** *Hanzawaia mantaensis*; Sample RO-7, Carapita Formation (LO).). Figures 1-12: bars = 200.

Benthic foraminifera found in the Cipero and Carapita **Plate 21**

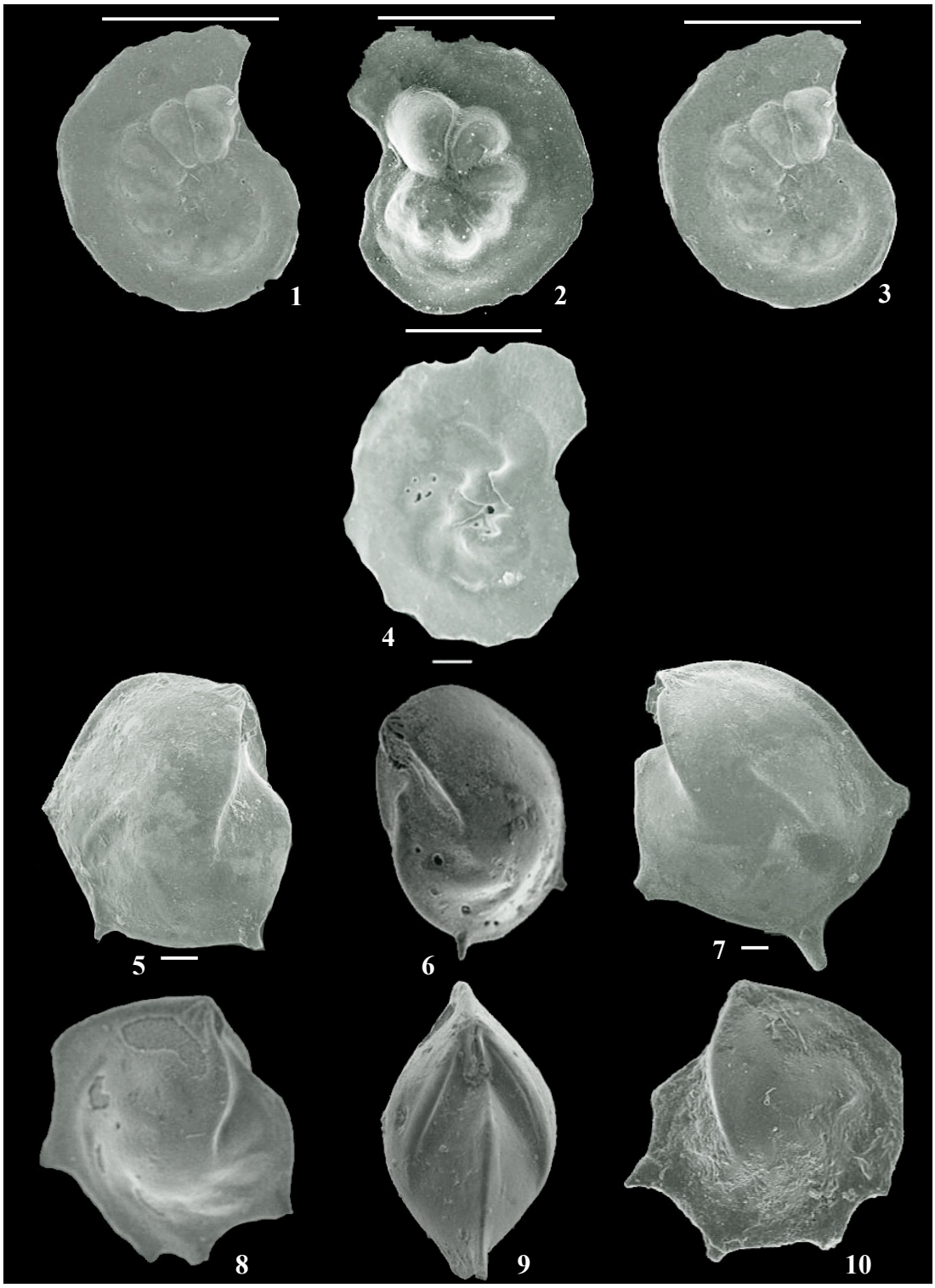

Plate 21. **1-3.** *Laticarinina pauperata*; Sample BO-287, Cipero Formation (LO). . **4.** *Laticarinina pauperata*; Sample RO-7, Carapita Formation (LO). **5-7.** *Lenticulina calcar*; Sample RDL-2865, Cipero Formation (LO). **8-10.** *Lenticulina calcar*; Sample RO-7, Carapita Formation (LO). Figures 1-10: bars= 200 μm.

Benthic foraminifera found in the Cipero and Carapita **Plate 22**

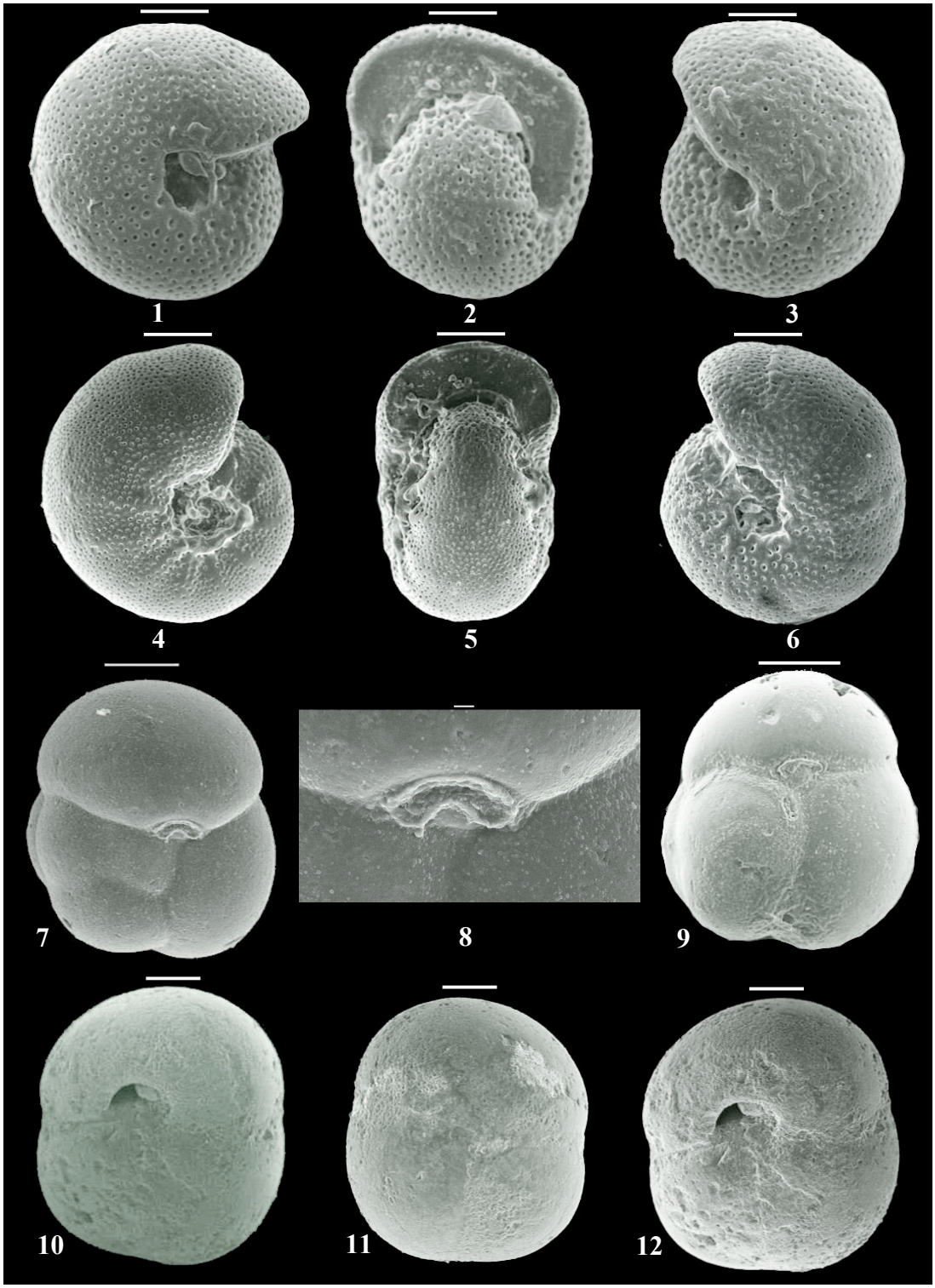

Plate 22. **1-3.** *Melonis pompilioides*; Sample BO-287, Cipero Formation (LO). **4-6.** *Melonis pompilioides*; Sample RO-11, Carapita Formation. **7-9.** *Sphaeroidina bulloides*; Sample BO-287, Cipero Formation. **10-12.** *Sphaeroidina bulloides*; Sample RO-1, Carapita Formation (LO). Figures 1-7,9-12: bars= 200 μm; Figure 8: bars= 100 μm.

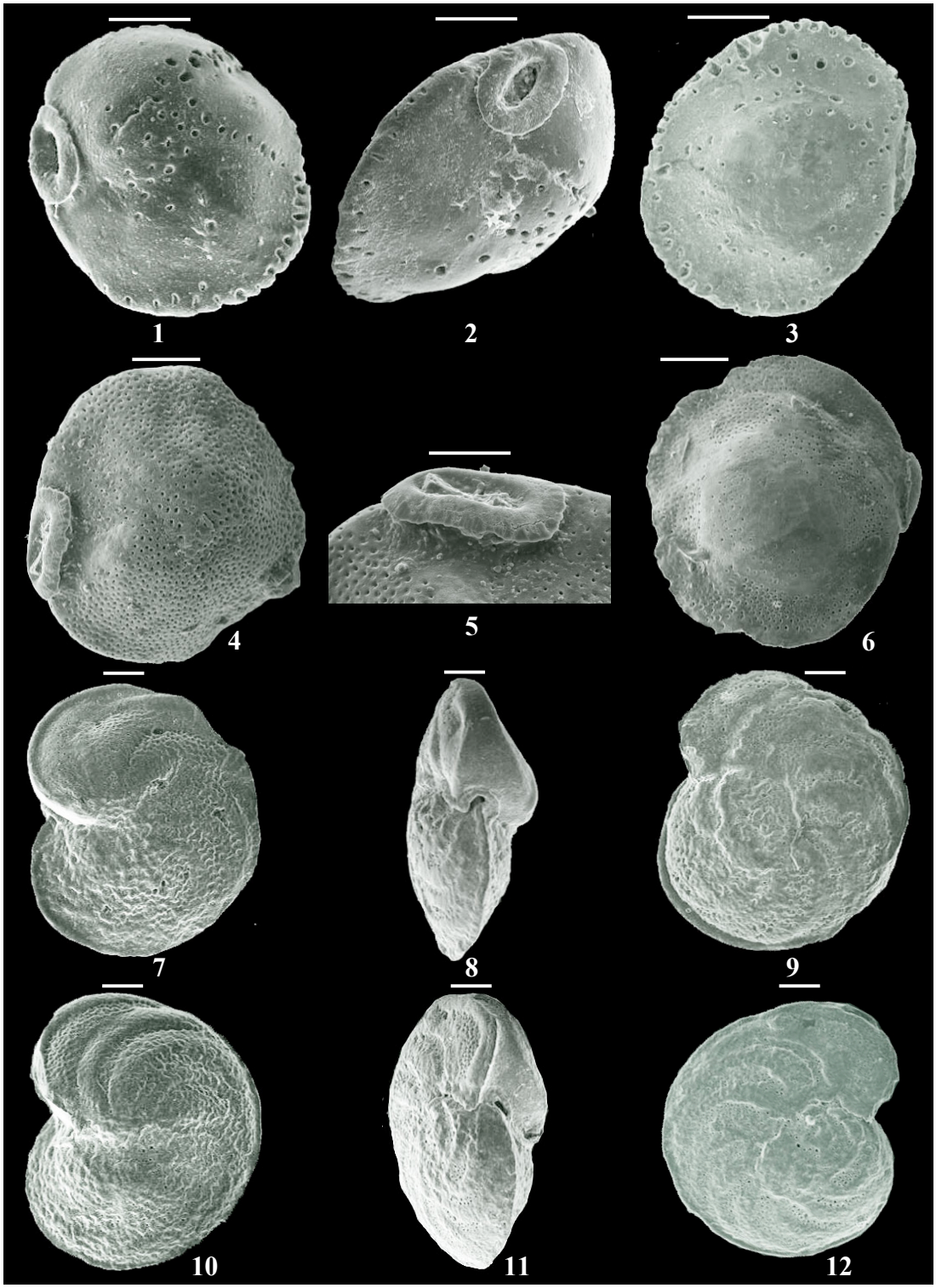

Plate 23. **1-3.** *Siphonina pozonensis*; Sample BO-287, Cipero Formation (LO). **4-6.** *Siphonina pozonensis*; Sample RO-11, Carapita Formation (LO). **7-9.** *Planulina renzi*; Sample RDL-2699, Cipero Formation (LO). **10-12.** *Planulina renzi*; Sample RO-9, Carapita Formation (LO). Figure 5: bars = 100 μm and Figures 1-4, 6-12: bars= 200 μm.

Plate 24. **1-3.** *Bolivina imporcata*; Sample RDL 2865, Cipero Formation (LO). **4-6.** *Bolivina imporcata*; Sample RO-5, Carapita Formation (LO). **7-9.** *Bolivina pisciformis*; Sample RDL-563, Cipero Formation. **10-12.** *Bolivina pisciformis*; Sample RO-5, Carapita Formation (LO). Figure 8: bars = 100 μm and Figures 1-12: bars= 200 μm.

Benthic foraminifera found in the Cipero and Carapita **Plate 25**

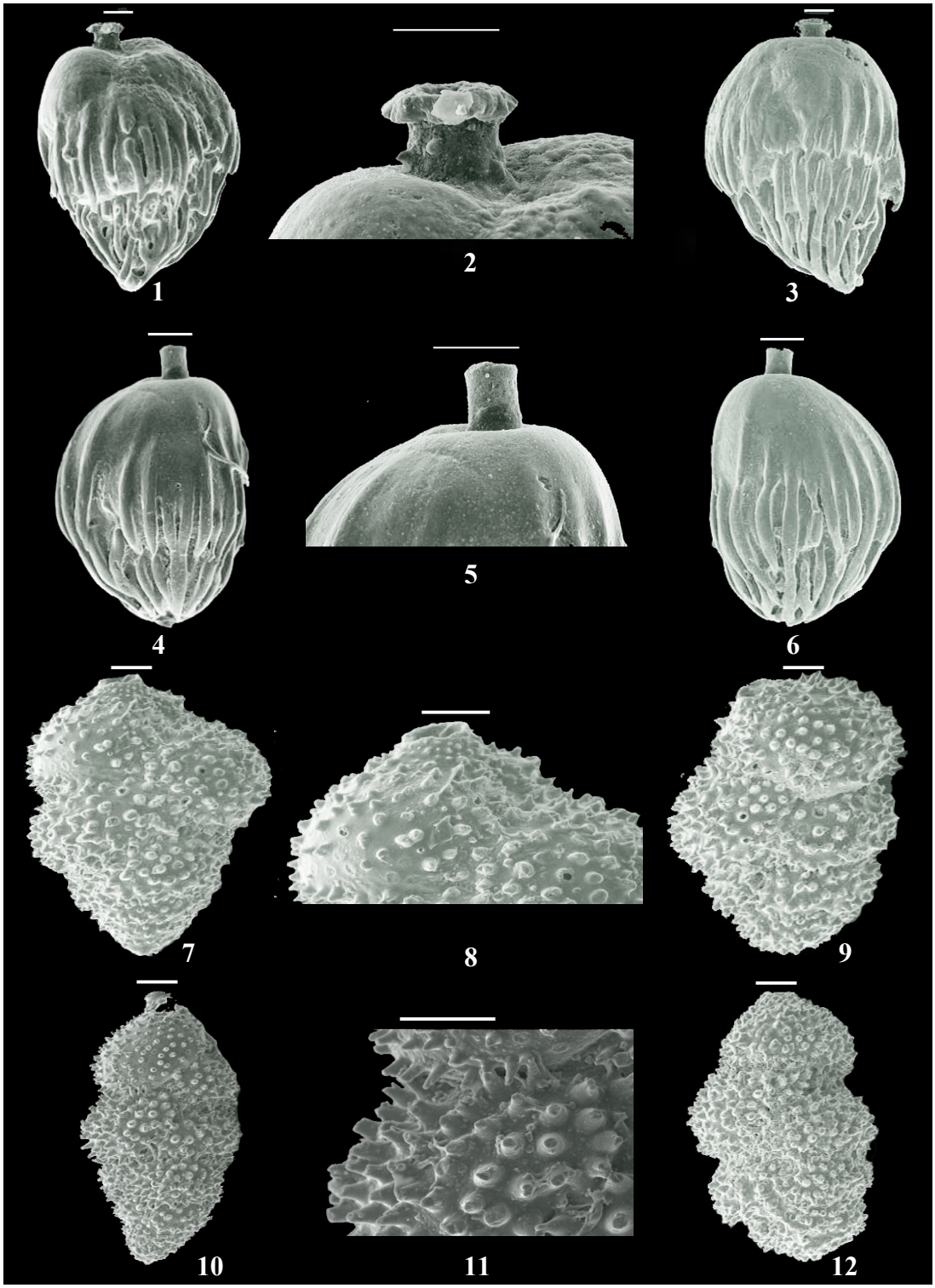

Plate 25. **1-3.** *Uvigerina mexicana*; Sample RDL 2865, Cipero Formation (LO). **4-6.** *Uvigerina mexicana*; Sample RO-1, Carapita Formation (LO). **7-9.** *Uvigerina rugosa*; Sample RDL-2865, Cipero Formation (LO). **10-12.** *Uvigerina rugosa*; Sample RO-9, Carapita Formation (LO). Figures 2,5,8,11: bars = 100 μm and Figures 1,3-4,6-7,9-10,12: bars= 200 μm.

Benthic foraminifera found in the Cipero and Carapita **Plate 26**

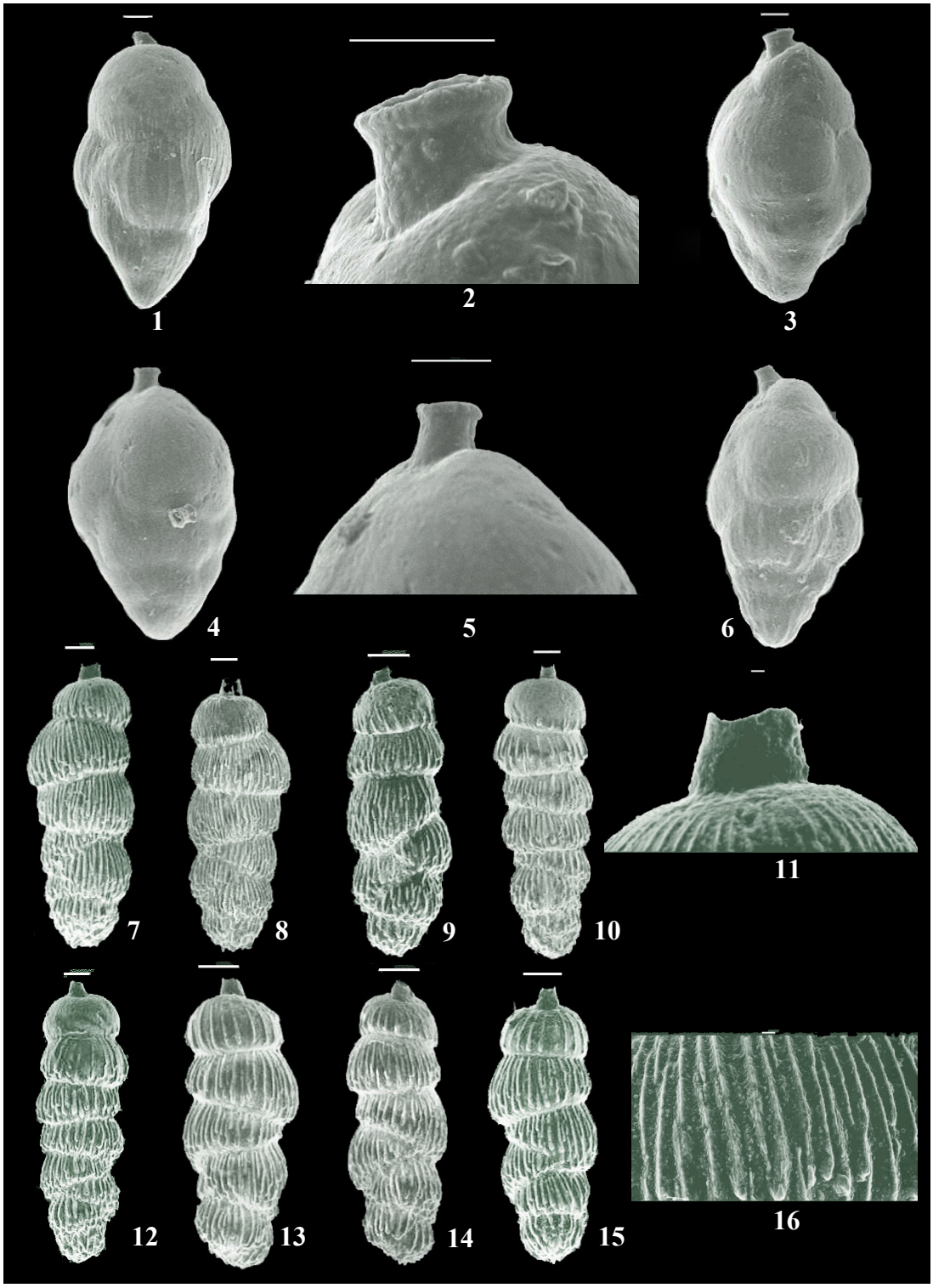

Plate 26. **1-3.** *Uvigerina carapitana*; Sample RDL 2859, Cipero Formation (LO). **4-6.** *Uvigerina carapitana*; Sample RO-5, Carapita Formation (LO). **7-11.** *Rectuvigerina multicostata*; Sample RDL-423, Cipero Formation. **12-16.** *Rectuvigerina multicostata*; Sample RO-5, Carapita Formation (LO). Figures 2,5,11,16: bars = 100 μm and Figures 1,3-4,6-10,12-15: bars= 200 μm.

Benthic foraminifera found in the Cipero and Carapita **Plate 27**

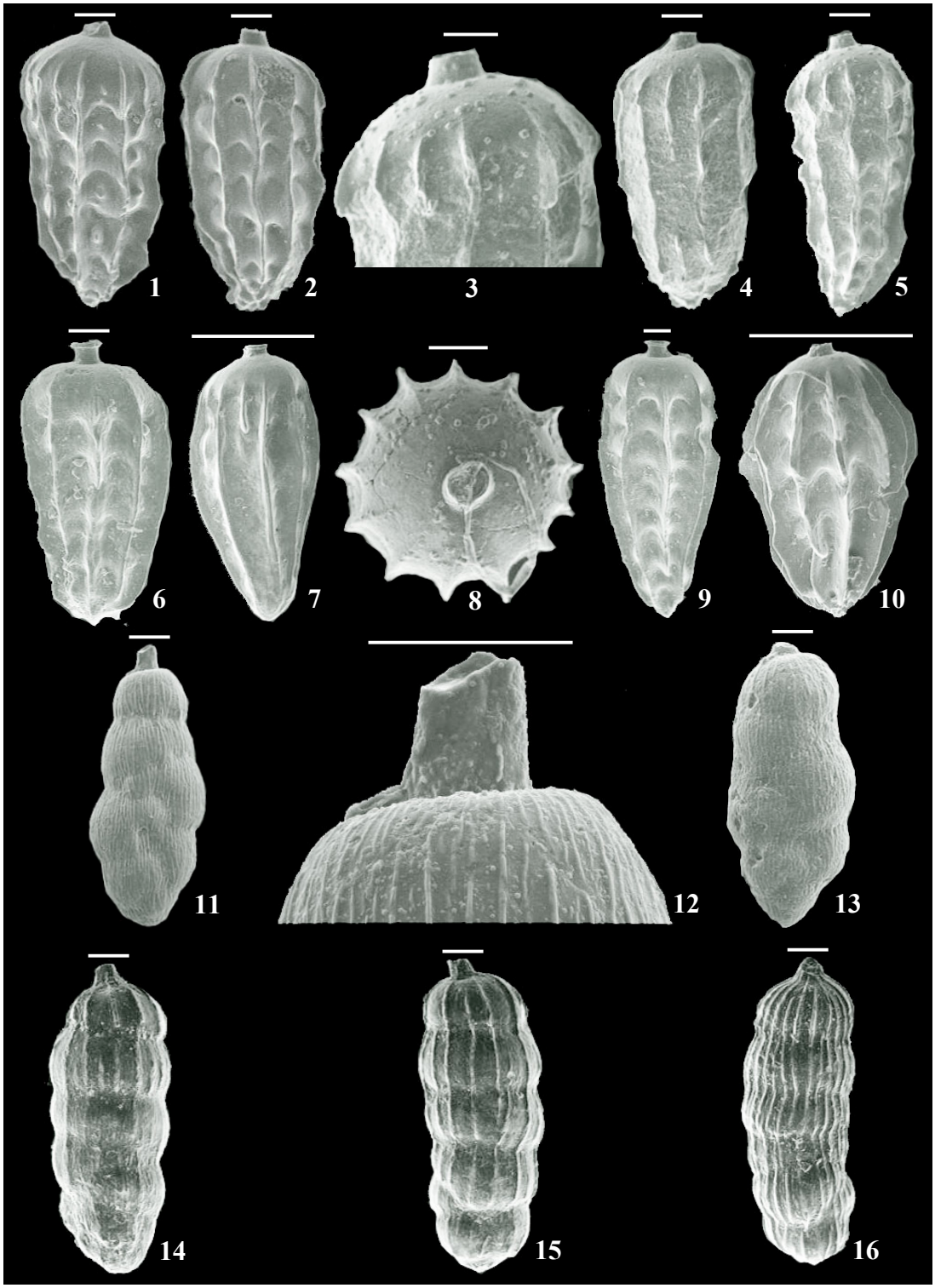

Plate 27. **1-5.** *Rectuvigerina transversa*; Sample BO 287, Cipero Formation (LO). **6-10.** *Rectuvigerina transversa*; Sample RO-5, Carapita Formation (LO). **11-13.** *Rectuvigerina striata*; Sample RDL-423, Cipero Formation (LO). **14-16.** *Rectuvigerina striata*; Sample RO-49, Carapita Formation (LO). Figures 3,8,12: bars = 100 μm and Figures 1-2,4,-7,9-11,13-16: bars= 200 μm.

Benthic foraminifera found in the Cipero and Carapita **Plate 28**

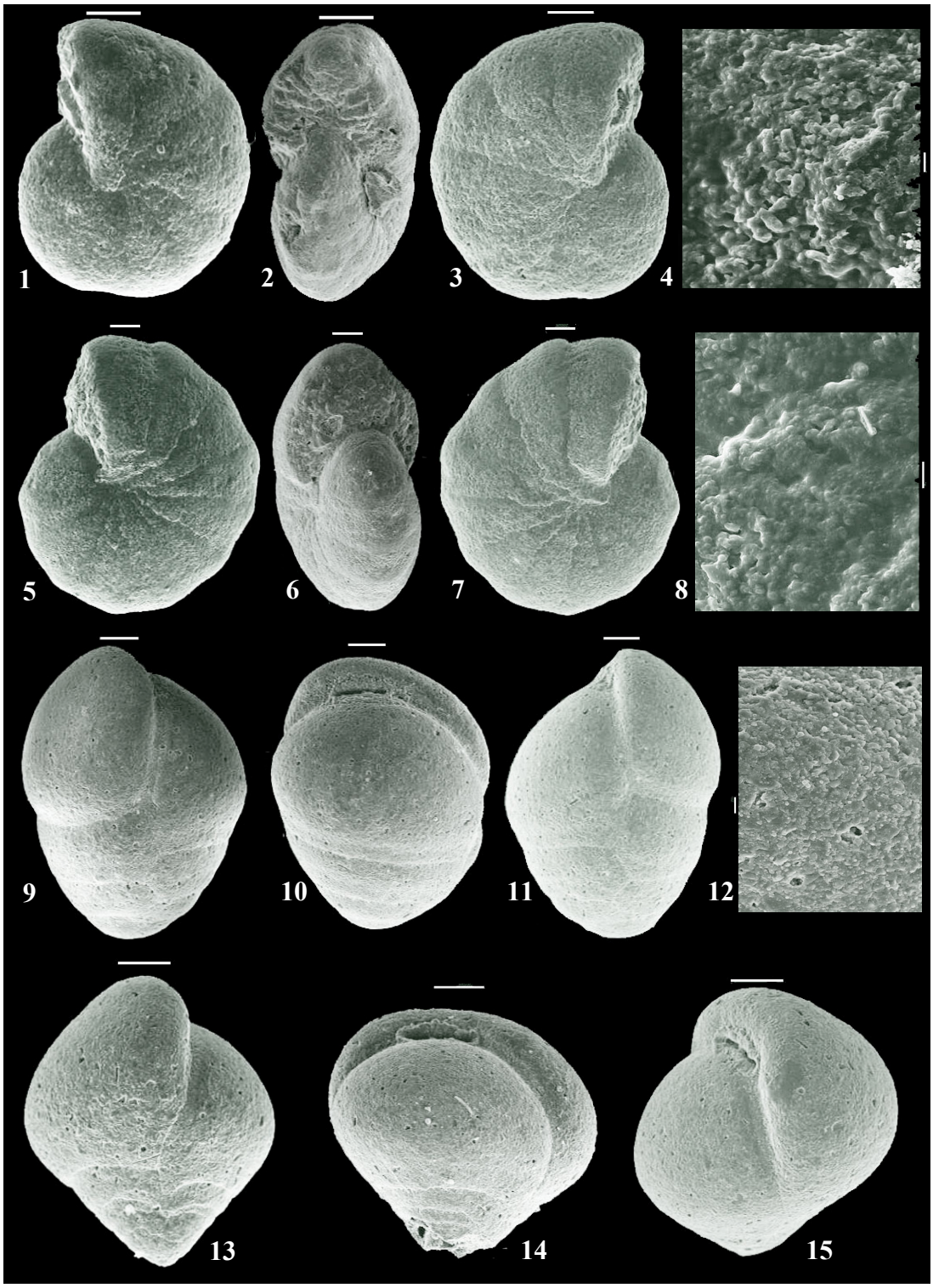

Plate 28. **1-4.** *Cyclammina cancellata*; Sample BO 287, Cipero Formation (LO). **5-8.** *Cyclammina cancellata*; Sample RO-1, Carapita Formation (LO). **9-12.** *Dorothia brevis*; Sample BO-287, Cipero Formation (LO). **13-15.** *Dorothia brevis*; Sample RO-13, Carapita Formation. Figures 4,8,12: bars = 100 μm and Figures 1-3,5-7,9-11,13-15: bars= 200 μm.

Benthic foraminifera found in the Cipero **Plate 29**

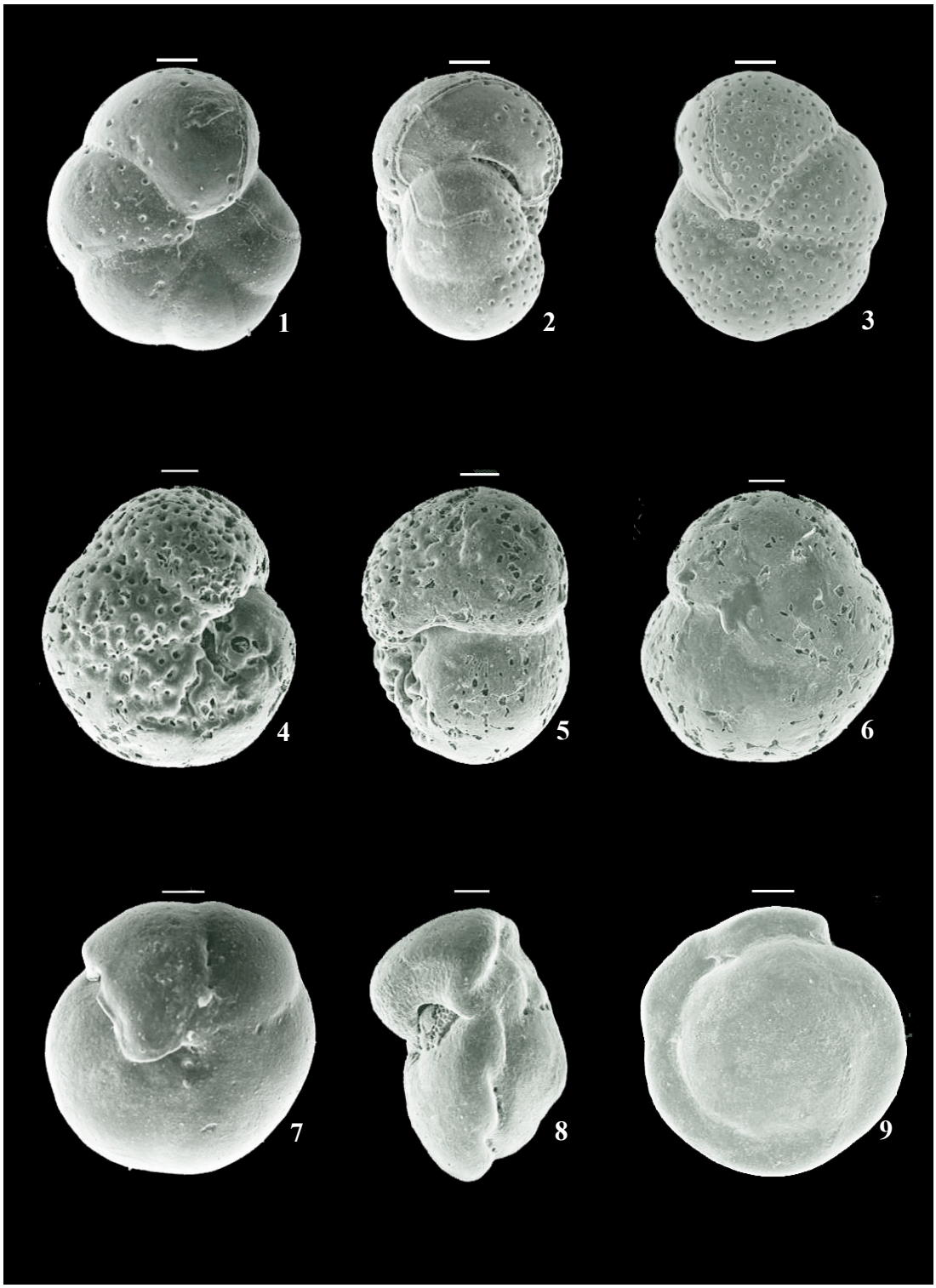

Plate 29. **1-3.** *Anomalinoides globulosus*; Sample BO 287, Cipero Formation (LO). **4-6.** *Anomalinoides pompiliodes*; Sample BO-287, Cipero Formation (LO). **7-9.** *Neoeponides umbonatus*; Sample BO-287, Cipero Formation (LO). Figures 1-9: bars = 200 μm.

Benthic foraminifera found in the Cipero **Plate 30**

Plate 30. **1-3.** *Buchnerina trinitatensis* ; Sample BO 287, Cipero Formation (LO). **4-6.** *Lenticulina adelinensis*; Sample BO 287, Cipero Formation (LO). **7-9.** *Lenticulina occidentalis* var. *torridus*; Sample RDL-2865, Cipero Formation (LO). **10-12.** *Paratrochamminoides irregularis*; Sample BO-287, Cipero Formation (LO). Figure 11: bars = 100 μm and Figures 1-10,12: bars= 200 μm.

Benthic foraminifera found in the Carapita **Plate 31**

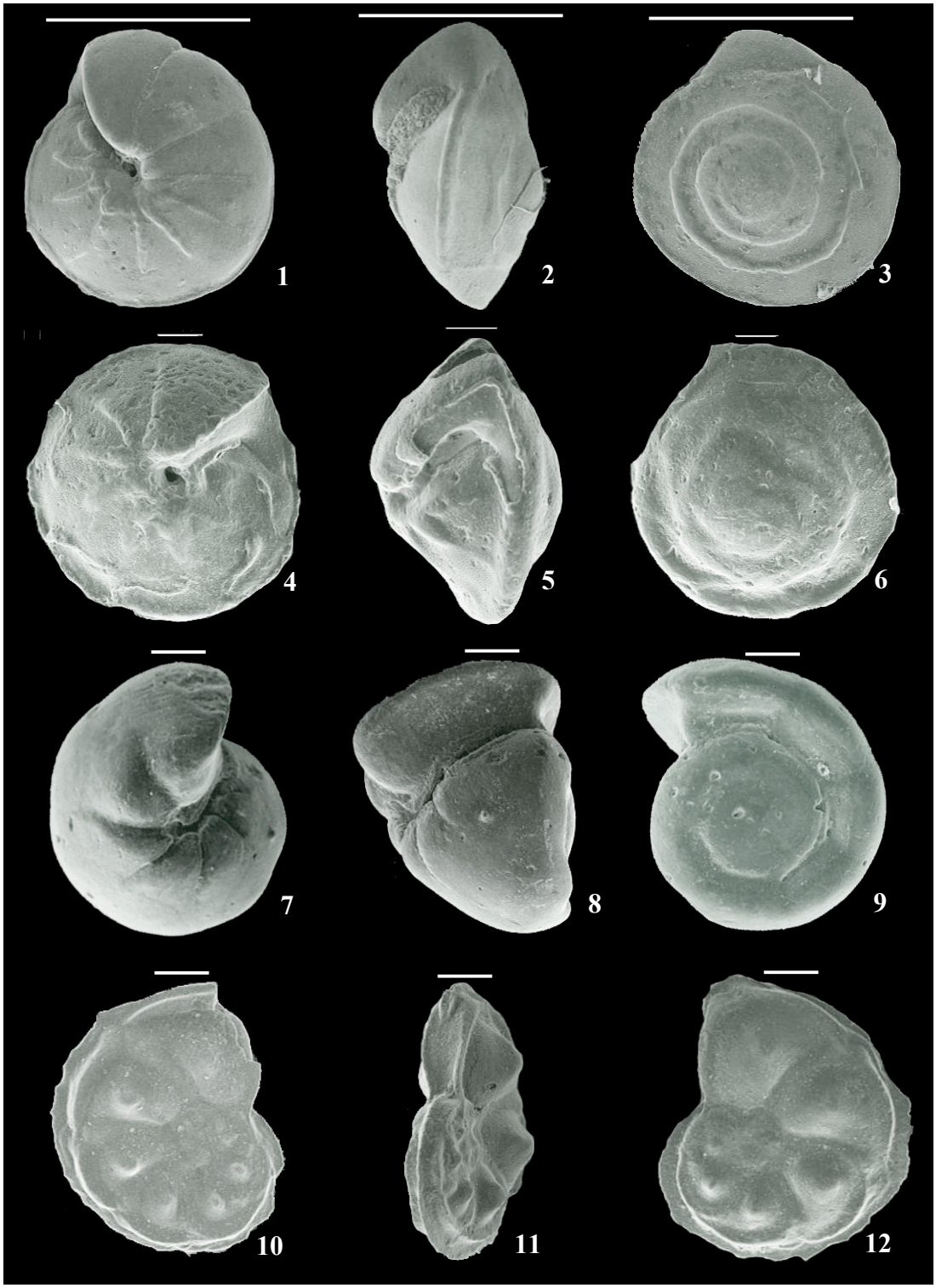

Plate 31. **1-3.** *Neoeponides campester*; Sample RO 1, Carapita Formation (LO). **4-6.** *Neoeponides parantillarum*; Sample RO-1, Carapita Formation (LO). **7-9.** *Gyroidinoides altiformis*; Sample RO-5, Carapita Formation (LO). **10-12.** *Planularia venezuelana*; Sample RO-7, Carapita Formation (LO). Figures 1-12: bars= 200 μm.

Benthic foraminifera found in the Carapita **Plate 32**

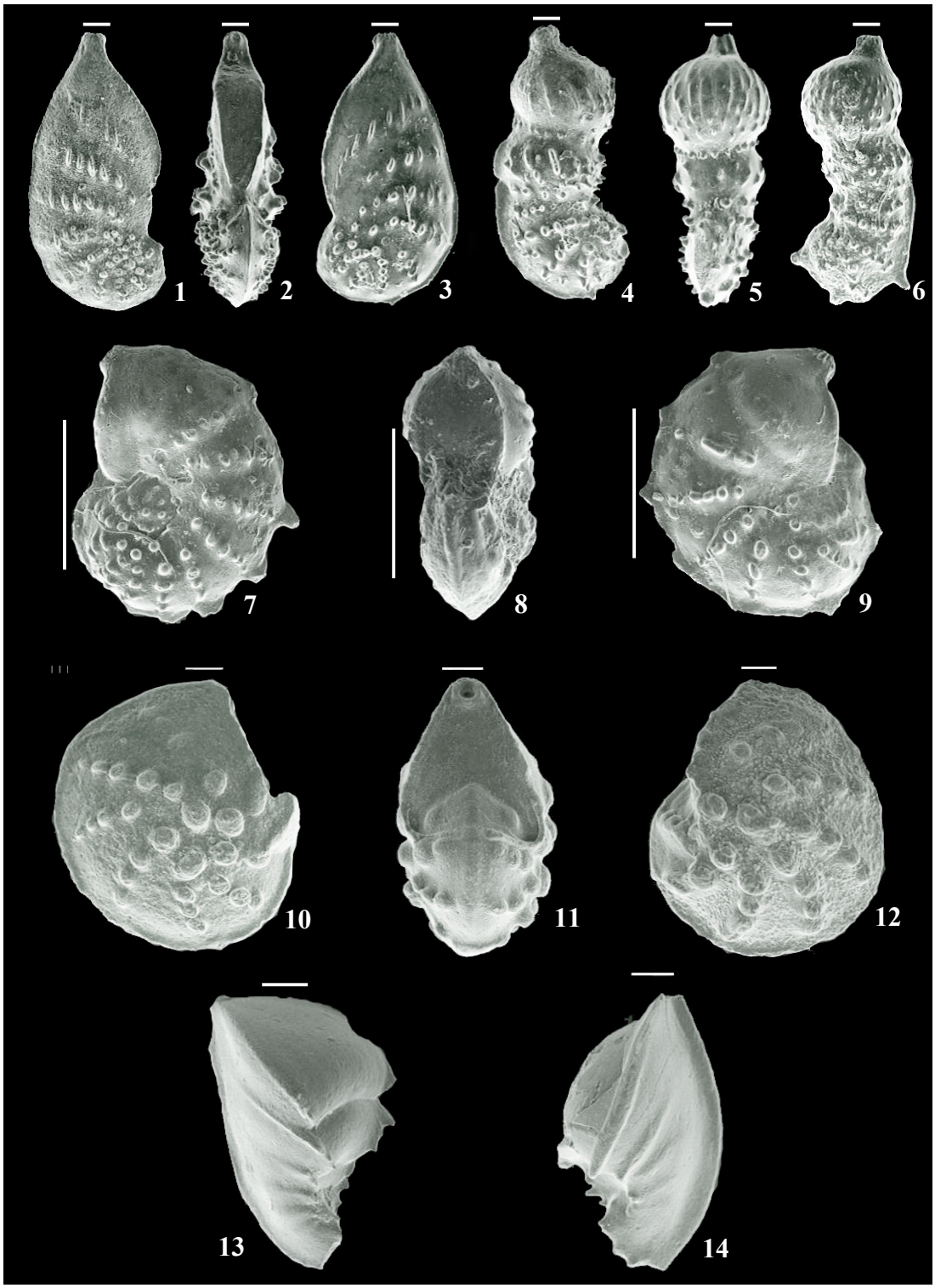

Plate 32. **1-3.** *Vaginulinopsis superbus*; Sample RO 1, Carapita Formation (LO). **4-6.** *Marginulinopsis basispinosus*; Sample RO-1, Carapita Formation (LO). **7-9.** *Lenticulina hedbergi*; Sample RO-1, Carapita Formation (LO). **10-12.** *Lenticulina subpapillosus*; Sample RO-5, Carapita Formation (LO). **13-14.** *Saracenaria senni*; Sample RO-7, Carapita Formation (LO). Figures 1-14 bars = 200 μm.

Benthic foraminifera found in the Carapita **Plate 33**

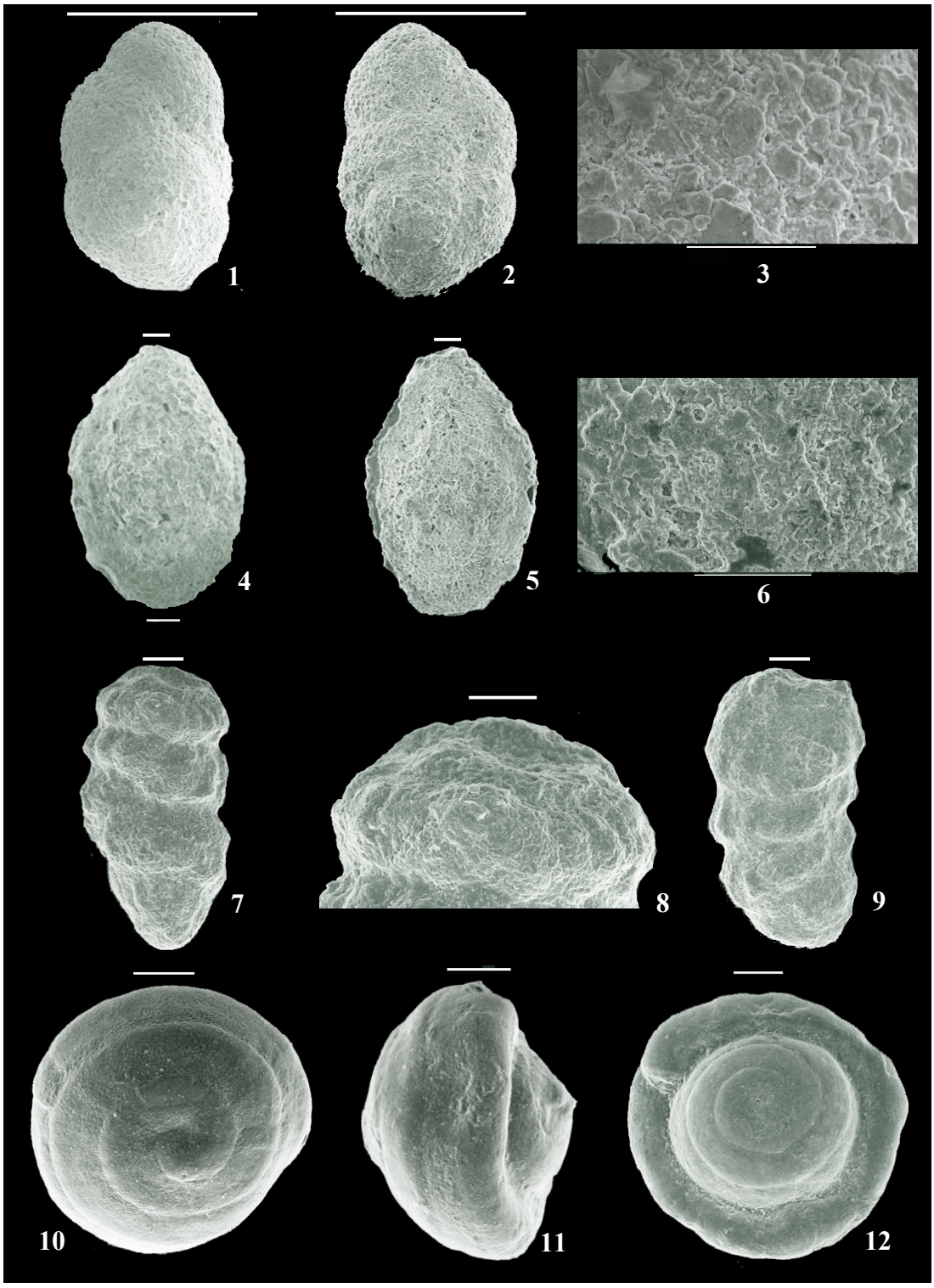

Plate 33. **1-3.** *Valvulina flexilis*; Sample RO 1, Carapita Formation (LO). **4-6.** *Sigmoilopsis schlumbergeri*; Sample RO-1, Carapita Formation (LO). **7-9.** *Alveovalvulinella pozonensis*; Sample RO-1, Carapita Formation (LO). **10-12.** *Glomospira charoides*; Sample RO-5, Carapita Formation (LO). Figure 1-2,4-5,7,9-12 : bars = 200 μm and Figures 3,6,8: bars= 100 μm.

Benthic foraminifera found in the Carapita **Plate 34**

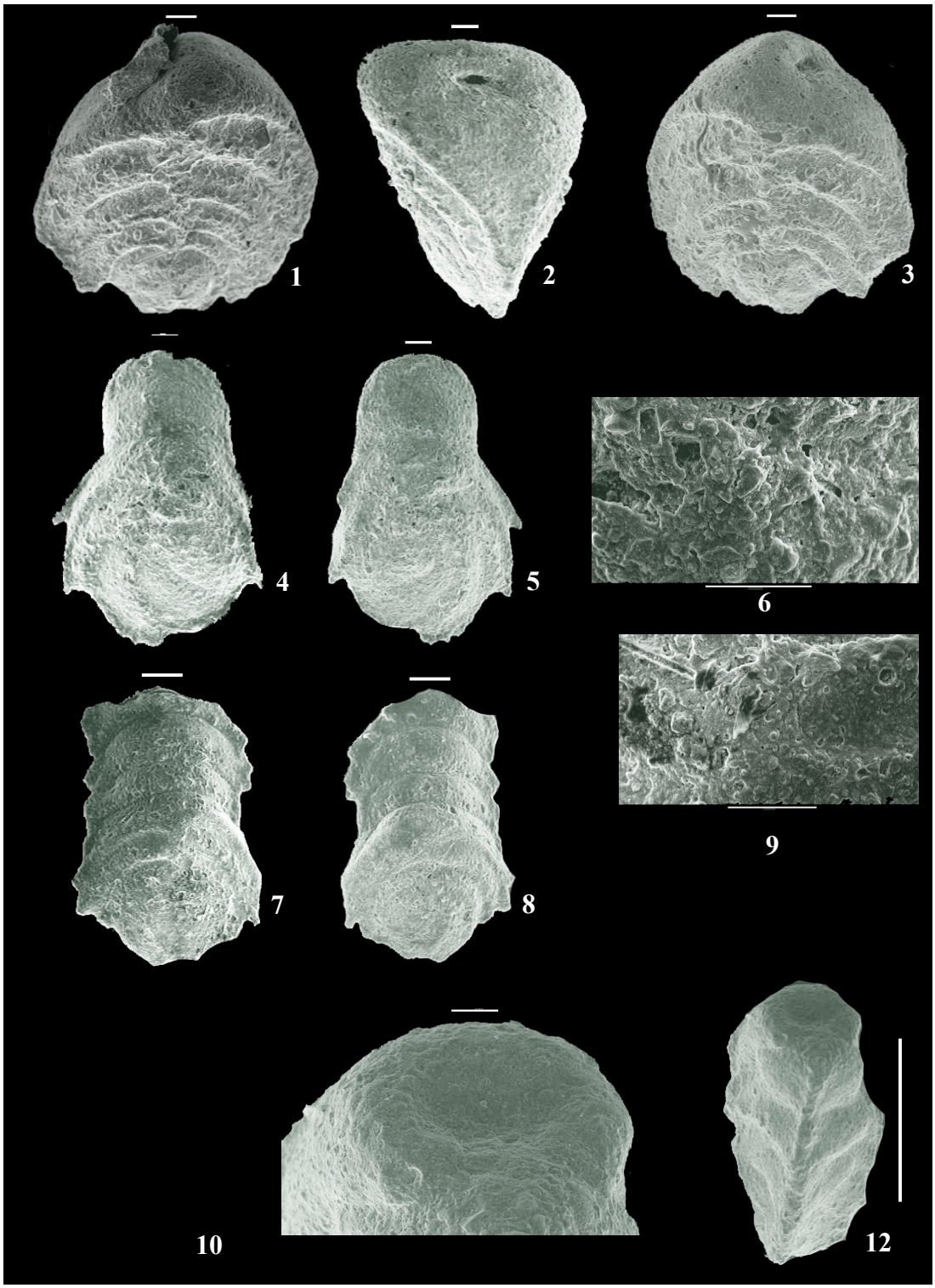

Plate 34. **1-3.** *Textularia tatumi*; Sample RO 7, Carapita Formation (LO). **4-6.** *Vulvulina jarvisi*; Sample RO-5, Carapita Formation (LO). **7-9.** *Vulvulina spinosa*; Sample RO-7, Carapita Formation (LO). **10-12.** *Gaudryina bullbrooki*; Sample RO-7, Carapita Formation. Figures 1-5,7-8,10-12: bars= 200 μm and Figures 6,9: bars= 100 μm.

APPENDIX I—Planktonic Foraminifera from the Carapita and the Cipero formations

Basis for classification of planktonic foraminifera: from morphological / phylogenetic / to wall texture classification

Between mid 1930s to end 1950s most planktonic foraminiferal research (Plummer, 1931; Thalmann, 1934; Renz, 1935; Glaessner's, 1937; Gandolfi, 1942; Bolli, 1945; Subbotina, 1947; Cita, 1948; Sigal, 1948; Grinsdale, 1951; Bronnimann, 1952b, Loeblich and Tappan, 1957a and Morozova, 1959) around the world were emphasized in mere morphological criteria (type and position of aperture, presence or absence of keels, shape of chambers, basic coiling mode, shape ornamentation and others features) and their biostratigraphic use.

In Trinidad and the Caribbean Region planktonic foraminifera have been used since mid 1960s in connection with the oil exploration industries. However, were Renz (1942, 1948), Cushman and Stainforth (1945), Cushman and Renz (1947) and Bermudez (1949) whose initiated surface studies in Venezuela and Trinidad in conjunction with Mene Grande Oil Company, Caribbean Petroleum and Creole Petroleum Corporation. Bolli (1957a; modified in 1966) developed a detailed zonation for the Paleocene and lower Eocene of Trinidad.

In mid 1960s to 1980s planktonic foraminifera studies turn from simple morphological classification to phylogenetic classification (Parker, 1962; Berggren, 1968; Steineck, 1971; Bandy, 1972, 1975; Fleisher, 1974 and Srinivasan and Kennett 1981a, 1981b) based on relationship of ancestor-descendent. For this job we have adopted wall texture classification and phylogeny (Murray, 1897; Lipps, 1966; Steineck and Fleisher, 1978; Premoli Silva and Boersma, 1989; Spezzaferri, 1994; Olsson et al.,

1999 and Pearson et al., 2006) into two different categories: spinose and non-spinose surface and distribution of taxa is presented in terms of the N-zonation of Blow (1969, 1979) and M-zonation (BKSA 95), Neogene and Berggren and Pearson (2005), Paleogene. Plates 1 and 2 show the main features in spinose and non-spinose wall texture identified in the studied section. Plate 1, figures 1-8; show gametogenic calcification. Plate 1, figure 1 show well preserved pustules in *Globigerinatella insueta* wall texture. Plate 2, show smooth surface and ?non-spinose wall texture in *?Neogloboquadrina siakensis*.

Species inventory

The following species of planktonic foraminifera have been arranged using the wall texture features (Murray, 1897; Lipps, 1966; Fleisher, 1974; Steineck and Fleisher, 1978; Premoli Silva and Boersma, 1989; Spezzaferri, 1994; Olsson et al., 1999 and Pearson et al., 2006) into two different categories. Category 1: spinose surface (*Globigerina. ciperoensis, Globigerinella obesa, Sphaeroidinellopsis disjuncta*, *Ss. seminulina seminulina, Globigerinoides trilobus, G. altiaperturus, G. bisphericus, Praeorbulina glomerosa, P. sicana, Orbulina bilobata, O. universa, Catapsydrax dissimilis dissimilis, Globorotaloides stainforthi* and *G. suteri*). Category 2: non-spinose surface (*Dentoglobigerina altispira globosa, D. venezuelana, Globoquadrina dehiscens, ?Neogloboquadrina siakensis, Globorotalia scitula* and *Globigerinatella insueta.*

Distribution of taxa is presented in terms of the N-zonation of Blow (1969, 1979) and M-zonation (BKSA 95), Neogene and Berggren and Pearson (2005), Paleogene.

Category 1: Spinose

Genus *Globigerina* d'Orbigny 1836

Globigerina ciperoensis Bolli 1954

(Plate 3, Figures 6-9)

Diagnostic Features: Test small to medium size, surface cancellate, spinose, low trochospiral, five spherical chambers in the last whorl, peripheral outline rounded; radial and depressed sutures in both sides, large umbilical aperture.

Remarks: Differs from *Globigerina angustiumbilicata* in having a larger umbilicus.

Known Stratigraphic Range: Upper Oligocene Zone P19 to lower Miocene N4B.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Carapita Formation in Zone N4/M1 (Sample WA 8780'-8790', WB 11220'-11240' and WC 10410'-10440).

Genus *Globigerinella* Cushman 1927

Globigerinella obesa (Bolli) 1957

(Plate 4, Figures 1-8)

Diagnostic Features: Test small to medium, smooth and spinose, low trochospiral, peripheral outline rounded, four to four and one-half inflated chambers in the last whorl; sutures radial and depressed in both sides, umbilical-extraumbilical aperture .

Remarks: Originally included in the genera *Globorotalia* (Bolli, 1957a), *Turborotalia* (Blow, 1969), *Globigerina* (Chaproniere, 1981) and evolved into *Globigerinella praesiphonifera* (Spezzaferri, 1994).

Known Stratigraphic Range: Upper Oligocene P22 to Recent.

Occurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene to lower middle Miocene of the Cipero Formation (Trinidad) from Zones N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone) to N9/M6 (sample RDL-538,

Globorotalia fohsi peripheroronda Zone). Recorded in the Carapita Formation in Zone N5/M2 to N9/M6, from samples WA 3520'-3550' to 9735'-9740', WB 2100'-2150' to 11600'-11610', WC 4380'-4410' to 10410'-10440' and RO-3 to RO-83.

Genus *Sphaeroidinellopsis* Banner and Blow 1959

(Plate 5, Figures 1-8)

Sphaeroidinellopsis disjuncta Finlay 1940

Diagnostic Features: Test large, thick, low trochospiral, surface cancellate and finely perforate, with four subspherical chambers in the last whorl, peripheral outline rounded; sutures depressed on both sides, aperture umbilical bordered by a thick rim.

Remarks: Its ultrastructure is intermediate between *Globoturborotalita woodi* and *Sphaeroidinellopsis*. Considered as a synonym of *Sphaeroidinellopsis seminulina* by Banner and Blow (1959).

Known Stratigraphic Range: Lower Miocene Zone N4/M1 to middle Miocene N11/M8.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zones N7/M4-N9/M6, from sample RDL-563 (*Globigerinatella insueta* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Sphaeroidinellopsis seminulina seminulina

(Plate 5, Figures 9-11)

Diagnostic Features: Test ovate, medium to large, low trochospiral; surface cancellate and densely perforate, three chambers in the final whorl; low arched and elongate umbilical aperture.

Remarks: Differs from *Sphaeroidinellopsis subdehiscens* by having three chambers in the final whorl.

Known Stratigraphic Range: Lower Miocene Zone N7/M4 to upper Pliocene Zone PL3/4 boundary.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zones N7/M4-N9/M6, from sample RDL-563 (*Globigerinatella insueta* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone) and in the Carapita Formation in Zone N9/M6, from samples WA 5510'-5540' to 4570'-4590'.

Genus *Globigerinoides* Cushman 1927

Globigerinoides trilobus (Reuss) 1850

(Plate 6, Figures 1-8)

Diagnostic Features: Test medium to large, distinctly cancellate, spinose, from with three spherical chambers in the last whorl, peripheral outline rounded; curved and depressed apertures in both sides, low umbilical-extraumbilical primary aperture.

Remarks: Differs from *Globigerinoides inmaturus* in having final larger chamber.

Known Stratigraphic Range: Lower Miocene Zone N4B/M1 to Recent.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone) and in the Carapita Formation in Zones N4/M1-N9/M6, from samples WA 2300'-2310' to 9735'-9740', WB 2100'-2150' to 11750'-11760', WC 4380'-4410' to 10900'-10950' and RO-1 to RO-89.

Globigerinoides altiaperturus Bolli 1957

(Plate 6, Figures 9-15)

Diagnostic Features: Test small to medium, cancellate, smooth and spinose, low trochospiral, peripheral outline rounded, three and a half spherical chambers in the last whorl; sutures depressed on both sides, very high umbilical primary aperture bordered by a sinuous rim.

Remarks: Differs from *Globigerinoides trilobus trilobus* in having distinctly higher primary aperture.

Known Stratigraphic Range: Lower Miocene zones N5/M2 to N7/M4.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo-Miocene Cipero and Lengua formations of Trinidad from Zone P20 to middle Miocene N14-M11. Recorded in this study in the Carapita Formation in Zone N6/M3, from samples WA 7380'-7410' to 7820'-7840' and RO-15 to RO-21.

Globigerinoides bisphericus Todd,

(Plate 7, Figures 1-7)

Diagnostic Features: Test small to medium, three and a half spherical chambers in the last whorl, peripheral outline broadly rounded, sutures depressed and radial in both sides, several apertures from with two (less commonly) to four between the last and earlier chambers.

Remarks: Regarded as the ancestor of *Praeorbulina* and *Orbulina*.

Known Stratigraphic Range: Lower Miocene to lower middle Miocene zones N7/M4 to N9/M6.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zone N8/M5, sample RDL-423 (*Praeorbulina glomerosa* Zone) and in the

Carapita Formation in Zone N8/M5, from samples WA 6240'-6270' to 7040'-7050', WB 7620'-7650' to 8210'-8230', WC 8000'-8050' to 8390'-8420' and RO-27 to RO-41.

Genus *Praeorbulina* Olsson, 1964

Praeorbulina glomerosa (group) Blow 1956

(Plate 8, Figures 1-12 and Plate 10, Figures 7-12)

Diagnostic Features: test ovoid to nearly circular, surface distinctly cancellate, spinose, chambers spherical, sutures slightly depressed with several small supplementary apertures along the suture on the spiral side.

Known Stratigraphic Range: lower middle Miocene zones N8/M5 to N9/M6.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zone N8/M5, sample RDL-423 (*Praeorbulina glomerosa* Zone).

Praeorbulina sicana De Stefani 1950

(Plate 9, Figures 1-6)

Diagnostic Features: Test subcircular to circular, surface distinctly cancellate, spinose, two and one-half chambers in the final whorl; sutures depressed, aperture irregular elongate slit between the last and the penultimate chamber.

Remarks: According to Kennett and Srinivasan (1983) this taxon developed from *Globigerinoides trilobus* and is the ancestor of *Praeorbulina/Orbulina.*

Known Stratigraphic Range: Lower middle Miocene zones N8/M5 to N9/M6.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zone N8/M5, sample RDL-423 (*Praeorbulina glomerosa* Zone) and in the

Carapita Formation in Zone N8/M5, from samples WA 6240'-6270' to 7040'-7050', WB 7620'-7650' to 8210'-8230' and WC 8000'-8050' to 8390'-8420'.

Genus *Orbulina* d'Orbigny 1839

Orbulina bilobata d'Orbigny 1846

(Plate 9, Figures 7-12)

Diagnostic Features: Test large, bilobate, surface distinctly perforate, spinose, chambers spherical; aperture areal with several openings on the final chamber and along the sutures.

Remarks: According to Blow (1956) *O. bilobata* evolved from *Praeorbulina sicana.*

Known Stratigraphic Range: lower middle Miocene Zone N9/M6 to Recent.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zone N9/M6, sample RDL-538 (*Globorotalia fohsi peripheroronda* Zone) and in the Carapita Formation in Zone N9/M6, from samples WC 5230'-5260' to 6650'.

Orbulina universa d'Orbigny 1839

(Plate 10, Figures 1-6)

Diagnostic Features: Test globular, surface distinctly and densely perforate, spinose, spherical chamber; aperture aereal with several small openings on the surface.

Remarks: Bolli and Saunders (1985) consider that *Orbulina bilobata* is a variant of *Orbulina universa.*

Known Stratigraphic Range: lower middle Miocene Zone N9/M6 to Recent.

Occurrences in Venezuela and Trinidad: Recorded in this study in the Cipero Formation in Zone N9/M6, sample RDL-538 (*Globorotalia fohsi peripheroronda* Zone)

and in the Carapita Formation in Zone N9/M6, from samples WA 2300'-2310' to 6240'-6270', WB 2100'-2150' to 4880'-4890', WC 5020'-5050' to 6800'-6850' and RO-47 to RO-87.

Genus *Catapsydrax* Bolli, Loeblich, and Tappan 1957

Catapsydrax dissimilis dissimilis (Cushman and Bermudez) 1937

(Plate 11, Figures 1-11)

Diagnostic Features: Robust, surface cancellate, probably spinose, with four chambers in last whorl, peripheral outline subcircular; aperture low arch covered by an umbilical bulla with one or more supplementary apertures.

Remarks: Spinosity in *Catapsydrax* was suspected but not proven, by the Eocene Planktonic Foraminifera Working Group (Pearson et al., 2006, p 69). Generally occurs with *Catapsydrax dissimilis ciperoensis*, which has more than one aperture.

Known Stratigraphic Range: Upper Eocene Zone P13 to lower Miocene N6/M3.

Ocurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene of the Cipero Formation (Trinidad), Zone N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone). Recorded in Carapita Formation from samples RO-25 to RO-1 (Zones N6/M3 to N7/M4).

Genus *Globorotaloides* Bolli 1957

Globorotaloides stainforthi (Bolli, Loeblich, and Tappan) 1957

(Plate 12, Figures 1-6)

Diagnostic Features: Test small to medium, surface distinctly cancellate, probably spinose, low trochospiral, four inflated to subglobular chambers in the final whorl,

peripheral outline lobulate to rounded; sutures depressed on both sides, primary aperture interiomarginal umbilical and supplementary aperture on the final whorl.

Remarks: Included earlier in the genus *Catapsydrax* but Spezzaferri (1994) included it in the genus *Globorotaloides* for having initially globorotaliiform and successively globigeriniform coiling mode.

Known Stratigraphic Range: Lower Miocene Zones N4B/M1 to N7/M4.

Occurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene to lower middle Miocene of the Cipero Formation (Trinidad) from Zones N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone). Recorded in the Carapita Formation in Zone N6/M3, from samples WA 7380'-7410' to 7530'-7540', WB 9600'-9620' and WC 9200'-9230' to 10830'-10840'.

Globorotaloides suteri Bolli 1957

(Plate 12, Figures 7-12)

Diagnostic Features: Test medium to large, surface strongly cancellate, probably spinose, low trochospiral, three to four inflated globular chambers in the final whorl; spiral sutures slightly curved and umbilical sutures radial and depressed, low aperture umbilical-extraumbilical.

Remarks: Differs from *Catapsydrax unicavus* in having initially globorotaliiform coiling mode and from *Globorotaloides variabilis* in having fewer chamber in the final whorl.

Known Stratigraphic Range: Lower Eocene (~P9) to lower Miocene Zone N7/M4.

Occurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene of the Cipero Formation (Trinidad) from Zones N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone).

Category 2: Non-Spinose

Genus *Dentoglobigerina* Blow 1979

Dentoglobigerina altispira globosa Bolli 1957

(Plate 13, Figures 1-11)

Diagnostic Features: Robust, surface distinctly cancellate, non-spinose, from five to six chambers in the final whorl, peripheral outline subcircular, radial sutures on both spiral and umbilical sides; aperture broad, umbilicus covered by tooth like projections.

Remarks: Differs from *D. altispira altispira* in the absence of a high trochospire.

Known Stratigraphic Range: Lower Miocene Zone N4B/M1 to mid Pliocene Zone ~PL4.

Occurrences in Venezuela and Trinidad: Occurs in Trinidad in the Oligo-Miocene of the Cipero and Lengua formations. In the studied section occurs in the lower Miocene to lower middle Miocene of the Cipero Formation (Trinidad) from Zones N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone) to N9/M6 (*Globorotalia fohsi peripheroronda* Zone). Recorded in the Carapita Formation in Zone N6/M3 to N9/M6, from samples WA 2300'-2310' to 7820'-7840', WB 3620'-3650' to 10800'-10830', WC 8240'-8270' to 10700'-10750' and RO-1 to RO-89.

"Dentoglobigerina" venezuelana Hedberg 1937

(Plate 14, Figures 1-12)

Diagnostic Features: Robust, surface distinctly cancellate, non-spinose, low trochospiral, with three to four chambers in the final whorl, peripheral outline rounded,

sutures radial on umbilical side and depressed and slightly curved on spiral side; aperture umbilical and low arched.

Remarks: Assigned to *Globigerina* by Blow (1969), Postuma (1971) and Stainforth et al. (1975) and to *Globoquadrina* by Kennett and Srinivasan (1983) based on lack of umbilical tooth by definition (Spezzaferri, 1994). Placed provisionally here in *"Dentoglobigerina"* pending ongoing investigations by the Oligocene Planktonic Foraminifera Working Group (OPFWG).

Known Stratigraphic Range: Lower Oligocene (~) to lower Pliocene (PL4/5).

Ocurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene to lower middle Miocene of the Cipero Formation (Trinidad) from Zones N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone) to N9/M6 (sample RDL-538, *Globorotalia fohsi peripheroronda* Zone). Recorded in the Carapita Formation in Zone N6/M3 to N9/M6, from samples WA 2300'-2310' to 9340'-9360', WB 2350'-2400' to 11750'-11760', WC 5410'-5440' to 10900'-10950' and RO-1 to RO-85.

Genus *Globoquadrina* Finlay 1947

Globoquadrina dehiscens (Chapman, Parr, and Collins) 1934

(Plate 15, Figures 1-8)

Diagnostic Features: Test medium to large, surface distinctly cancellate, non-spinose, with four inflated chambers in the last whorl, peripheral outline rounded; sutures depressed in both sides, low arched aperture covered by an umbilical tooth.

Remarks: Differs from its ancestor *Globoquadrina praedehiscens* in having four chambers in the last whorl and quadrate outline.

Known Stratigraphic Range: Lower Miocene Zone N4B/M1 to Late Miocene Zone N18/PL1a.

Occurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene to lower middle Miocene of the Cipero Formation (Trinidad) from Zones N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone) to N9/M6 (sample RDL-538, *Globorotalia fohsi peripheroronda* Zone). Recorded in the Carapita Formation in Zone N5/M2 to N9/M6, from samples WA 2300'-2310' to 8550'-8560', WB 3000'-3050' to 8610'-8640', WC 8690'-8720' and RO-17 to RO-69.

Genus *Neogloboquadrina* Bandy, Frerichs and Vincent 1967

?Neogloboquadrina siakensis (Le Roy) 1939

(Plate 16, Figures 1-16)

Diagnostic Features: Test medium to large, surface cancellate, ?non-spinose, five to seven chambers in the final whorl, peripheral outline rounded, sutures depressed in both sides, primary aperture umbilical-extraumbilical bordered by a distinct lip.

Remarks:

Paragloborotalia* vs. *Neogloboquadrina

The genus *Paragloborotalia* was introduced by Cifelli (1982) to designate groups of species with cancellate surface and spinose wall texture. Recently studies of the holotype and near topotypes of the species *siakensis* (Central Sumatra and Java, Indonesia) by Zachariasse (2010) suggest the absence of spines. In addition, this study shows the same behavior in *siakensis* in the Cipero Formation (sample BO-287, *Catapsydrax dissimilis* Zone) of Trinidad, i.e., cancellate surface and no clear evidence of spines (See Pl 13, Fig 1-16). Therefore, I assign *siakensis* provisionally to the non-spinose *Neogloboquadrina.*

Known Stratigraphic Range: Lower Oligocene (P22) to middle Miocene (N14/M11).

Occurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene to lower middle Miocene of the Cipero Formation (Trinidad) from Zones N5/M2 (sample BO-287, *Catapsydrax dissimilis* Zone) to N9/M6 (sample RDL-538, *Globorotalia fohsi peripheroronda* Zone). Recorded in the Carapita Formation in Zone N5/M2 to N9/M6, from samples WA 2300'-2310' to 9200'-9210', WB 2100'-2150' to 11750'-11760', WC 4380'-4410' to 10900'-10950' and RO-1 to RO-89.

Genus *Globorotalia* Cushman 1927

Globorotalia scitula Brady 1882

(Plate 17, Figures 1-16)

Diagnostic Features: Test medium to large, surface smooth and low to moderately perforate, non-spinose, low trochospiral, peripheral outline subcircular, with four to five compressed chamber in the final whorl; spiral side with sutures strongly curved and radial to slightly curved on the umbilical side, several pustule on umbilical side and aperture umbilical- extraumbilical with slit.

Remarks: Differs from *Globorotalia praescitula* in having peripheral outline subcircular.

Known Stratigraphic Range: Middle Miocene Zone N9/M6 to Recent.

Occurrences in Venezuela and Trinidad: In the studied section occurs in the lower middle Miocene of the Cipero Formation (Trinidad), Zone N9/M6 (sample RDL-538, *Globorotalia fohsi peripheroronda* Zone). Recorded in the Carapita Formation in Zone N9/M6, from samples WA 5600'-5690' to 6240'-6270', WB 2350'-2150' to 7410'-7440' and WC 5020'-5050' to 6650'-6700'.

Genus *Globigerinatella* Cushman and Stainforth 1945

Globigerinatella insueta Cushman and Stainforth 1945

(Plate 18, Figures 1-8)

Diagnostic Features: Robust and large, test subcircular to circular, non-spinose, chambers spherical with irregular pustule-like bullae; peripheral outline circular, sutures radial, primary aperture umbilical and multiple supplementary apertures.

Remarks: Differs from its ancestor *Globigerinita glutinata* in having several aereal supplementary apertures.

Known Stratigraphic Range: Lower Miocene N6/M3 to lower middle Miocene Zone N9/M6.

Occurrences in Venezuela and Trinidad: In the studied section occurs in the lower Miocene of the Cipero Formation (Trinidad) Zone N7/M4 (sample RDL-563, *Globigerinatella insueta* Zone).

APPENDIX II—CALCAREOUS BENTHIC FORAMINIFERA

Calcareous benthic foraminifera found in the Cipero and Carapita formations

Genus *Cibicidoides* Thalmann, 1939.

(Plate 19, Figures 1-6)

Cibicidoides crebbsi (Hedberg) 1937

Diagnostic Features: The broad, strongly sinuous sutures on umbilical side fusing to glossy umbilical boss a curved and tangential to the periphery on spiral side most adequately distinguishes *crebbsi* from other biconvex, coarsely puncatate, cibicidoidids. Sutures of early whorls usually fuse/merge and obscure initial chambers.

Paleobathymetry: Predominantly upper bathyal.

Known Stratgraphic Range: Upper Oligocene (P21) through Middle Miocene (N15/M12).

Occurrences in Venezuela and Trinidad: Hedberg (1937) reported this form in the lower to middle Miocene (Carapita Formation) of the Eastern Venezuela Basin. Common in the Acostian and Araguatian in the Agua Salada Group of Venezuala (Renz, 1948). Recorded in Zones N6-N14 in Trinidad (*fide* John Saunders, personal communication: Van Morkhoven et al., 1986: 141) where it occurs in the Ste Croix and Brasso Formations (Renz, 1948). Van Morkhoven et al. (1986) record it in Zones P21 through N15/M12) in the Eureka cores of the Gulf of Mexico. Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-89 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: This is one of the most characteristic benthic species in the Miocene and appears to be a useful marker for upper bathyal depths (van Morkhoven et al., 1986)

Cibicidoides incrassatus (Fichtel and Moll) 1978

(Plate 19, Figures 7-12)

Diagnostic Features: Test free, large and robust, perforate and subcircular, slightly lobulate in outline, periphery rounded, small to moderate size umbonal boss; at least twelve chambers in final whorl. Sutures broad, curved, slightly limbate on trochospiral side and slightly curved on umbilical side. Aperture interiomrginal extending onto the spiral side.

Paleobathymetry: Common in outer neritic and upper bathyal depths.

Known Stratgraphic Range: Lower Oligocene (P18) through Pleistocene (N23/Pt2).

Occurrences in Venezuela and Trinidad: As *Anomalinoides trinitatensis*, this form has been reported in the Upper Acostian and scarce in Lower Araguatian and Lucian (Lower zone) in the Agua Salada Group, Falcon Basin of Venezuela (Renz, 1948) and in the Oligo/Miocene (Ste. Croix and Brasso Formations) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-89 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Genus *Hanzawaia* Asano, 1944.

Hanzawaia concentrica (Cushman) 1964

(Plate 20, Figures 1-6)

Diagnostic Features: Wall calcareous, hyaline and finely perforate; test free, trochospiral, planoconvex, elongate in outline, flattened spiral side and convex ventral side; at least nine chambers in final whorl, umbilical side involute and sutures strongly curved; aperture an arch on the periphery with a slight lip.

Paleobathymetry: Upper to middle bathyal.

Known Stratgraphic Range: Lower Oligocene to Holocene.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Carapita Formation) of the Eastern Venezuela Basin (Hedberg, 1937), in the Upper Araguatian and Lucian (Lower zone) of the Agua Salada Group, Falcon Basin, Venezuela and Oligo/Miocene (Brasso Formation) of Trinidad. Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-11 to RO-89 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Hanzawaia mantaensis (Galloway and Morrey) 1971

(Plate 20, Figures 7-12)

Diagnostic Features: Test free, trochospiral, biconvex, flat spiral side and partially involute, wall calcareous, hyaline and finely perforate; between ten to eleven chambers in final whorl, apertural face surrounded by triangular keel

Paleobathymetry: Upper to middle bathyal.

Known Stratgraphic Range: Lower Oligocene to upper Miocene (N16/M13).

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Carapita Formation) of the Eastern Venezuela Basin (Hedberg, 1937), also occurs scarce in the *Uvigerinella sparsicostata* Zone and common throughout Acostian and Lower

Araguatian in the Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene (Ste. Croix Formation) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-7 to RO-89 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-2865 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: Differ from *Cibicides americanus* because its smaller, less inflated and has large umbilicus.

Genus *Laticarinina* Galloway and Wissler, 1927.

Laticarinina pauperata (Parker and Jones, 1865)

(Plate 21, Figures 1-4)

Diagnostic Features: Test free, slightly trochoid, discoidal, flattened rounded to oval in outline, compressed, biconvex to planoconvex, periphery with a broad and thin transparent keel. Chambers numerous, ten to eleven in the final whorl, slightly radial sutures on ventral side and flush on spiral side; small rounded aperture on ventral side.

Paleobathymetry: Predominantly bathyal to abyssal.

Known Stratgraphic Range: Lower Oligocene (P19) through Pleistocene (N23/Pt2).

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Carapita Formation) of the Eastern Venezuela Basin (Hedberg, 1937), also occurs scarce in the Acostian and Lucian (Lower zone) in the Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene (Ste. Croix and Brasso Formations) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Cipero Formation in Zones N5/M2-N9/M, from

sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: *L. pauperata* occurs at different depths but is predominantly bathyal. Discussions about its mode of life has been given by different authors (Loeblich and Tappan, 1964, Gallloway and Wissler, 1927) but it is still unresolved whether it is attached or free-living in life position. Phleger and Parker (1951) reported upper depth limits of 500 m for *L. pauperata* in the Norwest Gulf of Mexico.

Genus *Lenticulina* Lamarck 1804.

Lenticulina calcar (Linnaeus) 1758

(Plate 21, Figures 5-10)

Diagnostic Features: Test free, planispiral, biconvex, five to seven chambers in the final whorl, periphery keeled with radial spines, each single spine generally opposite each chamber in final whorl; chambers inflated increasing gradually in size as added, some chambers without spines, sutures limbate slightly curved, wall calcareous, hyaline, smooth, finely perforate; aperture radiate.

Paleobathymetry: Outer neritic to lower bathyal.

Known Stratgraphic Range: Upper Eocene to Recent.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Carapita Formation) of the Eastern Venezuela Basin (Hedberg, 1937), also occurs common in the Acostian, Araguatian and Lucian (Lower zone) in the Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene (Ste. Croix and Brasso Formations) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-7 to RO-5 (Zones N6/M3-N8/M5) and in the Cipero

Formation in Zones N5/M2-N9/M6, from sample RDL-2865 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Genus *Melonis* de Montfort, 1808.

Melonis pompilioides (Fichtel and Moll, 1798)

(Plate 22, Figures 1-6)

Diagnostic Features: Test free, planispiral, biumbilicate, slightly compressed, involute; periphery broadly rounded; chambers increasing in size as added , usually nine to eleven in the final whorl; sutures straight, radiating, smooth. Wall coarsely perforate; aperture an interiomarginal equatorial slit.

Paleobathymetry: Outer neritic to middle bathyal.

Known Stratgraphic Range: Upper Oligocene (P22) through Holocene (Pt2).

Occurrences in Venezuela and Trinidad: Occurs in the *Uvigerinella sparsicostata* Zone, common in the Acostian and Lower Araguatian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948), also occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-75 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: Differs from *M. spharoides* in having less inflated chambers; also *M. spharoides* has a different peripheral outline and more chambers (10-11) than *M. pompiliodes* (See van Morkhoven et al., 1986). The morphologic difference between *M. pompilioides* (outer neritic to middle bathyal) and *M. sphaeroides* (lower bathyal to

abyssal) would appear useful in paleobathymetric distribution. Whittaker (1988) suggests that *M. pompilioides* is synonymous with *Nonionina pompiliodes*.

Genus *Sphaeroidina* d'Orbigny, 1826.

Sphaeroidina bulloides d'Orbigny, 1826.

(Plate 22, Figures 7-12)

Diagnostic Features: Test free, subglobular, initial portion trochospiral, later streptospiral, four to six inflated chambers, increasing in size as added; sutures thin, depressed, aperture interiomarginal surrounded by a lip. Wall calcareous, hyaline and finely perforate.

Paleobathymetry: Neritic to upper bathyal depths.

Known Stratgraphic Range: Lower Oligocene (P19) through Pleistocene (N23/Pt2).

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947) also occurs in the *Uvigerinella sparsicostata* Zone, Acostian Araguatian and Lucian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-89 (Zones N6/M3-N9/M6).

Genus *Planulina* d'Orbigny, 1826.

Planulina renzi Cushman and Stainforth, 1945.

(Plate 23, Figures 7-12)

Diagnostic Features: Test free, robust, compressed, large, peripheral margin acute, with thin and delicate keel; involute on both spiral and umbilical side, umbilical side more convex than spiral, between fifteen to eighteen chambers in final whorl, increasing gradually in size as added; sutures limbate; wall surface coarsely perforate giving a granular appearance; aperture equatorial slit, slightly arched, extending from the periphery to the dorsal side.

Paleobathymetry: Bathyal through abyssal.

Known Stratgraphic Range: Oligocene (P18) through upper Miocene (N17/M14).

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947) and in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-9 to RO-87 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M, from sample RDL-2865 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: van Morkhoven et al., (1986) recognized specimens similar to *P. renzi* with larger umbos in the upper Eocene, less ornamented during the Oligocene, transitional forms near the Oligo/Miocene boundary and strongly ornamented during the Miocene. Also they include *Planulina marialana* var. gigas as a synonym of *renzi.*

Genus *Siphonina* Reuss, 1850.

Siphonina pozonensis Cushman and Renz 1941

(Plate 23, Figures 1-6)

Diagnostic Features: Test free, trochospiral, biconvex, periphery strongly keeled, acute, slightly lobulate; five chambers inflated in last whorl, sutures oblique on the spiral side and radial to curved on umbilical side, aperture areal with short neck and phialine lip. Wall calcareous, hyaline, smooth and coarsely perforate.

Paleobathymetry: Upper bathyal deposits

Known Stratgraphic Range: Lower Miocene (N5/M3) through middle Miocene (N14/M11).

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947) also occurs in the *Uvigerinella sparsicostata* Zone, Acostian Araguatian and Lucian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-11 to RO-59 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: Differs from *S. tenuicarinata* in having less coarsely perforate, more convex test and strongly keeled periphery.

Genus *Bolivina* d'Orbigny 1839.

Bolivina imporcata Cushman and Renz 1941

(Plate 24, Figures 1-6)

Diagnostic Features: Test slightly inflated, biserial, elongate in outline, wall calcareous with coarse perforations and distinctly crenulated appearance, aperture ovate in final

chamber; periphery broadly rounded: at least six pairs of chambers, increasing gradually in size; sutures strongly curved, frequently with lobe shaped ornamentation.

Paleobathymetry: Middle neritic to bathyal.

Known Stratgraphic Range: Lower Oligocene (P18) through upper Miocene (N16/M13a).

Occurrences in Venezuela and Trinidad: Common in the upper Acostian, Araguatian and Lucian (lower and upper zones) in the Agua Salada Group, Falcon Basin, Venezuala (Renz, 1948). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-77 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample RDL-2865 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Bolivina pisciformis Galloway and Morrey 1929

(Plate 24, Figures 7-12)

Diagnostic Features: Test slightly inflated, free biserial and elongate; periphery broadly rounded, at least six pairs of chambers, wall calcareous finely perforate with sutures strongly curved, aperture terminal, elongate slit.

Paleobathymetry: Middle neritic to bathyal.

Known Stratgraphic Range: Lower Oligocene (P18) through upper Miocene (N16/M13).

Occurrences in Venezuela and Trinidad: Common in the Acostian and lower Araguatian in the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Typically in Ste. Croix and Brasso Formation (Esmeralda member) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop)

from sample RO-5 to RO-89 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Genus *Uvigerina* d'Orbigny, 1826.

Uvigerina carapitana Hedberg, 1937.

(Plate 26, Figures 1-6)

Diagnostic Features: Test free, robust, triserial with about three to four whorls, chambers strongly inflated; periphery smoothly rounded; aperture tubular over the long neck in the margin of last chamber. Wall thick, calcareous, hyaline, finely perforate, sometimes ornamented with longitudinal striae.

Paleobathymetry: Bathyal.

Known Stratgraphic Range: Lower Miocene (N6/M3) through upper Miocene (N17/M15).

Occurrences in Venezuela and Trinidad: This form occurs in the lower to middle Miocene of the Carapita Formation, Eastern Venezuela Basin (Hedberg, 1937); in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947) also occurs (scarce) in the *Uvigerinella sparsicostata* Zone and (common) in the Acostian Araguatian and Lucian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-59 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N6/M2-N9/M6, from sample RDL-2859 (*Catapsydrax stainforthi* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: The nearly smooth test is almost unique and differentiates it from the other Neogene species (See van Morkhoven et al., 1986).

Uvigerina mexicana Nuttall 1932

(Plate 25, Figures 1-6)

Diagnostic Features: Test free, triserial, short, strongly ornamented with longitudinal costae; chambers slightly inflated, sutures curved, depressed; apertural end flattened in both forms, at the end of short neck in final chamber.

Paleobathymetry: Outer neritic and bathyal.

Known Stratgraphic Range: Upper Eocene (P16) through Recent.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene of the Carapita Formation, Eastern Venezuela Basin (Franklin, 1944) and in the Oligo/Miocene (Ste Croix Formation) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-75 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample RDL-2865 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Uvigerina rugosa Schwager, 1866.

(Plate 25, Figures 7-12)

Diagnostic Features: Test free, triserial; elongate, periphery lobulate, chambers increasing gradually in size, strongly ornamented with papillae on each chamber, aperture terminal at the end of a short neck, with lip.

Paleobathymetry: Bathyal depths.

Known Stratgraphic Range: Upper Oligocene (P21) through Pleistocene (N23/Pt2).

Occurrences in Venezuela and Trinidad: This form occurs in the Acostian Araguatian and Lucian (Lower zone) of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene (Ste Croix Formation) of Trinidad (Cushman and Stainforth, 1947)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-9 to RO-75 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample RDL-2865 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks:

U. hispida vs *U. rugosa*

Both species exhibit similarities or likeness such as; shape, size, and in being densely covered with spines on the surface. However, *U. rugosa* is characterized by its distinct eccentric aperture across the final whorl and less coarse ornament (Boersma, 1984). According to Whittaker (1988), *U. rugosa* differs from *U. hispida* in having more and longer spines. Lamb and Miller (1984) placed an upper-depth limit of 1000 m for *U. rugosa.*

Genus *Rectuvigerina* Mathews 1945

Rectuvigerina multicostata (Cushman and Jarvis, 1929)

(Plate 26, Figures 7-16)

Diagnostic Features: Test free, elongate, length three times the width, triserial in the early portion follow by biserial and uniserial; chambers slightly inflated and increasing

gradually in size, sutures depressed, aperture terminal circular produced with a cylindrical neck with lip. Wall ornamented with several costae and in some cases spines.

Paleobathymetry: Bathyal depths.

Known Stratgraphic Range: Upper Oligocene (P21) through Pliocene (N20/PL4-5).

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947) and in the Acostian and Araguatian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-11 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N8/M5, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-423 (*Praeorbulina glomerosa* Zone).

Rectuvigerina striata (Schwager) 1866

(Plate 27, Figures 11-16)

Diagnostic Features: Test free; elongate, triserial in the early portion later ones biserial to uniserial; periphery lobulate, four to five inflated chambers in uniserial portion, increasing gradually in size; sutures deeply depressed. Aperture terminal on a neck with distinct lip. Wall thin, finely perforate, ornamented with fine striae, an some individuals ending as spines.

Paleobathymetry: Upper to middle bathyal.

Known Stratgraphic Range: Lower middle Miocene (N9/M6) through middle Pliocene (N20/PL5).

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947) and in the Upper

Acostian and Lower Araguatian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-49 to RO-75 (Zone N9/M6) and in the Cipero Formation in Zones N8/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-423 (*Praeorbulina glomerosa* Zone).

Rectuvigerina transversa (Cushman) 1918

(Plate 27, Figures 1-10)

Diagnostic Features: Test free, elongate, triserial in the early portion later short biserial stage and finally uniserial; sutures arched, indented with costae; aperture with a short cylindrical neck.

Paleobathymetry: Upper bathyal.

Known Stratgraphic Range: Lower Miocene (N4/M1) to middle Miocene (N11/M8).

Occurrences in Venezuela and Trinidad: This form occurs in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Hedberg, 1937) and in the *Uvigerinella sparsicostata* Zone in the Lower and Upper Acostian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Also occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-89 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: van Morkhoven et al., (1986) found this species restricted to the lower to upper Miocene and also characteristic of upper bathyal depths.

Calcareous benthic foraminifera found in the Cipero Formation

Genus *Anomalinoides* Brotzen, 1942.

Anomalinoides globulosus (Chapman and Parr 1937)

(Plate 29, Figures 1-3)

Diagnostic Features: Test almost planispiral, elongate in outline, sutures straight on umbilical side and curved on umbilical side, six to eight chambers inflated in final whorl, increasing in size: wall calcareous; umbilical surface smooth, with sparsely distributed pores, spiral side densely perforate.

Paleobathymetry: Outer neritic and upper bathyal.

Known Stratgraphic Range: Oligocene through Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the of the Ste. Croix Formation of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Cipero Formation in Zones N5/M2-N8/M5, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-423 (lower *Globigerinatella insueta* Zone).

Remarks: Differs from *A. semicribratus* in having its aperture extending to the periphery; in having a nearly planispiral coil and more coarsely perforate spiral side (See van Morkhoven et al., 1986).

Anomalinoides pompilioides Galloway and Heminway 1941

(Plate 29, Figures 4-6)

Diagnostic Features: Test low trochospiral, strongly involute, and nearly circular in outline, chambers inflated, five to seven in the last whorl, wall calcareous and strongly

perforate on both sides but more common on umbilical side, sutures straight on umbilical side and curved on spiral side.

Paleobathymetry: Middle bathyal through abyssal.

Known Stratgraphic Range: Middle Eocene (P12) through middle Miocene (N9/M6).

Occurrences in Venezuela and Trinidad: Common in the Oligo/Miocene of the Cipero Formation of Trinidad (Cushman and Stainforth, 1945). Recorded in this study in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Genus *Neoeponides* Reis, 1960.

Neoeponides umbonatus (Reuss, 1851)

(Plate 29, Figures 7-9)

Diagnostic Features: Test free, trochospiral, biconvex, periphery with a circular thin keel, six to seven chambers slightly inflated in the last whorl, increasing gradually in size as added; sutures limbate on the spiral side and curved to radial in the umbilical side; aperture an interiomarginal slit with a thin lip extending from the umbilical to the periphery area; small supplemental apertures on the spiral side. Wall calcareous, hyaline and finely perforate.

Paleobathymetry: Outer neritic through lower bathyal.

Known Stratgraphic Range: Upper Oligocene to Recent.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986) and in the *Uvigerinella sparsicostata* Zone, through the Acostian, Araguatian and Lucian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Also occurs in the

Oligo/Miocene (Ste Croix, Brasso and Cipero formations) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Cipero Formation in Zones N5/M2-N9/M, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Genus *Buchnerina* R. W. Jones 1984

Buchnerina trinitatensis (Cushman and Stainforth) 1945

(Plate 30, Figures 1-3)

Diagnostic Features: Test free, finely perforate, wall calcareous, hyaline, aperture terminal, oval on long neck, keels forming a band around the total test. .

Paleobathymetry: Bathyal through abyssal.

Known Stratgraphic Range: Upper Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: Occurs commonly in the Oligo/Miocene (Cipero Formation) of Trinidad (Cushman and Stainforth, 1945). Recorded in this study in the Cipero Formation in Zones N5/M2-N9/M, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Remarks: This species was described by Cushman and Stainforth (1945) in the Oligo/Miocene of Cipero and Ste. Croix formations of Trinidad as *Lagena trinitatensis*. Robertson (1998) included in the genus *Buchnerina*.

Genus *Lenticulina* Lamarck 1804.

Lenticulina adelinensis Keijzer 1945

(Plate 30, Figures 4-6)

Diagnostic Features: Test free, large, and stout, planispiral; circular in outline, periphery acute and smooth with a narrow thin keel, four chambers in final whorl, increasing gradually in size, sutures flush with surface. Aperture elliptical and concave over face in final chamber; wall calcareous, hyaline, smooth and finely perforate.

Paleobathymetry: Neritic to lower bathyal.

Known Stratgraphic Range: Lower Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Upper Oligocene (Sombrerito Formation), Falcon Basin of Venezuela (Bermudez, 1949) Recorded in this study in the Cipero Formation in Zone N5/M2 BO-287 (*Catapsydrax dissimilis* Zone).

Lenticulina occidentalis (Cushman) var. torridus (Cushman, 1923)

(Plate 30, Figures 7-9)

Diagnostic Features: Test free, planispiral, circular to slightly angular in outline, with a narrow thin keel, seven to eight chambers in final whorl, increasing gradually in size, sutures thin and slightly curved aperture radiate; wall calcareous, hyaline, smooth, and finely perforate.

Paleobathymetry: Neritic to middle bathyal.

Known Stratigraphy Range: Lower Oligocene (P8) to upper Miocene (N18/Pl1).

Occurrences in Venezuela and Trinidad: Occurs in the Upper Oligocene (Sombrerito Formation), Falcon Basin of Venezuela (Bermudez, 1949). Recorded in this study in the Cipero Formation in Zone N5/M2, sample BO-287 (*Catapsydrax dissimilis* Zone).

Calcareous benthic foraminifera found in the Carapita Formation

Genus *Neoeponides* Reis, 1960.

Neoeponides campester (Palmer and Bermudez, 1941)

(Plate 31, Figures 1-3)

Diagnostic Features: Test free, large, trochospiral, biconvex; periphery angular, acute, bordered by a limbate keel, seven to ten chambers in final whorl, dorsal sutures strongly oblique and ventral sutures radial, aperture interiomarginal between the periphery and the umbilicus; wall calcareous, hyaline and finely perforate.

Paleobathymetry: Upper bathyal.

Known Stratgraphic Range: Lower Oligocene (P18) through middle Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene of Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-89 (Zones N6/M3-N9/M6).

Neoeponides parantillarum (Galloway and Heminway, 1941)

(Plate 31, Figures 4-6)

Diagnostic Features: Test free, trochospiral, biconvex, spiral sized more convex that umbilical side, periphery subacute to rounded, seven to eight chambers in the last whorl, increasing gradually in size as added; sutures curved on spiral side and radial on umbilical side; wall calcareous, hyaline and finely perforate, aperture an interiomarginal slit with a distinct thickened lip.

Paleobathymetry: Upper bathyal.

Known Stratgraphic Range: Lower Oligocene to Recent.

Occurrences in Venezuela and Trinidad: Occurs in the Lucian (*Vaginulinopsis superbus* Zone) of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948), also

occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-89 (Zones N6/M3-N9/M6).

Genus *Gyroidinoides* Brotzen, 1942.

Gyroidinoides altiformis (Stewart and Stewart) 1930

(Plate 31, Figures 7-9)

Diagnostic Features: Wall calcareous and finely perforate, test free, trochospiral, planoconvex, circular in outline, spiral side flat to convex, umbilical side convex with deep umbilicus, eight to ten chambers in the last whorl, inflated on the umbilical side and slightly depressed on the spiral side: aperture extending from periphery to umbilicus.

Paleobathymetry: Upper bathyal to abyssal.

Known Stratgraphic Range: Upper Eocene to Recent.

Occurrences in Venezuela and Trinidad: This form occurs in the Oligo/Miocene (Carapita Formation) of the Eastern Venezuela Basin (Hedberg, 1937), also occurs common in the Acostian and scarce in the Araguatian and Lucian (lower zone) in the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene (Ste. Croix and Brasso formations) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-45 (Zones N6/M3-N8/M5).

Genus *Planularia* Defrance, in de Blainville 1826

Planularia venezuelana Hedberg, 1937.

(Plate 31, Figures 10-12)

Diagnostic Features: Test large, compressed, slightly longer than broad, thin, sides almost parallel, early portion closely coiled; two to three whorls. Peripheral margin truncate with a broad thin and delicate keel. Chambers inflated increasing gradually in size as added; six in last whorl. Sutures strongly curved, distinct radiate aperture; wall calcareous, hyaline and finely perforate.

Paleobathymetry: Neritic to bathyal.

Known Stratgraphic Range: Lower to upper Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Hedberg, 1937) and in the Lower and Upper Acostian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Also occurs in the Oligo/Miocene (Ste Croix, Brasso and Cipero formations) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-7 to RO-89 (Zones N6/M3-N9/M6).

Genus *Vaginulinopsis* Silvestri, 1904

Vaginulinopsis superbus (Cushman and Renz) 1941

(Plate 32, Figures 1-3)

Diagnostic Features: Test free, early portion closely coiled and compressed, planispiral, evolute, later portion uncoiled, periphery keeled; six to nine compressed chambers, increasing gradually in size, sutures distinct, with round knoblike beads on the sutures; aperture terminal, radiate, at the end of elongate terminal chamber, with distinct neck. Wall calcareous, hyaline, smooth and finely perforate.

Paleobathymetry: Outer neritic to bathyal.

Known Stratgraphic Range: Upper Oligocene through Miocene.

Occurrences in Venezuela and Trinidad: This form occurs in the Lucian (Upper zone) and in the *Vaginulinopsis superbus*/*Trochammina* cf. *pacifica* zonule of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene (Brasso Formation) of Trinidad (Cushman and Stainforth, 1947)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-5 (Zone N6/M3).

Genus *Marginulinopsis* Silvestri, 1904

Marginulinopsis basispinosus (Cushman and Renz) 1941

(Plate 32, Figures 4-6)

Diagnostic Features: Test free, short, stout, elongate; early portion closely coiled, later uncoiled to rectilinear, periphery angular with a distinct keel with basal spines, six to eight compressed chambers in the coiled portion, two to three in the uncoiled portion, terminal chamber inflated, sutures ornamented with distinct beads in the coiled portion, aperture terminal, at the end of a short neck.

Paleobathymetry: Neritic to middle bathyal.

Known Stratgraphic Range: Lower Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the *Marginulinopsis basispinosus* Zone of the Lower Lucian in the Agua Salada Group, Falcon Basin of Venezuela (Renz, 1948). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-15 (Zone N6/M3).

Genus *Lenticulina* Lamarck 1804.

Lenticulina hedbergi Cushman and Renz, 1941.

(Plate 32, Figures 7-9)

Diagnostic Features: Test free, planispiral, involute, biconvex, periphery keeled with small spines; chambers inflated increasing gradually in size as added, some chambers without spines, six to seven chambers in the final whorl, sutures limbate with distinctly pustules, slightly curved, wall calcareous, hyaline, smooth, finely perforate; aperture radiate.

Paleobathymetry: Range from upper to middle bathyal depths.

Known Stratigraphy Range: Lower Oligocene (P18) to upper Miocene (N16/M13).

Occurrences in Venezuela and Trinidad: This form occurs common in the Lower Acostian and scarce in Upper Acostian in the Falcon Basin, Venezuela (Renz, 1948) and in the Oligo/Miocene (Ste. Croix and Brasso Formations) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-15 (Zone N6/M3).

Lenticulina subpapillosus (Nuttall) 1932

(Plate 32, Figures 10-12)

Diagnostic Features: Test free, biconvex, subcircular peripheral margin with thin keel, chambers inflated increasing gradually in size as added, five to seven chambers in the final whorl, sutures limbate slightly curved, wall calcareous with papillose ornamentation, hyaline, smooth, finely perforate; aperture radiate.

Paleobathymetry: Neritic to middle bathyal.

Known Stratgraphic Range: Lower Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Upper Oligocene (Sombrerito Formation), Falcon Basin of Venezuela (Bermudez, 1949). Recorded in this study in the

Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-89 (Zones N6/M3-N9/M6).

Genus *Saracenaria* Defrance 1824

Saracenaria senni Hedberg 1937

(Plate 32, Figures 13-14)

Diagnostic Features: Test free, small, initial portion close coiled, later portion uncoiling and curved; seven chambers, increasing gradually in size. Periphery keeled, sometimes with stout spines and the end but not on all chambers; sutures curved, radiate aperture. Wall calcareous, hyaline, smooth and finely perforate.

Paleobathymetry: Bathyal depths.

Known Stratgraphic Range: Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Hedberg, 1937) and in the *Uvigerinella sparsicostata* Zone in the Lower Acostian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Also occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-7 to RO-53 (Zones N6/M3-N9/M6).

APPENDIX III—AGGLUTINATED BENTHIC FORAMINIFERA

Agglutinated benthic foraminifera from the Cipero and Carapita formations

Genus *Cyclammina* H. B. Brady, 1876.

Cyclammina cancellata Brady, 1879

(Plate 28, Figures 1-8)

Diagnostic Features: Test free, large, robust, planispiral, biconvex, involute, circular to oval in outline, periphery rounded, subcircular; wall finely agglutinated, nine to twelve chambers in the final whorl, slightly inflated, gradually increasing in size, sutures radial, depressed; aperture multiple with interiomarginal slit and several rounded pores on the apertural face.

Paleobathymetry: Range from upper bathyal to abyssal.

Known Stratgraphic Range: Upper Eocene to Recent.

Occurrences in Venezuela and Trinidad: Occurs in *Uvigerinella sparsicostata* Zone, Acostian, Araguatian and Lucian (Lower and Upper zones) in the Agua Salada Group, Falcon Basin of Venezuela (Renz, 1948). In the Oligo/Miocene (Carapita Formation) of the Eastern Venezuela Basin (Hedberg, 1937) and in the Oligo/Miocene (Ste. Croix and Brasso formations) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-67 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Genus *Dorothia* Plummer, 1931.

Dorothia brevis Cushman and Renz, 1945.

(Plate 28, Figures 9-15)

Diagnostic Features: Test free, robust, chambers strongly inflated, gradually increasing in size, sutures depressed, wall finely to moderate agglutinated, aperture over the final chamber covered by a thin lip.

Paleobathymetry: Bathyal to abyssal.

Known Stratgraphic Range: Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Ste. Croix and Brasso formations) of Trinidad (Cushman and Renz, 1947). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-89 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M6, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Agglutinated foraminifera from the Cipero Formation

Genus *Paratrochamminoides* Cushman 1910

Paratrochamminoides irregularis White 1928

(Plate 30, Figures 10-12)

Diagnostic Features: Test robust, large, coiling glomospiral, chambers globular, elongate, aperture a simple terminal opening. Wall finely agglutinated.

Paleobathymetry: Bathyal

Known Stratgraphic Range: ?Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: This form occurs in the Oligo/Miocene (Cipero Formation) of Trinidad (Cushman and Stainforth, 1945). Recorded in the Cipero Formation in Zone N5/M2, sample BO-287 (*Catapsydrax dissimilis* Zone).

Agglutinated foraminifera from the Carapita Formation

Genus *Valvulina* d'Orbigny, 1826.

Valvulina flexilis Cushman and Renz, 1941.

(Plate 33, Figures 1-3)

Diagnostic Features: Test free, early portion triserial after biserial in adult stage. Chambers strongly deformed, wall agglutinated.

Paleobathymetry: Bathyal through abyssal depths.

Known Stratgraphic Range: Upper Oligocene to middle Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Ste Croix Formation) of Trinidad (Cushman and Stainforth, 1947) and scarce in the *Uvigerinella sparsicostata* Zone, Acostian and Araguatian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948) also in the Miocene of the Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-75 (Zones N6/M3-N9/M6).

Genus *Sigmoilopsis* Finlay, 1947.

Sigmoilopsis schlumbergeri (Silvestri, 1904)

(Plate 33, Figures 4-6)

Diagnostic Features: Test free, ovate, biconvex; chambers indistinct and slightly inflated, periphery subacute to rounded. Wall finely agglutinated, terminal rounded aperture on a short neck with a bifid tooth, surrounded by a lip.

Paleobathymetry: Outer neritic to middle bathyal depths.

Known Stratgraphic Range: Lower middle Miocene (N8/M5) through Pleistocene (N23/Pt2).

Occurrences in Venezuela and Trinidad: This form occurs in the Oligo/Miocene of the Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-49 (Zones N6/M3-N9/M6).

Genus *Alveovalvulinella* Cushman 1933

Alveovalvulinella pozonensis Cushman and Renz 1941

(Plate 33, Figures 7-9)

Diagnostic Features: Test free, elongate, periphery cylindrical in outline, robust; initial portion trochospiral, later becoming uniserial, alveolar inflated chambers, increasing rapidly in size in uniserial portion, sutures depressed, indistinct, wall thick strongly agglutinated, terminal aperture.

Paleobathymetry: Upper bathyal to abyssal.

Known Stratgraphic Range: Lower Oligocene (P18) through upper Miocene (N16/M13).

Occurrences in Venezuela and Trinidad: Common in the Acostian and Araguatian in the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Also occurs in the Oligocene Nariva Formation of Trinidad. Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-79 (Zones N6/M3-N9/M6) and in the Cipero Formation in Zones N5/M2-N9/M, from sample BO-287 (*Catapsydrax dissimilis* Zone) to RDL-538 (*Globorotalia fohsi peripheroronda* Zone).

Genus *Glomospira* Rzehak, 1885.

Glomospira charoides (Jones and Parker, 1860)

(Plate 33, Figures 10-12)

Diagnostic Features: Test irregularly with tubular streptospirally enrolled chamber, wall finely to moderate agglutinated and aperture at the open end of the tubular chamber.

Paleobathymetry: Middle bathyal through abyssal depths.

Known Stratgraphic Range: Cretaceous to Recent.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Carapita Formation) Eastern Venezuela Basin (Hedberg, 1937), also occurs in the Upper Acostian and Lucian (Lower zone) of the Agua Salada Group, Falcon Basin, Venezuela and in the Oligo/Miocene (Ste. Croix and Brasso formations) of Trinidad (Renz, 1948). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-45 (Zones N6/M3-N8/M5).

Remarks: This is a cosmopolitan species, often found in deep-sea environments; however in the Gulf of Mexico it occurs at shallower depths. Its variability in the abundance in different environments can be useful as paleoecological indicator (See Kaminski and Gradstein, 2005).

Genus *Textularia* Defrance, in de Blaineville 1824

Textularia tatumi Cushman and Ellisor, 1939

(Plate 34, Figures 1-3)

Diagnostic Features: Test free, small, biserial in adult portion, at least four pairs of chambers in biserial portion, somewhat indistinct, increasing rapidly in size, apertural depression at base of apertural face. Wall finely agglutinated

Paleobathymetry: Bathyal

Known Stratgraphic Range: Miocene

Occurrences in Venezuela and Trinidad: This form occurs in the Miocene of the Carapita Formation in the Eastern Venezuela Basin (Jouval and Villain, 1986)**.** Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-7 to RO-49 (Zones N6/M3-N9/M6).

Genus *Vulvulina* d'Orbigny 1826

Vulvulina jarvisi Cushman, 1932

(Plate 34, Figures 4-6)

Diagnostic Features: Test free, early portion planispiral follow by biserial and finally single terminal chamber, periphery acute and keeled, sutures limbate and slightly curved, aperture interiomarginal slit in terminal chamber. Wall finely agglutinated.

Paleobathymetry: Bathyal.

Known Stratgraphic Range: Eocene to upper Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Oligo/Miocene (Cipero Formation) of Trinidad (Cushman and Stainforth, 1945). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-5 to RO-75 (Zones N6/M3-N9/M6).

Vulvulina spinosa Cushman 1932

(Plate 34, Figures 7-9)

Diagnostic Features: Test free, large, initial portion coiled, later chamber triserial becoming uniserial, at least seven pairs in the biserial portion with a projecting spine at the outer margin; aperture terminal and elongate. Wall finely agglutinated.

Paleobathymetry: Bathyal.

Known Stratgraphic Range: Lower Oligocene to Pleistocene.

Occurrences in Venezuela and Trinidad: This form occurs in the Oligo/Miocene (Ste Croix and Brasso Formations) of Trinidad (Cushman and Stainforth, 1947) and in the upper Acostian of the Agua Salada Group, Falcon Basin, Venezuela (Renz, 1948). Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-7 to RO-75 (Zones N6/M3-N9/M6).

Genus *Gaudryina* d'Orbigny, in de la Sagra 1839

Gaudryina bullbrooki Cushman, 1936.

(Plate 34, Figures 10-12)

Diagnostic Features: Test free, large and robust, elongate, early portion triserial and sharply triangular; the last pair of chambers biserial: wall strongly agglutinated with a large amount of calcareous sands, aperture at the inner margin of the last chamber.

Paleobathymetry: Bathyal to abyssal.

Known Stratgraphic Range: Oligocene to Miocene.

Occurrences in Venezuela and Trinidad: Occurs in the Acostian, Upper Araguatian and Lucian (Lower zone) of the Agua Salada Group, Falcon Basin, Venezuela. Recorded in this study in the Carapita Formation (Rio Oregano outcrop) from sample RO-1 to RO-45 (Zones N6/M3-N8/M5).