

Genus Bifarina Parker and Jones 1872

Bifarina setosa Stacy, new species

Pl. 11 fig. 4

Test free, small, biserial becoming uniserial in final stage, elongate oval in cross section. Chambers laterally compressed, expanding very rapidly in early stages. then very gradually; hence, sides almost parallel in the upper half of the test. In the acutely angled, early portion of the test, periphery of each chamber developing a small, fine, short spine; periphery of the later, subparallel part narrowly rounded, smooth and only rarely spinose. Sutures of biserial portion straight, oblique, flush; sutures of uniserial part curved, horizontal, depressed. Aperture a terminal slit in center of final chamber.

Size. Height, 0.34 mm.; width, 0.15 mm.; thickness, 0.06 mm.

Remarks. This form appears similar to some of the younger Tertiary species of this genus although they do not show a development of a spinose periphery in the early portion of the test. No similar Cretaceous species are known.

Type. Holotype UMMP 54237

Bifarina? trinidadensis Stacy, new species

Pl. 11 figs. 8, 18

Test free, small, straight, uniserial with very small initial, biserial stage. Globular chambers enlarging gradually in size. Periphery lobate; sutures deeply depressed, horizontal. Aperture a circular opening at end of short neck, somewhat acentric.

Size. Height, 0.45 mm.; diam., 0.17 mm.

Remarks. Most similar to Rectogumbelina texana Cushman but with a much smaller biserial stage and more deeply depressed sutures.

Rectogumbelina is now considered to be a synonym of Bifarina (see Loeblich and Tappan, 1964, p. C654).

Type. Holotype UMP 54238

Family PLANOMALINIDAE Bolli, Loeblich and Tappan

Genus Planomalina Loeblich and Tappan 1946

Planomalina cf. buxtorfi (Gandolfi)

Pl. 12 figs. 10, 11

Planulina buxtorfi Gandolfi, 1942, p. 103, pl. 3, fig. 7, pl. 5, figs. 3-6. -- Sigal, 1952, p. 23, fig. 22.

Planomalina apsidostroba Loeblich and Tappan, 1946, p. 258, pl. 37, figs. 22, 23. -- Frizzell, 1954, p. 131, pl. 21, fig. 11. -- Bolli, Loeblich and Tappan, 1957, p. 23, pl. 1, figs. 2, 3.

Planomalina buxtorfi (Gandolfi). Loeblich and Tappan, 1961, pp. 269, 270, pl. 2, figs. 1, 2.

Test free, small, planispiral, biumbilicate, almost completely involute. Chambers increasing very gradually in size, much lower than wide, triangular in section. Periphery acute, low rounded keel formed by extension of limbate sutures. Sutures very curved, limbate, slightly raised, meeting at periphery to form the keel. Aperture a slit at base of narrow, triangular apertural face, extending into the umbilical area, covered by small flap in the umbilical area. Lateral, umbilical portions of successive apertures remaining open as supplementary, relic apertures.

Size. Height, 0.33 mm.; thickness, 0.10 mm.

Remarks. Three small, immature specimens have been found that are referable to this species, but they do not show the lobate periphery nor the beaded sutures or keel of the typical adult. This appearance is much lower, stratigraphically, than has been reported for this

species before. The occurrence reported as P. cf. apsidostroba by Bolli, 1959 is considered to be P. pseudobuxtorfi, n. sp.

Planomalina pseudobuxtorfi Stacy, new species

Pl. 12 figs. 53-56

Planomalina cf. apsidostroba Loeblich and Tappan. Bolli, 1959, p. 259, pl. 20, fig. 1.

Test free, moderate size, planispiral, biumbilicate, partly evolute, with about three whorls. Ten to twelve, gradually increasing, subglobular chambers in final whorl. Periphery acute, faintly keeled, lobate. Sutures radial, straight to slightly curved, depressed, distinct. Aperture a slit at base of last chamber, extending into the umbilicus on both sides; umbilical portion covered by thickened lip which remains as relic apertures on preceding chambers.

Size. Height, 0.51 mm.; thickness, 0.12 mm.

Remarks. This species differs from P. buxtorfi by having sutures that are depressed and almost straight, rather than beaded, limbate and highly curved in the adult whorl. The keel of the present form is low and obscure rather than large and beaded. P. pseudobuxtorfi, n. sp., was quite common in the Upper Albian samples, both in Trinidad and Eastern Venezuela.

Type. Holotype UMP 54239

Genus Biglobigerinella Lalicker 1948

Biglobigerinella barri Bolli

Pl. 12 figs. 51, 52

Biglobigerinella barri Bolli, Loeblich and Tappan, 1957, p. 25, pl. 1, figs. 13-18. -- Bolli, 1959, p. 263.

Test free, medium to large, planispiral, biumbilicate, partly

evolute. Eight to ten subglobular, gradually increasing chambers in final whorl. Periphery rounded, somewhat lobate. Sutures depressed, straight, radial, becoming sigmoid in umbilicus due to lips over relic apertures. Aperture a low slit at base of chamber, extending into the umbilicus on each side; umbilical portion of aperture covered by low flaps remaining as relic apertures of preceding chambers. In some, but not all adult, specimens, final one or two chambers becoming flattened or broadly oval, then succeeded by a pair of globular chambers, one on each side of the plane of coiling. Single extraumbilical aperture developed in each chamber of the pair.

Size. Height, 0.50 mm.; thickness, 0.16 mm.

Remarks. Bolli, Loeblich and Tappan included not only specimens with paired final chambers or flattened, ovate single chamber but also those mature specimens in which the final chamber was globular and similar to the other chambers of the whorl. The present writer has also found gradations between all types in this study, but it should be noted that the large specimens which terminate in a normal globular final chamber cannot be distinguished from the descriptions and illustrations given for Globigerinelloides algeriana Cushman and ten Dam.

Biglobigerinella cushmani (Tappan)

Pl. 12 figs. 3-5

Globigerinella cushmani Tappan, 1943, p. 513, pl. 83, figs. 5a, b. --

Frizzell, 1954, p. 127, pl. 20, figs. 8a, b.

Test free, small, planispiral, biumbilicate, almost completely involute. Five to six, globular chambers in final whorl. Final chamber broadened, ovate, not as high as preultimate chamber; or divided into two smaller, globular chambers, one on each side of plane of coiling.

Periphery broadly rounded, lobate. Sutures deeply depressed, straight, radial. Aperture an arch at base of apertural face and extending along sides into umbilical area. Lips of shell material covering umbilical portion of apertures not observed on present specimens, but probably present.

Size. Height, 0.30 mm.; thickness of final chamber, 0.23 mm.

Remarks. Although the Trinidad specimens have five or six chambers in the final whorl, instead of eight as noted by Tappan, the present suite of specimens suggest that the form described from the Duck Creek Formation is in reality a Biglobigerinella in which the pair of supplementary final chambers had not developed.

Genus Globigerinelloides Cushman and ten Dam 1948

Globigerinelloides blowi (Bolli)

Pl. 12 figs. 6, 7, 12, 13

Planomalina blowi Bolli, 1959, p. 260, pl. 20, figs. 2, 3.

Test free, moderate size, planispiral, biumbilicate, slightly evolute. Chambers globular (about equal dimensions of height, width and thickness), rapidly expanding, from four to six, usually five in final whorl. Periphery rounded, very lobate. Sutures deeply depressed, straight, radial. Aperture a low slit at base of final chamber, extending into umbilicus on each side; umbilical portion covered by indistinct flap. Relic aperture of earlier chambers sometimes preserved in umbilicus. Surface smooth.

Size. Height, 0.30 mm.; thickness, 0.16 mm.

Remarks. Some of the specimens have a faintly reticulate surface. A careful examination of G. blowi suggests that the inner shell wall has large pores that are covered by the outer surface. The "cancellate" forms are probably specimens in which the outer surface is missing and

the pores form the cancellate or faintly reticulate ornamentation.

This species, and the ones following, are referred to the genus Globigerinelloides rather than Planomalina because they lack a peripheral keel.

Globigerinelloides cf. blowi (Bolli)

Pl. 12 figs. 1, 2

Test free, very small, planispiral, biumbilicate, very slightly evolute. Five to six, rapidly expanding, globular chambers in the final whorl. Periphery rounded, very lobate. Sutures deeply depressed, straight, radial. Peripheral aperture extending into the umbilicus on each side; umbilical parts of aperture covered by small flap. Relic apertures sometimes present.

Size. Height, 0.19 mm.; thickness, 0.10 mm.

Remarks. This form is much smaller than the typical G. blowi, has a deeper, narrower umbilicus and no gradational specimens have been found. It differs from G. escheri by having globular, rather than laterally compressed chambers. It is closest in size and shape to G. biforaminate Hofker but lacks the two, rounded apertures of this species.

Globigerinelloides eaglefordensis (Moreman)

Pl. 12 figs. 14, 15

Anomalina eaglefordensis Moreman, 1927, p. 99, pl. 16, fig. 9.

Planomalina caseyi Bolli, Loeblich and Tappan, 1957, p. 24, pl. 1, figs. 4, 5.

Globigerinelloides eaglefordensis (Moreman). Loeblich and Tappan, 1961, pp. 268, 269, pl. 2, figs. 3-7.

Not Planulina eaglefordensis (Moreman). Cushman, 1946, p. 156, pl. 64, figs. 8, 9. --- Frizzell, 1954, p. 132, pl. 21, figs. 13a-c.

Test free, small to moderate size, planispiral, biumbilicate, partly evolute. Six to seven, globular chambers in final whorl; in some specimens chambers enlarging very gradually, in others increasing quite rapidly. Periphery rounded, lobate. Sutures depressed, straight, radial. Aperture a low arch at base of last chamber, extending into the umbilical area, there covered by apertural flap. Relic apertures and covering flaps present in umbilical area on earlier chambers.

Size. Height, 0.31 mm.; thickness, 0.15 mm.

Globigerinelloides escheri (Kaufmann)

Pl. 12 figs. 8, 9, 16, 17

Nonionina escheri Kaufmann, 1865, p. 198, text-fig. 110a.

Globigerinella escheri (Kaufmann). Brommimann, 1952, pp. 46-49, text-figs. 22, 23.

Planomalina escheri (Kaufmann). Bolli, 1959, pp. 260, 261, pl. 20, figs. 7, 8.

Test free, small, planispiral, biumbilicate, partly evolute. Five to eight chambers in final whorl, subglobular, laterally compressed, increasing rapidly in size. Periphery rounded, lobate. Sutures depressed, straight, radial. Aperture a low slit at base of apertural face, extending into the shallow umbilicus; umbilical portion covered by small, narrow lip. Relic aperture rarely preserved, but observed on a few specimens.

Size. Height, 0.18 mm.; thickness, 0.08 mm.

Globigerinelloides maridalensis (Bolli)

Pl. 12 figs. 18, 19

Planomalina maridalensis Bolli, 1959, p. 261, pl. 20, figs. 4-6.

Test free, moderate size, planispiral, biumbilicate, partly

evolute. Chambers globular at first, then becoming flattened radially in final whorl, hence thicker and wider than high, increasing gradually in size, from four to five in final whorl. Periphery broadly rounded, lobate. Sutures depressed, straight, radial. Aperture a low arch at base of final chamber extending into the broad, shallow umbilicus on each side; apertural flaps over umbilical portion. Relic apertures present.

Size. Height, 0.30 mm.; thickness, 0.15 mm.

Remarks. A few specimens of this species also show the finely reticulate or cancellate surface similar to that observed on some specimens of G. blowi.

Globigerinelloides saundersi (Bolli)

Pl. 12 figs. 20, 21

Planomalina saundersi Bolli, 1959, p. 262, pl. 20, figs. 9-11.

Test free, small to moderate size, planispiral, biumbilicate, partly evolute. Chambers enlarging rapidly in size, four to five in whorl, final chambers becoming radially elongate, somewhat pointed, with axis often somewhat oblique. Periphery rounded, deeply lobate. Sutures depressed, straight, radial. Aperture a low, lipped slit at base of last chamber extending into the umbilicus. Relic apertures sometimes preserved.

Size. Height, 0.28 mm.; thickness, 0.13 mm.

Remarks. Some specimens of this species also show the finely reticulate to cancellate surface.

Genus Hastigerinoides Bronnimann 1952

Hastigerinoides maridalensis Stacy, new species

Pl. 12 figs. 25, 26

Test free, small to medium size, planispiral, biumbilicate, partly evolute. Four to six, rapidly enlarging chambers in final whorl, globular in early stage, final two or three chambers somewhat radially elongate but much less than twice as high as wide, clavate. Periphery rounded, deeply lobate. Sutures depressed, straight, radial. Aperture a low, sometimes lipped, peripheral slit. No umbilical or relic apertures observed.

Size. Height, 0.28 mm.; thickness, 0.10 mm.

Remarks. This species differs from H. rohri Bronnimann by having much less elongate, more rounded final chambers and from G. saundersi by having no relic apertures, by having rounded rather than pointed chambers and by having the axis of the final chambers straight rather than oblique.

Type. Holotype UMP 54240

Hastingerinoides diversiforma Stacy, new species

Pl. 12 figs. 27-30

Test free, moderate size, planispiral, biumbilicate, partly evolute. Five to six, rapidly enlarging chambers in final whorl, early chambers globular, last three or four chambers radially elongate, about twice as high as wide, clavate or tapering and pointed. Periphery acutely rounded, deeply lobate. Sutures depressed, straight, radial. Aperture a low, lipped slit at base of final chamber extending into the broad, shallow umbilicus on each side. Relic apertures not observed.

Size. Height, 0.33 mm.; thickness 0.10 mm.

Remarks. Somewhat similar to H. rohri Bronnimann but with less acutely tapering chambers and one or two globular chambers, instead of all chambers of final whorl elongate. This species has much more elon-

gate final chambers than H. mardilensis above.

Some specimens of this species were found in which only the final chamber was elongate and pointed, while the other chambers of the final whorl were globular.

Type. Holotype UMMP 54241, Paratype UMMP 54242

Family SCHACKOINIDAE Pokorny

Genus Schackoina Thalmann 1932

Schackoina cabri Sigal

P. 12 figs. 33, 34

Schackoina cabri Sigal, 1952, pp. 20, 21, fig. 18. - Montanaro-Gallitelli,

1955, pp. 143, 144, text-fig. -- Sigal, 1959, p. 72, text-figs.

Test free, small, flattened trochospiral to planispiral, biumbilicate, slightly involute. Five, gradually expanding, radially elongate chambers in final whorl. Open bases of spines or bulbs peripheral on chambers; final chamber sometimes broadened laterally with two bases, one on each side of equatorial plane. Periphery acutely rounded, stellate. Sutures depressed, radial. Aperture a low, lipped slit at base of final chamber extending into umbilicus.

Size. Height, 0.29 mm.; thickness, 0.12 mm.

Remarks. Sigal (1959) emended the original description of this species to include a number of new specimens which have one to several bulbous terminations on the chamber. On the basis of these specimens, he places Leupoldina protuberans Bolli as a synonym of S. cabri. On the bases of the present specimens in which the hollow basis are much smaller and more constricted than those found on L. protuberans, the writer continues to recognize both forms as separate species.

Schackoina cenomana (Schacko)

Pl. 12 figs. 31, 32, 40-42

Siderolina cenomana Schacko, 1897, p. 166, pl. 4, figs. 3-5.

Hantkenina cenomana (Schacko). Cushman and Wickenden, 1930, p. 40, pl. 6, figs. 4-6.

Hantkenina (Schackoina) cenomana (Schacko). Thalmann, 1932, p. 288.

Schackoina gandolfii Reichel, 1947, p. 397, text-figs. 3a-g, 6 (3), 7 (3), 1D (1,3,4), pl. 8, fig. 1. -- Bolli, 1959, p. 263, pl. 20, figs. 12-13.

Schackoina cenomana (Schacko). Bolli, Loeblich and Tappan, 1957, p. 26, pl. 2, figs. 1, 2. -- Loeblich and Tappan, 1961, pp. 270, 271, pl. 1, figs. 2-7.

Test free, small, planispiral, biumbilicate, partially evolute. Three to five rapidly enlarging, radially elongate chambers in final whorl, each producing a hollow, centrally placed, peripheral tubulospine (broken in most specimens), axis of final chambers sometimes oblique; chambers of earlier whorls globular. Final chambers sometimes thickened laterally. Periphery acutely rounded, stellate. Sutures depressed, radial. Aperture lipped, a low arch at base of last chamber, extending into the umbilicus on each side.

Size. Height, 0.27 mm.; thickness, 0.10 mm.

Schackoina cenomana (Schacko) bicornis Reichel

Pl. 12 figs. 45, 46

Schackoina cenomana bicornis Reichel, 1947, pp. 401, 402, text-figs.

4a-f, 6 (4), 7 (4), 86, 9a-g, 1D (6, 8).

Test free, small, planispiral, biumbilicate, slightly evolute. Four to six (usually four or five) rapidly expanding, radially elongate chambers in final whorl, each with hollow, central, peripheral tubulo-

spine, final chamber (sometimes also peultimate chamber) with two hollow spines arranged on each side of equatorial plane. Spines usually broken, leaving only hollow spine bases at end of chambers. Periphery acutely rounded, stellate. Sutures depressed, radial. Apertures usually two interomarginal, lipped, umbilical apertures with peripheral aperture usually closed.

Size. Height, 0.28 mm.; thickness, 0.14 mm.

Remarks. The closing of the peripheral part of the aperture, leaving only interomarginal, umbilical apertures in some specimens suggest that this is a transition form to Leupoldina but with spines instead of bulb-shaped chamber extensions.

Schackoina multispinata (Cushman and Wickenden)

Pl. 12 figs. 43, 44

Hantkenina multispinata Cushman and Wickenden, 1930, p. 40, pl. 6, figs. 4-6.

Schanckoina multispinata (Cushman and Wickenden). Cushman, 1946, p. 148, pl. 61, figs. 11, 12. -- Bolli, 1959, p. 264, pl. 20, fig. 19. -- Loeblich and Tappan, 1961, pp. 271, 272, pl. 1, figs. 8-10.

Hantkenina trituberculata Morrow, 1934, p. 195, pl. 29, figs. 24, 26-28.

Schackoina trituberculata (Morrow). Loetterle, 1937, p. 47, pl. 7, figs. 7a, b. -- Cushman, 1946, p. 148, pl. 61, figs. 13-16. -- Montanaro-Gallitelli, 1955, p. 142, pl. 1, fig. 11.

Test free, small, planispiral, biumbilicate, partially evolute. Four or five, rapidly enlarging, radially elongate chambers in final whorl; final two or three chambers has two or three asymmetrically arranged, peripheral tubulospines; other chambers of final whorl with one spine extending from the median portion of the periphery of each

chamber. Final chamber sometimes laterally expanded, quadrate. Periphery rounded, somewhat stellate. Sutures depressed, radial. Aperture a low, lipped slit at base of final chamber extending into the umbilicus on each side.

Size. Height, 0.34 mm.; thickness, 0.17 mm.

Schackoina pustulans Bolli pustulans Bolli

Pl. 12 figs. 35 -39

Schackoina pustulans pustulans Bolli, 1957, p. 274, pl. 1, figs. 1-4. --

Bolli, 1959, p. 264. -- Sigal, 1959, pp. 70, 72, text-figs. 1-10.

Test free, planispiral, biumbilicate, almost completely involute. Four, gradually expanding, radially elongate chambers in final whorl, with bulb-shaped extensions, rather than spines, at end of final one or two chambers. This bulb-shaped termination separated from the rest of the chamber by definite constriction in the chamber wall; bulbs often broken off, leaving a hollow base similar to spine bases. Periphery narrowly rounded, stellate. Sutures depressed, radial. Aperture a low, lipped slit at base of final chamber, extending into the umbilicus; peripheral aperture closed in some specimens, leaving the two intramarginal, umbilical apertures.

Size. Height, 0.29 mm.; thickness, 0.10 mm.

Schackoina pustulans Bolli quinquecamerata Bolli

Pl. 13 figs. 1, 2

Schackoina pustulans quinquecamerata Bolli, 1957, pp. 274, 275, pl. 1,

figs. 6, 7. -- Bolli, 1959, p. 264. -- Sigal, 1959, pp. 70, 72, text-figs. 11-18.

The same as S. pustulans pustulans but with five, instead of four chambers in the final whorl.

Size. Height, 0.31 mm.; width, 0.10 mm.

Schackoina reicheli Bolli

Pl. 12 figs. 47-50

Schackoina reicheli Bolli, 1957, p. 275, pl. 1, figs. 8-10. -- Bolli, 1959, p. 264. -- Sigal, 1959, p. 74, text-figs. 48, 49.

Test free, small, planispiral, biumbilicate, partly evolute. Four to five chambers in final whorl; final two or three very strongly elongate, terminating in a small bulb, rather than spine. Periphery acutely rounded, stellate. Sutures depressed, radial. Aperture a low, lipped slit at base of final chamber, extending into the umbilicus on each side.

Size. Height, 0.31 mm.; thickness, 0.08 mm.

Schackoina? sp.

Pl. 13 figs. 55, 56

Test free, large for this species, low trochoid spiral, evolute. Five rapidly enlarging, radially elongate, pointed chambers in the final whorl. Single hollow spines presumed at end of chambers. Periphery acute, stellate. Sutures depressed, radial. Aperture not observed.

Size. Height, 0.64 mm.; thickness, 0.17 mm.

Remarks. Since only an internal mold was found of this form, apertural characteristics could not be observed. Because of this, no specific name is proposed.

Genus Leupoldina Bolli 1957

Leupoldina protuberans Bolli

Pl. 13 figs. 3-6

Leupoldina protuberans Bolli, 1957, p. 277, pl. 2, figs. 1-13. -- Bolli, 1959, p. 264, pl. 20, fig. 20. -- Sigal, 1959, pp. 72, 74, text-

figs.

Test free, small to moderate size, planispiral, biumbilicate, partly evolute. Four to five radially elongate chambers in final whorl. Final two or three chambers with two bulb-shaped terminations arranged symmetrically on each side of the equatorial plane; chamber preceding these final chambers terminating in a single bulb in some specimens. Division along line of equatorial plane of final chamber often shallow, resulting in flat, laterally expanded chamber with bulbs almost horizontal. Periphery rounded, stellate. Sutures depressed, radial. Aperture formed by two intramarginal, umbilical openings covered by small lip.

Size. Height, 0.39 mm.; thickness, 0.20 mm.

Family ROTALIPORIDAE Sigal 1958

Genus Hedbergella Bronnimann and Brown 1958

Hedbergella bollii Stacy, new species

Pl. 13 figs. 7-9

Praeglobotruncana infracretacea (Glaessner). Bolli, 1959, p. 266, pl.

21, figs. 9, 10. (not of Glaessner 1937).

Test free, small, trochoid spiral of two and a half whorls, spiral side flat, evolute, umbilical side completely involute. Five to six (rarely four) globular chambers in final whorl, increasing very gradually in size. Periphery rounded, lobate. Sutures depressed, radial. Umbilicus open, moderately wide and deep. Aperture a low slit at base of final chamber on periphery and extending into umbilicus; sometimes covered by low apertural lip of shell material.

Size. Height, 0.19 mm.; thickness, 0.09 mm.

Remarks. This species, first noted and illustrated as P. infracretacea (Glaessner) by Bolli in 1959, can be separated from Glaessner's

species by the very gradual enlargement of the chambers instead of the very rapid increase in size of chambers of the latter form. The specimens identified as Globigerina infracretacea Glaessner by Moullade (1960, p. 136, pl. 2, fig. 18-20) are also probably H. bollii, n. sp. It is considered to be a Hedbergella because it lacks the keel of Praeglobotruncana and has an aperture that extends across the periphery, instead of being restricted to the umbilicus, as in Globigerina.

Type. Holotype UMP 54243

Hedbergella infracretacea (Glaessner)

Pl. 13 figs. 16-18

Globigerina infracretacea Glaessner, 1937, p. 28, fig. 1.

Globigerina cretacea d'Orbigny. Bronnimann, 1952, pp. 14, 15, text-figs.

3a-m.

Praeglobotruncana cf. gautierensis (Bronnimann). Bolli, 1959, p. 266, pl. 21, figs. 7, 8.

Test free, small, flat trochoid spiral of three whorls, spiral side flat, evolute, umbilical side completely involute. Five to six rapidly increasing, globular chambers in final whorl; final chamber much larger than preceding ones. Periphery broadly rounded, lobate. Sutures depressed, radial. Umbilicus open, narrow, deep. Aperture an arched slit at base of last chamber over the periphery, extending into the umbilicus.

Size. Height, 0.19 mm.; thickness, 0.11 mm.

Remarks. Although the Trinidad specimens are smaller than the size given by Glaessner, they seem otherwise identical with the description and illustration given for this species. It differs from H. bollii, n. sp., by the more rapid increase in chamber size (particularly

noticeable in side view) and from H. trinidadensis, n. sp., (identified by Bolli, 1959, as P. gautierensis) by having fewer chambers in the final whorl and by more rapid size increase of the chambers.

Hedbergella planispira (Tappan)

Pl. 13 figs. 10-15

Globigerina planispira Tappan, 1940, p. 122, pl. 19, fig. 12. --- Tappan, 1943, p. 513, pl. 83, fig. 3. --- Lozo, 1944, p. 562, pl. 3, fig. 5. --- Frizzell, 1954, p. 127, pl. 20, fig. 2.

Praeglobotruncana planispira (Tappan). Bolli, Loeblich and Tappan, 1957, p. 40, pl. 9, fig. 3. --- Bolli, 1959, p. 267, pl. 22, figs. 3, 4.

Praeglobotruncana modesta Bolli, 1959, p. 267, pl. 22, fig. 2.

Hedbergella planispira (Tappan). Loeblich and Tappan, 1961, pp. 276, 277, pl. 5, figs. 4-11.

Test free, small to moderate size, flat trochoid spire of three whorls, spiral side flat, evolute, umbilical side involute. Five to six globular chambers in final whorl, increasing gradually in size. Periphery rounded, lobate. Sutures depressed, radial. Umbilicus open, broad. Aperture a slit at peripheral base of final chamber, extending into the umbilicus.

Size. Height, 0.25 mm.; thickness, 0.10 mm.

Hedbergella praewashitensis Stacy, new species

Pl. 13 figs. 19-21

Test free, moderate size, low trochoid spiral of about two and a half whorls, subtriangular rectangular in spiral view. Three to three and a half, very rapidly enlarging, globular chambers in final whorl;

final chamber much larger than preceding ones. Periphery broadly rounded, lobate. Sutures depressed, distinct. Umbilicus almost closed by bulla-like extension of the final chamber. Aperture a low slit along the peripheral margin of the final chamber and extending into the umbilicus under the swollen extension of that chamber. Surface finely cancellate with low, reticulate ridges and shallow, irregular pits.

Size. Height, 0.29 mm.; width, 0.20 mm. thickness, 0.17 mm.

Remarks. Very similar and closely related to H. washitensis (Carsey) which occurs in the overlying Gautier Formation (see Bolli, 1959). The present species can easily be distinguished from H. washitensis by the much finer surface ornamentation and by the tendency to have three, rather than four chambers in the final whorl.

Type. Holotype U MMP 54244

Hedbergella rohri (Bolli)

Pl. 13 figs. 22-24

Praeglobotruncana rohri Bolli, 1959, pp. 267, 268, pl. 22, figs. 5-7.

* Test free, moderate size, low trochoid spiral of three whorls, spiral side evolute, umbilical side involute. Nine or ten, subglobular, very gradually increasing chambers in final whorl; much broader than high. Periphery very broadly rounded, lobate. Sutures depressed, radial. Umbilicus deep, narrow. Aperture an arched, sometimes lipped opening on peripheral margin at base of last chamber with narrow slit extending into the umbilical region. Surface faintly rugose.

Size. Height, 0.29 mm.; thickness, 0.14 mm.

Hedbergella trinidadensis Stacy, new species

Pl. 13 figs. 33-35

Praeglobotruncana gautierensis (Bronnimann). Bolli, 1959, pp. 265, 266,

pl. 21, figs. 3-6, (not of Bronnimann, 1952).

Test free, moderate size, low trochoid spire of three whorls, spiral side evolute, umbilical side involute. Five to eight globular chambers in final whorl, broader than high and increasing rapidly in breadth. Periphery broadly rounded, lobate. Sutures depressed, radial. Umbilicus narrow, deep. Aperture a slit at peripheral margin at the base of the last chamber, extending into the umbilicus.

Size. Height, 0.36 mm.; thickness, 0.20 mm.

Remarks. This form differs from H. gautierensis (Bronnimann) by generally having more chambers in the final coil, a low trochoid spire instead of a flat spiral that is lower than the edge of the final whorl, a less inflated final chamber and less rapidly enlarging chambers in the final whorl. It differs from H. rohri Bolli by having fewer and more rapidly enlarging chambers in the final whorl.

Type. Holotype UMP 54245

Hedbergella sp.

Pl. 13 figs. 42-44, 47-49

Test free, medium size, low trochoid spiral of three whorls, spiral side evolute, umbilical side involute. Chambers enlarging very rapidly, subglobular, broader than high, four to five in final whorl. Chambers of final whorl much larger than preceding ones, almost completely closing umbilicus. Periphery very broadly rounded, lobate. Sutures depressed, radial. Aperture a large, arched, lipped opening on periphery at base of last chamber and extending into umbilical area.

Size. Height, 0.31 mm.; thickness, 0.21 mm.

Remarks. Similar to H. portdownensis (Williams-Mitchell) but with much broader final chambers and a much more restricted aperture. Since

only a few, pyritized specimens of this form were found, no specific name is proposed.

Genus Clavihedbergella Banner and Blow 1959

Clavihedbergella simplex (Morrow)

Pl. 13 figs. 25-27, 39-41

Hastigerinella simplex Morrow, 1934, p. 198, pl. 30, fig. 6. ---

Loetterle, 1937, p. 46, pl. 7, fig. 5. --- Cushman, 1946, p. 143, pl. 61, fig. 10.

Clavihedbergella simplex (Morrow). Banner and Blow, 1959, p. 19, ---

Loeblich and Tappan, 1961, pp. 279, 280, pl. 3, figs. 11-14.

Globigerina cretacea d'Orbigny. Bolli, 1959, p. 270, pl. 22, figs. 8, 9.

Test free, moderate to small size, flat trochoid spiral of about three whorls. Chambers increasing somewhat gradually in size, globular at first becoming radially elongate, five or six in final whorl. Periphery rounded, deeply lobate to sellate. Sutures depressed, radial. Umbilicus open, broad. Aperture marginal, with lip, at base of last chamber and extending short distance into the open umbilicus.

Size. Height, 0.28 mm.; thickness, 0.11 mm.

Clavihedbergella subcretacea (Tappan)

Pl. 13 figs. 28-32, 36-38

Hastigerinella subcretacea Tappan, 1943, pp. 513, 514, pl. 83, figs.

4a-c. --- Frizzell, 1954, p. 14a-c.

Test free, small, flat trochoid spiral. Chambers increasing rapidly in size, those of early whorls globular, becoming very radially elongate and clavate in final whorl. Four or five (rarely three or six) chambers in final whorl. Periphery rounded, stellate. Sutures depressed, radial. Umbilicus wide shallow. Aperture marginal, with narrow lip,

extending slightly into umbilicus.

Size. Height, 0.33 mm.; thickness, 0.11 mm.

Family GLOBIGERINIDAE Carpenter, Parker and Jones

Genus Globigerina d'Orbigny 1826

Globigerina kugleri Bolli

Pl. 14 figs. 1-3

Globigerina kugleri Bolli, 1959, pp. 270, 271, pl. 23, figs. 3-5.

Test free, small, trochoid spiral of about two and a half whorls. Globular chambers increase rapidly in size, four (rarely three) in the final whorl. Periphery rounded, lobate, somewhat quadrate in outline. Sutures depressed, radial. Umbilicus small, narrow. Aperture a large, arched opening, usually lipped, at base of umbilical face of the last chamber.

Size. Height, 0.25 mm.; thickness, 0.16 mm.

Globigerina? graysonensis Tappan

Pl. 13 figs. 50-52

Globigerina graysonensis Tappan, 1940, p. 122, pl. 19, figs. 15-17. --

Tappan, 1943, p. 513, pl. 82, figs. 15a-c. -- Bolli, 1959, p. 270, pl. 23, figs. 1, 2.

Eggerella graysonensis (Tappan). Frizzell, 1954, p. 74, pl. 6, figs.

14a-c.

Gubkinella graysonensis (Tappan). Loeblich and Tappan, 1961, p. 259. --

Loeblich and Tappan, 1964, p. C652.

Test free, very small, low trochoid spire of about three whorls. Globular chambers increasing gradually in size, five in the final whorl. Periphery broadly rounded, lobate. Sutures depressed, radial. Umbilicus narrow, partly closed by chambers of final whorl. Aperture a rimmed

slit extending from the umbilical region at base of the last chamber toward, but not reaching, periphery.

Size. Height, 0.13 mm.; thickness, 0.10 mm.

Remarks. There seems to be some question about the correct generic placement of this species. Both Allomorphina and Gubkinella have been proposed recently. It probably is not a species of Eggerella. The Trinidad specimens agree very well with Tappan's original description and illustrations, and appear to basically fit the genus Globigerina, therefore, the original designation is provisionally followed.

Superfamily ORBITOIDACEA Schwager

Family CIBICIDIDAE Cushman

Genus Cibicides de Montfort 1808

Cibicides? infracretacea Stacy, new species

Pl. 14 figs. 11-13

Test free, moderate size, planoconvex, trochoid spiral; flat, evolute spiral side; umbilical side almost completely involute, convex. Chambers curved, enlarging somewhat rapidly, about nine in final whorl. Periphery acutely rounded, circular. Sutures curved, limbate, flush to slightly depressed. Aperture a low slit on periphery at base of last chamber and extending onto the umbilical side.

Size. Height, 0.40 mm.; thickness, 0.11 mm.

Remarks. This form is most similar to C. coonensis (Berry) but has sutures limbate and flush, rather than depressed. It also appears similar to some of the younger Tertiary species of Cibicides, but these have strongly raised sutures. Further study may show that this species has the subtriangular, umbilical flaps and the bilamellar wall of Gravelinella, but this could not be determined with the present specimens.

Type. Holotype UMMP 54246

Genus Stichocibicides Cushman and Bermudez 1936

Stichocibicides cf. subcretacea Tappan

Pl. 14 figs. 41-43

Stichocibicides subcretacea Tappan, 1943, p. 514, pl. 83, figs. 9, 10.

-- Frizzell, 1954, p. 133, pl. 21, figs. 21a-c.

Test free or possibly attached on spiral side, medium size, compressed planoconvex; trochoid spiral of about three whorls; flat, evolute spiral side; umbilical side involute. Curved chambers enlarging rapidly, about ten in final whorl, final chambers very wide and narrow, tending to become uniserial. Periphery acute, final chambers becoming lobate in some specimens. Sutures curved, slightly depressed on umbilical side, limbate and raised on spiral side. Aperture obscure on present specimens.

Size. Height, 0.05 mm.; thickness, 0.12 mm.

Remarks. Except for the raised and limbate, rather than depressed sutures on the spiral side, the Trinidad specimens appear identical to the form described by Tappan. The irregular spiral surface suggests possible attachment during life, but no attachment scar is visible on the present specimens.

Superfamily CASSIDULINACEA d'Orbigny

Family PLEUROSTOMELLIDAE Reuss

Genus Nodosarella Rzehak 1895

Nodosarella rohri Bartenstein, Bettenstaedt and Bolli

Pl. 14 fig. 14

Nodosarella rohri Bartenstein, Bettenstaedt and Bolli, 1957, p. 43,

pl. 6, figs. 126, 127.

Test free, slender, irregularly biserial (or trochospiral with

chambers at 170°). High, ellipsoid chambers enlarging gradually. Periphery rounded, lobate. Sutures depressed, oblique. Aperture terminal, consisting of several pores connected by slits, at end of apertural neck.

Size. Height, 0.49 mm.; width, 0.15 mm.

Family CAUCASINIDAE Bykova

Genus Cassidella Hofker 1951

Cassidella primitiva (Cushman)

Pl. 14 fig. 4

Virgulina primitiva Cushman, 1936, p. 46, pl. 7, fig. 1. -- Cushman, 1937a, p. 2, pl. 1, figs. 1-3. -- Lozo, 1944, p. 522. -- Frizzell, 1954, p. 117, pl. 17, figs. 19a, b.

Test free, small, slender, twisted along axis of growth, initially triserial becoming irregularly biserial. Subglobular chamber increasing gradually in size. Periphery rounded, slightly lobate. Sutures slightly depressed, obscure, oblique. Aperture a large, wide, loop-shaped opening at base of last chamber.

Size. Height, 0.41 mm.; width, 0.19 mm.

Remarks. This species belongs in Cassidella rather than Virgulina because of the initial triserial stage.

Family INVOLUTINIDAE Butschli

Genus Trocholina Paalzow 1922

Trocholina infragranulata Noth

Pl. 14 figs. 18-20

Trocholina infragranulata Noth, 1951, p. 69, pl. 1, figs. 32a-c. --

Bartenstein, Bettenstaedt and Bolli, 1957, pp. 44, 45, pl. 5, figs.

12a, b, pl. 6, fig. 141. -- Moullade, 1960, p. 135, pl. 2, fig. 9.

Neotrocholina infragranulata (Noth). Guillaume, 1963, p. 259, pl. 1,

figs. 19-23

Test free, small, conical, planoconvex. Globular proloculum followed by a spirally coiled, dorsally evolute tubular second chamber. Ventral umbilical region filled with eight to ten small calcareous plugs or pillars. Radial suture flush or faintly depressed. Aperture a circular or oval opening at end of second chamber.

Size. Diam., 0.21 mm.; height, 0.10 mm.

Remarks. This form is the most common and often the only microfossil found in samples from the Toco Formation. It was also the most abundant species in the Laventille #1 well samples

Family NONIONIDAE Schultze

Genus Pullenia Parker and Jones 1862

Pullenia trinidadensis Stacy, new species

Pl. 13 figs. 45, 46, 53, 54

Test free, moderate size, planispiral, involute, subquadrate in outline. Four subglobular, rapidly expanding chambers in final whorl. Periphery rounded, lobate. Sutures depressed, radial. Aperture a slit at base of last chamber.

Size. Height, 0.39 mm.; width, 0.31 mm.; thickness, 0.30 mm.

Remarks. This form can be distinguished from other Cretaceous species of Pullenia by the much more rapid increase in size of the chambers and by having only four, rather than five chambers in the final whorl.

Type. Holotype UMMP 54247

Family ALABAMINIDEA Hofker

Genus Gyroidina d'Orbigny 1826

Gyroidina cuchensis Stacy, new species

Pl. 14 figs. 8-10

Test free, small, planoconvex, trochoid spiral of two and a half whorls; spiral side evolute, flat to very slightly convex; umbilical side involute, deeply convex. Chambers enlarging and thickening very rapidly, seven in the final whorl, final chamber much broader than high or wide. Periphery broadly rounded, faintly lobate. Sutures slightly depressed, radial. Umbilicus closed. Aperture a narrow slit at base of final chamber extending from periphery to umbilical area.

Size. Diam., 0.24 mm.; thickness, 0.19 mm.

Remarks. This Trinidad species differs from G. loetterlei Tappan by the more rapid thickening of the final chambers resulting in a much more strongly convex ventral outline in G. cuchensis, n. sp.

Type. Holotype UMP 54248

Family OSANGULARIIDAE Loeblich and Tappan

Genus Conorotalites Kaeffer 1958

Conorotalites intercedens (Bettenstaedt)

Pl. 14 figs. 5-7, 15-17

Globorotalites bartensteini intercedens Bettenstaedt, 1952, p. 281,

pl. 3, fig. 31, pl. 4, figs. 48-58. -- Bartenstein, Bettenstaedt and Bolli, 1957, pp. 48, 49, pl. 8, figs. 171-202.

Conorotalites intercedens (Bettenstaedt). Simon, Bartenstein, et al., 1962, p. 277, text-fig. 22, pl. 37, fig. 2.

Test free, medium to small size, trochoid spiral of three whorls, planoconvex; spiral side flat, evolute; umbilical side highly convex, sometimes bell-shaped and pointed (type 5), other times flattened (type 4). Six to seven rapidly enlarging chambers in final whorl, final chamber always broader than preceding ones; three or four preultimate chambers in some specimens increasing rapidly and regularly in breadth to form the bell-shaped, pointed umbilical outline; in others, the

preultimate chambers remaining about the same thickness to result in a lower, flattened profile. Periphery acute, sometimes slightly lobed. Sutures on spiral side curved, limbate, flush; on umbilical side straight to slightly sigmoid, radial, depressed. Umbilicus open, broad in the flattened form and narrow in the bell-shaped specimens. Aperture a slit at base of last formed chamber on the umbilical side.

Size. Height, (type 4), 0.39 mm., (type 5), 0.32 mm.; thickness, (type 4), 0.14 mm., (type 5), 0.20 mm.

Remarks. It is pointed out in Simon, Bartenstein, et al., (1962) that a completely intergradational series exists between C. bartensteini - C. intercedens - C. aptiensis, in which six morphologic types can be distinguished. Trinidad specimens can easily be separated into types 4 and 5, which are included within the variation of C. intercedens.

Family ANOMALINIDAE Cushman

Genus Gavelinella Brotzen 1942

Gavelinella barremiana Bettenstaedt

Pl. 14 figs. 38-40

Gavelinella barremiana Bettenstaedt, 1952, p. 275, pl. 2, figs. 26-29.

-- Bartenstein, Bettenstaedt and Bolli, 1957, p. 47, pl. 7, figs. 168, 169. -- Simon, Bartenstein, et al., 1962, p. 282, pl. 37, fig. 7, pl. 39, fig. 5.

Test free, moderate size, flat trochoid spiral of about three whorls, planoconvex with sides almost parallel; spiral side flat, evolute; umbilical side low convex, involute to partly evolute. Low, curved chambers increasing gradually in size, nine to ten in final whorl. Periphery acute, slightly lobate. Sutures curved, depressed, radial. Umbilicus open, shallow, broad. Aperture a low, lipped slit at base of final chamber, on umbilical side extending from periphery to the um-

bilicus; narrow, triangular flap formed by lip over umbilical area in some specimens.

Size. Height, 0.30 mm.; thickness, 0.10 mm.

Gavelinella intermedia (Berthelin)

Pl. 14 figs. 32-34

Anomalina intermedia Berthelin, 1880, p. 67, pl. 4, fig. 14.

Gravelinella intermedia (Berthelin). Moullade, 1960, pp. 138, 140, pl. 2, figs. 15-17, 22, 29. -- Simon, Bartenstein, et al., 1962, pp. 289, 290, pl. 39, figs. 9, 10.

Test free, medium size, flat trochoid spiral of two and a half to three whorls, low biconvex to planoconvex; spiral side flat to low convex, evolute to almost completely involute; umbilical side convex, involute to partly evolute. About ten, rapidly enlarging, curved chambers in final whorl. Final chambers much thicker than in G. barremiana Bettenstaedt. Periphery acutely rounded, slightly lobate. Sutures curved, depressed, radial. Umbilicus open, deep. Aperture a low slit at base of final chamber, extending from periphery into the umbilicus.

Size. Height, 0.40 mm.; thickness, 0.19 mm.

Superfamily ROBERTINACEA Reuss

Family CERATOBULMINIDAE Cushman

Genus Epistomina Terquem 1883

Epistomina caracolla (Roemer)

Pl. 14 figs. 24-26, 29-31

Gyroidina caracolla Roemer, 1841, p. 97, pl. 15, fig. 22.

Epistomina caracolla caracolla (Roemer). Bartenstein and Brand, 1951, p. 326, pl. 11, figs. 323a-c, pl. 12A, figs. 330a-c. -- Bartenstein,

Bettenstaedt and Bolli, 1957, p. 46, pl. 5, figs. 113, 114, pl. 114, fig. 142. -- Simon, Bartenstein, et al., 1961, p. 260, pl. 35, figs. 13a-c.

Test free, large, trochoid spiral of three whorls about equally biconvex. Chambers increasing gradually in size, eight or nine in final whorl. Periphery acute, rimmed by clear shell material. Sutures limbate but flush, slightly curved on spiral side, straight, radial on umbilical side. Umbilicus closed by boss of clear shell material. Primary aperture a rounded, lipped opening at base of final chamber on umbilical side, near the periphery; secondary lateromarginal opening parallel to periphery on umbilical side, usually closed in earlier chambers by secondary shell deposit.

Size. Diam., 0.70 mm.; thickness, 0.38 mm.

Epistomina ornata (Roemer)

Pl. 14 figs. 21-23, 35-37

Planulina ornata Roemer, 1841, p. 98, pl. 15, fig. 25.

Epistomina ornata (Roemer). Bartenstein and Brand, 1951, pp. 327, 328, pl. 12A, figs. 327a-c. -- Bartenstein, Bettenstaedt and Bolli, 1957, p. 46, pl. 5, fig. 110, 115, pl. 6, fig. 143. -- Simon, Bartenstein, et al., 1961, p. 264, pl. 35, figs. 17a-c, pl. 38, fig. 6.

Test free, large, trochoid spiral of three whorls, about equally biconvex. Chambers increasing somewhat gradually in size, seven or eight in final whorl. Periphery acute, rimmed by rounded keel of shell material. Sutures limbate and strongly raised in the early portions of the final whorl becoming strongly curved between final chambers. Umbilicus closed but a prominent, circular "pseudumbilicus" formed by the

raised, limbate spiral sutures around umbilical area. Primary aperture a low arched opening at the base of the final chamber; secondary latero-marginal slits on the umbilical side of the periphery closed by later shell deposition.

Size. Diam., 0.76 mm.; thickness, 0.44 mm.;

Epistomina periosa Stacy, new species

Pl. 15 figs. 1-3

Test free, medium size, low trochoid spiral of three whorls, planoconvex to unequally biconvex; spiral side low convex, evolute; umbilical side flat to slightly convex, involute. Chambers increase gradually in size, ten in final whorl. Periphery acute, slightly rimmed. Sutures limbate, flush to slightly depressed, straight; radial on umbilical side; slightly oblique on spiral side. Umbilicus closed by overlapping chambers. Primary aperture a low arched opening at base of final chamber on umbilical side near periphery; lateromarginal slits parallel to peripheral margin, filled by secondary shell material.

Size. Diam., 0.45 mm.; thickness, 0.17 mm.

Remarks. This species is most similar to E. lacunosa Loeblich and Tappan but is almost completely planoconvex, rather than biconvex and the sutures are flush or depressed, rather than raised.

Type. Holotype UMMP 54249

Epistomina perplexa Stacy, new species

Pl. 15 figs. 4-12

Test free, medium to large, low trochoid spiral of three and a half whorls becoming almost planispiral in some specimens, unequally biconvex with the spiral side always the flatter. Chambers increase somewhat rapidly in size, seven to eight in final whorl. Periphery

acute; keeled, not lobate in trochospiral specimens; flattened, angular to lobate in planispiral-like forms. Sutures limbate, strongly raised, usually straight or slightly curved, except on umbilical side of trochoid forms, there strongly curved. Umbilical side of "planispiral" types partly evolute, showing about two and a half whorls; umbilical area of trochoid forms marked by spiral ridge of shell material, formed by the raised, limbate spiral suture. Primary aperture obscure, a low opening at base of final chamber near the periphery on the umbilical side. On trochoid specimens the lateromarginal slits start at the rear of the chamber, about a quarter of the distance from the margin, on the umbilical side and curve forward and outward, connecting with the peripheral keel at the middle of the chamber. These slits filled with shell material, limbate and raised; hence, their junction with the curved suture forming a raised Y-shaped structure between each chamber on the umbilical side. Lateromarginal apertures obscure on planispiral-like specimens.

Size. Diam. (trochoid type), 0.55 mm.; ("planispiral" type), 0.61 mm.; thickness (trochoid type), 0.28 mm.; ("planispiral" type), 0.18 mm.

Remarks. Although there is a strong difference between the two extremes of this species, numerous specimens are available that show a complete gradation between the two. No species similar to the planispiral-like forms have been described. The trochospiral specimens are somewhat similar to E. ornata (Roemer) but are much less strongly biconvex and have a flatter spire. They are also similar to E. charlottae Vieaux, but the lateromarginal slits of this species are parallel with the periphery, rather than curved.

Type. Holotype UMMP 54250, Paratype UMMP 54251

Genus? species?

Pl. 14 figs. 27, 28

Test free, moderate to small, globular in outline, Streptospirally coiled, early chambers in a planispiral coil, involute, final whorl developed at right angles to earlier plane of coiling, embracing earlier portion. Chambers subglobular, quadrate, about five in final whorl. Periphery broadly rounded, slightly lobate. Sutures depressed, straight. Aperture obscure, appears to be a series of small pores along the base of the apertural face of the final chamber.

Size. Height, 0.30 mm.; width, 0.29 mm.; thickness, 0.26 mm.

Remarks. Only three specimens of this unusual species were found and the writer has been unable to find a genus with these characteristics. Further study is necessary before it can clearly be demonstrated that this is indeed a new genus.

Figured Specimen, UMMF 54252

Order OSTRACODA Laterille

Suborder PLATYCOPA Sars

Family CYTHERELLIDAE Sars

Genus Cytherella Jones 1849

Cytherella exquisita Neale

Pl. 15 figs. 27, 28

Cytherella exquisita Neale, 1962, pp. 427, 428, pl. 1, figs. 2, 3, 8-11.

Dorsal border straight in the anterior two-thirds, then angling sharply downward; anterior broadly rounded; ventral border straight, parallel with the anterior part of the dorsal border; posterior narrowly rounded, below the midline. Right valve overlapping the left strongly along the dorsal and ventral border. Viewed from above, the shell tapers from a narrow anterior to the greatest width about two-thirds of the way to the rear. Shell thick and robust with a smooth surface.

Size. Length, 0.59 mm.; height, 0.37 mm.; width, 0.27 mm.

Cytherella foveata Veen

Pl. 15 figs. 15, 16

Cytherella foveata Veen, 1932, p. 341, pl. 7, figs 1-18. -- Howe and Laurencich, 1958, p. 247, text-fig.

Dorsal border straight; anterior border broadly rounded; ventral border slightly concave, parallel with dorsal border; posterior rounded, truncate. Deep, narrow pit at middle of shell just above midline at the location of the muscle scars. Two vague, indistinct nodes posterior border.

Size. Length, 0.71 mm.; height, 0.36 mm.; width (one valve), 0.19 mm.; est. total width, 0.38 mm.

Remarks. Although the present specimens are more completely

rectangular in outline and are from the Lower, rather than the Upper Cretaceous as described by Van Veen, they seem to fit within the limits of this species.

Cytherella parallela (Reuss)

Pl. 15 figs. 19, 20

Cytherina parallela Reuss, 1845, p. 16, pl. 5, fig. 33.

Cytherella parallela (Reuss). Alexander, 1929, pp. 50, 51, pl. 1, figs. 13, 16.

Dorsal and ventral borders straight and parallel; anterior border broadly rounded; posterior border curving downward in the upper third of the shell from the dorsal border then becoming abrupt, straight. Right valve overlapping left along dorsal, ventral and posterior border. There is a suggestion of a Krithe-type gap between valves in the posterior. Surface smooth.

Size. Length, 0.73 mm.; height, 0.44 mm.; width, 0.29 mm.

Cytherella scotti Alexander

Pl. 15 figs. 13, 14

Cytherella scotti Alexander, 1929, p. 48, pl. 1, figs. 12, 15. -- Howe and Laurencich, 1958, p. 255, text-fig.

Dorsal and ventral borders subparallel, with a slight concavity in each, near the middle; anterior and posterior borders rounded. Left valve strongly overlapping right along dorsal and ventral borders, less along the posterior, and no overlap present along the narrow anterior border. Shell smooth.

Size. Length, 0.72 mm.; height, 0.42 mm. width, 0.31 mm.

Genus Cytherelloidea Alexander 1929

Cytherelloidea ovata Weber

Pl. 15 figs. 21, 22

Cytherelloidea ovata Weber, 1935, p. 144, pl. 8, fig. 4. -- Howe and Laurencich, 1958, p. 267, text-fig. -- Neale, 1962, pp. 429, 430, pl. 1, figs. 1, 4.

Dorsal border slightly convex; anterior border broadly rounded, rimmed; ventral border subparallel with dorsum, slightly concave; posterior border truncately rounded. Submarginal rib paralleling the border except in the anterodorsal third where it "V"s sharply downward. Median rib starting in the upper quarter of the posterior part of the submarginal rib, extending straight for about one-fourth of the shell length, then angling sharply downward to the lower third of the shell, finally curving upward to the midline near, but not reaching, the anterior part of the submarginal rib. A second, lower ridge parallels the upper one and is connected to it by a cross-bar near the posterior. Small, oval muscle pit formed in the area bounded by the curving median ridge and the dorsal submarginal rib.

Size. Length, 0.49 mm.; height, 0.27 mm.; width, 0.16 mm.

Remarks. There seems to be no doubt that the Trinidad specimens are the same as the species described by Neale (1962). The descriptions and illustrations of Weber's species as given in Howe and Laurencich (1958) do not suggest that the submarginal rib completely encircles the shell and the narrow anterior rim on the present specimens is quite different from that suggested by Weber. Lacking comparative material, the Trinidad specimens are provisionally assigned to C. ovata. This species also appears closely related to C. darensis Swain from the North Carolina Lower Cretaceous.

Cytherelloidea ovata Weber subsp. robusta, Stacy, new subspecies

Pl. 15 figs. 25, 26

As pointed out by Neale (1962), some specimens develop a wider posterior and definite tubercles at the posterior ends of the two median ridges. Otherwise the ornamentation is consistent for this species. Since no graditional specimens were found, each being distinctly one type or the other, this form is described as a new variety; however, it may prove later that all of these specimens represent sexually dimorphic forms of the same species.

Size. Length, 0.52 mm.; height, 0.30 mm.; width, 0.21 mm.

Type. Holotype UMMP 54253

Cytherelloidea reticulata Alexander

Pl. 15 figs. 23, 24

Cytherelloidea reticulata Alexander, 1929, p. 57, pl. 2, fig. 11 --

Howe and Laurencich, 1958, p. 268, text-fig.

Dorsal and ventral borders subparallel, with ventral border slightly concave; anterior border rounded, rimmed; posterior border truncate. Two large, connected tubercles at posterior giving rise to slender dorsal and ventral, outwardly curving ribs which extend about two-thirds of shell length. Faint median rib along middle half of shell curving below the distinct muscle pit. Surface finely reticulate.

Size. Length, 0.55 mm.; height, 0.32 mm.; width, 0.24 mm.

Remarks. This specimen from Trinidad fits Alexander's species almost exactly except for the angulate posterior illustrated for the Texas form.

Suborder PODOCOPA Sars

Family BAIRDIIDAE Sars

Subfamily BAIRDIINAE Sars

Genus Bairdia McCoy 1844

Bairdia glenrosensis Vanderpool

Pl. 15 figs. 17, 18

Bairdia glenrosensis Vanderpool, 1928, p. 100, pl. 13, figs. 1, 2. ---

Howe and Laurencich, 1958, p. 70, text-fig.

Dorsal border convex; anterior border obliquely rounded; ventral sinuose with a slight concavity near middle; posterior obtusely angled near the ventral border. Left valve strongly overlapping the right along the dorsal and ventral borders; surface smooth.

Size. Length, 0.76 mm.; height, 0.56 mm.; width, 0.45 mm.

Genus Bythocypris Brady 1880

Bythocypris subcretacea Stacy, new species

Pl. 16 figs. 3, 4

Dorsal border straight, about half of the shell length; anterior border slopes sharply from the cardinal angle, thence obliquely, narrowly rounded in the lower third; ventral border straight; posterior acutely rounded below the midline. Surface smooth. Left valve overlapping the right valve throughout. Interior features not seen.

Size. Length, 0.42 mm.; height, 0.20 mm.; width, 0.16 mm.

Remarks. Similar in outline to B. limburgensis Veen from the Upper Cretaceous of Holland; however, specimens of the present species are rarely more than half the size of Veen's species.

Type. Holotype UMP 54254

Bythocypris sp. 1

Pl. 16 figs. 25, 26

Dorsal border convex; anterior border rounded; ventral border straight; posterior acutely angled just above the ventral border. Left

valve slightly overlapping right along the dorsal and ventral borders.

Surface smooth.

Size. Length, 0.39 mm.; height, 0.17 mm.; width, 0.15 mm.

Remarks. Because of the rare occurrence, a specific name is not proposed at this time.

Bythocypris sp. 2

Pl. 16 figs. 23, 24

Dorsal border very slightly convex; anterior border obliquely rounded; ventral slightly concave; posterior narrowly rounded near the ventral border. Shell smooth.

Size. Length, 0.45 mm.; height, 0.20 mm.; width, 0.17 mm.

Remarks. No specific name is proposed because of the rarity of material.

Bythocypris? sp. 3

Pl. 16 figs. 11, 12

Dorsal and ventral borders straight and parallel; anterior border rounded, somewhat compressed; posterior border thicker, and somewhat more narrowly rounded than the anterior. Shell smooth.

Size. Length, 0.55 mm.; height, 0.25 mm.; width, 0.19 mm.

Remarks. Generic assignment of this form is very questionable, and since only one specimen has been found, no specific name is proposed.

Family CYPRIDIAE Baird

Subfamily PARACYPRIDINAE Sars

Genus Paracypris Sars 1866

Paracypris dentonensis Alexander

Pl. 16 figs. 19, 20

Paracypris dentonensis Alexander, 1929, p. 65, pl. 4, figs. 1, 4. --

Howe and Laurencich, 1958, p. 447, text-fig.

Dorsal border arched; anterior border rounded obliquely; ventral border straight to slightly arched; posterior pointed at the postero-ventral angle. Shell widest just anterior to the middle.

Size. Length, 0.36 mm.; height, 0.22 mm.; width, 0.18 mm.

Remarks. This form is about one-third the size of Alexander's species, but except for size it seems to fit his illustration and description.

Paracypris goodlandensis Howe and Laurencich

Pl. 16 figs. 17, 18

Paracypris siliqua Jones and Hinde. Alexander, 1929, p. 65, pl. 3, figs. 7, 10, pl. 4, fig. 5. (Not P. siliqua Jones and Hinde, 1890).

Paracypris goodlandensis Howe and Laurencich, 1958, p. 448, text-fig.

Dorsal border convex, with middle third along the hinge line more or less straight; anterior border obliquely rounded; ventral border straight to slightly concave; posterior acutely angled in the lower third. Left valve overlapping right in all but the anterior border. Broad, shallow sulcus in the front third of the dorsal border and extending down to about the midline. This sulcus more noticeable on right valve than on the left.

Size. Length, 0.75 mm.; height, 0.40 mm.; width, 0.28 mm.

Paracypris cf. goodlandensis Howe and Laurencich

Pl. 16 figs. 27, 28

Similar to this species, but without the sulcus.

Paracypris trinidadensis Stacy, new species

Pl. 16 figs. 9, 10

Dorsal border convex; anterior border obliquely rounded; ventral

border concave; posterior acutely angled at the ventral border. Right valve overlapping left along the dorsal and ventral borders. Surface smooth.

Size. Length, 0.62 mm.; height, 0.21 mm.; width, 0.18 mm.

Remarks. This small, cylindrical form is unlike any described species of Paracypris.

Type. Holotype UMP 54255

Paracypris sp. (young molts?)

Pl. 16 figs. 5, 6

Dorsal border slightly convex; anterior border obliquely rounded; ventral border straight to slightly concave; posterior acutely angled at the venter.

Size. Length, 0.41 mm.; height, 0.19 mm.; width, 0.16 mm.

Remarks. A number of small Paracypris specimens are found scattered throughout the section. They are probably young molts of several species.

Subfamily INCERTAE

Genus Krausella Ulrich 1894

Krausella minuta Triebel

Pl. 16 figs. 21, 22

Krausella minuta Triebel, in Veen, 1936, pp. 176, 177, pl. 10, figs.

7-15. -- Bonnema, 1940, p. 115, pl. 3, figs. 32-34. -- van den Bold, 1946, p. 67, pl. 2, figs. 7a, b. -- Howe and Laurencich, 1958, p. 376, text-fig.

Oval outline formed by left valve. Left valve strongly overlapping right except at posterior. Right valve much smaller, elongate oval in outline, except the posterior which forms a sharp point just below the

midline. Surface finely punctate.

Size. Length, 0.58 mm.; height, 0.31 mm.; width, 0.30 mm.

Family CYTHERIDAE Baird

Subfamily CYTHERINAE Dana

Genus Cythere Muller 1785

Cythere cf. multilamella Bosquet

Pl. 16 figs. 7, 8

Cythere multilamella Bosquet, 1854, p. 80 (90), pl. 5, figs. 12a-d. --

Howe and Laurencich, 1958, p. 167, text-fig.

Dorsal border straight; anterior border broadly rounded; ventral border slightly sinuose; posterior compressed, obtusely angled at about the midline with faint denticulations on the ventral part. Eyespot and muscle node present, but indistinct. Surface marked by longitudinal, slightly curved ribs, separated by pits. Hinge and other internal features not observed.

Size. Length, 0.36 mm.; height, 0.19 mm.; width, 0.16 mm.

Remarks. Although the present specimens are much smaller than Bosquet's species, they compare so favorably in outline and sculpturing that it is felt that they are probably related.

Subfamily TRACHYLEBERIDINAE Sylvester-Bradley

Genus Cythereis Jones 1894

Cythereis dentonensis Alexander

Pl. 17 figs. 5, 6, 22

Cythereis dentonensis Alexander, 1929, p. 94, pl. 8, figs. 10, 11. --

Howe and Laurencich, 1958, p. 194, text-fig.

Dorsal border straight; anterior border rounded, compressed, rimmed with very small denticles along the lower half of the rim; posterior border straight and varies between being subparallel with the

dorsal border and raising toward the rear; posterior border compressed, rimmed, angled below the midline and denticulate on the ventral side. Prominent eyespot rising above the dorsal border. The narrow dorsal and ventral ribs terminating in a large node. A small, but distinct node occurs just behind the large, circular muscle swelling. Surface finely reticulate.

Size. Length, 0.59 mm.; height, 0.32 mm.; width, 0.24 mm.

Cythereis corneuli Deroo

Pl. 17 figs. 18, 19

Cythereis corneuli Deroo, 1956, p. 1518, pl. 4, figs. 59-61. -- Howe and Laurencich, 1958, p. 190, text-fig.

Dorsal border straight; anterior border obliquely rounded, heavily rimmed, finely denticulate; ventral border straight, subparallel with dorsal; posterior border compressed, rimmed, angulate at about the midline, denticulate on ventral part. Prominent, high eyespot. Rounded, thick dorsal ridge terminating in an elongate node at posterior cardinal angle. Muscle node and thickened, rounded median ridge occupying middle two-thirds of shell length along midline. Ventral ridge starting below muscle node and terminating in an elongate node at the posterior ventral angle. Surface finely and indistinctly reticulate.

Size. Length, 0.70 mm.; height, 0.40 mm.; width, 0.35 mm.

Cythereis cf. faujasi Veen

Pl. 16 figs. 1, 2

Cythereis faujasi Veen, 1936, p. 153, pl. 6, figs. 58-63. -- Howe and Laurencich, 1958, p. 197, text-fig.

Dorsal border straight; anterior border obliquely rounded, rimmed with two rows of very small denticles on the lower half of the rim;

ventral border rising toward the rear, sinuous and slightly concave in the posterior half; posterior border compressed, rimmed, angled at about the midline. Eyespot prominent, projecting above the line of the dorsal border. Dorsal rim narrow with low, scattered tubercles, expanding outward toward the rear to a large, downward projecting node at the posterior cardinal angle. Large, round to slightly oval muscle-swelling near the midline in the anterior half of the shell. Posterior rim starting near the base of the anterior rim, extending outward and back, terminating in a rounded node. Small, rounded tubercles widely scattered over the surface. Interior of shell not seen.

Size. Length, 0.64 mm.; height, 0.34 mm.; width, 0.25 mm.

Remarks. This species is similar in size, outline and ornamentation to C. faujasi described by Van Veen from the Maestrichtian of Holland. It differs, however, by not having the two larger toothlets on the anterior border, by having no denticles along the lower posterior margin and by having the eyespot rising above the dorsal border.

Cythereis fredericksburgensis Alexander

Pl. 17 figs. 15, 23

Cythereis fredericksburgensis Alexander, 1929, p. 89, pl. 8, figs. 12,

13. --- Howe and Laurencich, 1958, p. 198, text-fig.

Dorsal border straight; anterior border obliquely rounded, strongly rimmed, denticulate in the lower two-thirds; ventral border straight, rising slightly toward the rear; posterior compressed, angulate below midline, denticulate on ventral part. Dorsal and ventral ridges low, rounded and somewhat convex, obscuring the straight borders. Large, glassy eyespot at the cardinal angle. Subcentral muscle node followed by low obscure median ridge. Surface reticulate to coarsely punctate.

Size. Length, 0.65 mm.; height, 0.35 mm.; width, 0.20 mm.

Remarks. Although the Trinidad specimen is much smaller, it corresponds in the other details with both Alexander's description and illustrations, and with specimens of this species from a sample of the Glen Rose Formation of Texas.

Figured Specimen From Trinidad. UMMP 54256

Cythereis cf. rudispinata Chapman and Sherborn

Pl. 17 figs. 3, 4

Cythereis rudispinata Chapman and Sherborn, 1893, p. 348, pl. 14, figs. 6, 7. -- Chapman, 1917, p. 56, pl. 14, fig. 15. -- Triebel, 1940, p. 200, pl. 4, figs. 47-50. -- Howe and Laurencich, 1958, pp. 230, 231, text-figs.

Dorsal border straight; anterior border broadly rounded, rimmed, denticulate; ventral border straight, rising slightly toward the rear; posterior border compressed, angulate at the midline. Strong, irregular muscle node and well-developed eyespot. Surface covered with irregularly placed spines.

Size. Length, 0.58 mm.; height, 0.32 mm.; width, 0.17 mm.

Remarks. The Trinidad specimens are much smaller than the size reported for this species.

Cythereis expolita Stacy, new species

Pl. 17 figs. 9, 10

Dorsal and ventral borders straight and converging toward the rear; anterior border obliquely rounded, strongly rimmed, very faintly denticulate; posterior compressed, somewhat rimmed, triangular with the point near the midline. Large eyespot protruding above the dorsal border and large tubercle extending above the dorsal border at post-

erior cardinal angle. Muscle node large and situated anterior of the middle. Indistinct ventral rib starting below the muscle node, and extending backward to terminate in a large node, at the posteroventral angle. Surface smooth.

Size. Length, 0.63 mm.; height, 0.36 mm.; width, 0.30 mm.

Remarks. This small, slender type is quite different from any other species of Cythereis described from Cretaceous sediments.

Type. Holotype UMP 54257

Cythereis binoda Stacy, new species

Pl. 17 figs. 11, 12

Dorsal border straight to slightly concave; anterior border compressed, rimmed, obliquely rounded, rim bearing small denticles on the lower two-thirds; ventral border straight, rising toward the dorsum in the rear; posterior compressed, triangular, rimmed, acutely angled at about the midline with small tubercles along the ventral border. Prominent, glassy eyespot extending above the dorsal border at the cardinal angle; three or four large, rounded nodes scattered along the dorsal border which terminates in a large structure formed of several fused nodes at the posterior cardinal angle. Large, smooth muscle node at the midline, in the anterior two-thirds of the shell and a single, smaller node behind it. Ventral rim starting just anterior to the muscle node, extending back to the posteroventral angle, there terminated by a fusion of several nodes. Surface of shell irregularly reticulate. Hinge of right valve from anterior to posterior consisting of crenulate tooth, socket, median finely crenulate groove and posterior crenulate tooth. Hinge of left valve consisting of complementary structures.

Size. Length, 0.69 mm.; height, 0.38 mm.; width, 0.33 mm.

Remarks. This species is very close to C. dallasensis Alexander, especially to the topotype described by Howe and Laurencich, the main difference being in the consistent occurrence of the single node behind the muscle node in these specimens, which was not described on Alexander's species.

Type. Holotype UMP 54258

Cythereis domoilensis Stacy, new species

Pl. 17 figs. 16, 17

Dorsal border straight; anterior border broadly rounded, rimmed, finely denticulate; ventral border straight, rising upward towards the rear; posterior border compressed, rimmed, angled slightly below midline, upper part of the posterior border concave. Well-developed eyespot. Dorsal ridge starting behind the eyespot, extending backward and outward to posterior cardinal angle, there terminating in elongate vertical node. Strong muscle node with second irregular node behind. Ventral ridge starting inside of lower part of the anterior rim, extending back to posteroventral angle. Surface covered with irregular pustules and incomplete reticulations.

Size. Length, 0.77 mm.; height, 0.43 mm.; width, 0.39 mm.

Remarks. This form is similar to C. subovata Alexander but it does not have the large eyespot protruding above the cardinal angle; and the muscle node and the elongate node behind it are distinctly separated, fused to form a median ridge.

Type. Holotype UMP 54259

Cythereis cantilensis Stacy, new species

Pl. 17 figs. 7, 8

Dorsal border straight; anterior border broadly rounded, rimmed, denticulate; posterior border straight, rising slightly toward the rear; posterior border compressed, rimmed, angled above midline. Prominent, glassy eyespot. Very low dorsal ridge extending from behind eyespot to the posterior cardinal angle, there terminating in an elongate, perpendicular node. Large oval muscle node in the forward third of the shell; behind, but clearly separated from it, a low, straight median ridge directed slightly upward and terminating against lower part of the elongate node at posterior cardinal angle. Ventral ridge low, about three-fourths of shell length. Surface finely and regularly reticulate.

Size. Length, 0.65 mm.; height, 0.34 mm.; width, 0.25 mm. (thickness).

Remarks. This species is very similar to Cythereis krumensis Alexander from the Albian of Texas, but the posterior angulation in the present specimens are above the midline, rather than below it, and the dorsal view of this Venezuelan species shows that it is less inflated and parallel-sided.

Type. Holotype UMP 54260

Cythereis pariaensis Stacy, new species

Pl. 17 figs. 13, 14

Dorsal border straight; anterior border broadly rounded, rimmed, finely denticulate; ventral border straight, rising slightly toward the rear; posterior border compressed, rimmed, angulate at the midline; dorsal ridge low, rounded, terminating in an elongate, angled node. Two to three low spines, or spine bases, along anterior part of the dorsal ridge. Ventral ridge forming continuation of the anterior rim terminating at the posteroventral angle as a downward projection.

Large muscle node in the anterior third of the shell at the midline.

Surface smooth.

Size. Length, 0.84 mm.; height, 0.43 mm.; width, 0.37 mm.

Remarks. Very similar to, and may be a variety of Cythereis cornelli Deroo, but the lack of the median ridge, the smooth surface and the more elongate shape of the shell suggest a different species.

Type. Holotype UMMP 54261

Genus Protocythere Triebel 1938

Protocythere trinidadensis Stacy, new species

Pl. 17 figs. 1, 2

Typical Protocythere shape with broadly rounded, strongly rimmed anterior and compressed, rimmed, angulate posterior. Prominent eyespot. Short, dorsal rib arching above border, about one-third of shell length; median rib vague, and only marked by low swelling; ventral rib large and swollen, occupying middle half of the shell length. Surface covered by widely scattered, large pores. Hinge dentition not observed.

Size. Length, 0.61 mm.; height, 0.35 mm.; width, 0.32 mm.

Remarks. The indistinct median rib separates this form from other described species of Protocythere.

Type. Holotype UMMP 54335

Subfamily PROGONOCYTHERINAE Sylvester-Bradley

Genus Neocythere Mertens, 1956

Neocythere cf. mertensi Oertli

Pl. 16 figs. 13, 14

Neocythere mertensi Oertli, 1958, pp. 1308, 1509, pl. 5, figs, 114-122.

Dorsal border straight; anterior border obliquely rounded, somewhat compressed; ventral border slightly convex, rising toward the rear; posterior border compressed, angulate near the midline. Overlap

of left valve along dorsal border giving the dorsal outline a curved appearance. Strong sulcus parallel to anterior border. Second, strong sulcus starting behind the eyespot, extending diagonally toward the front and to the midline. Two large, broad sulci parallel to venter in the middle two-thirds of the shell. Pitted grooves, separated by ridges, producing somewhat triangular surface ornamentation. Hinge structure, from broken, poorly preserved specimens, apparently in left valve: large, dorsal, crenulate socket followed by smooth, forward-projecting tooth then long narrow crenulate bar. Posterior elements of hinge not preserved in the present specimens. Right valve containing complementary anterior crenulate tooth followed by socket then narrow crenulate groove. Posterior part of hinge missing in this specimen also.

Size. Length, 0.61 mm.; height, 0.37 mm.; width, 0.37 mm.

Remarks. The present specimens differ from typical Neocythere mertensi Oertli by the triangular rather than concentric ornamentation, and by the fact that although the grooves in the Trinidad specimens contain pits, the grooves are not formed by the pits.

Neocythere semiconcentrica (Mertens)

Pl. 16 figs. 15, 16

"Cythere" semiconcentrica Mertens, 1956, p. 186, pl. 9, figs. 15-18. --

Howe and Laurencich, 1958, p. 173, text-fig.

Dorsal border straight; anterior border obliquely rounded, somewhat compressed; ventral border convex, rising towards the rear; posterior border compressed, acutely rounded at about the midline. Lateral swelling overhanging ventral border. Surface sculpture formed by shallow pits in concentric rows.

Size. Length, 0.65 mm.; height, 0.40 mm.; width, 0.43 mm.

Subfamily CYTHERIDEINAE Sars

Genus Asciocythere Swain 1952

Asciocythere goodlandensis (Alexander)

Pl. 17 figs. 24, 25

Cytheridea goodlandensis Alexander, 1929, p. 69, pl. 4, fig. 15.

Asciocythere goodlandensis (Alexander). Howe and Laurencich, 1958, pp. 59, 60, text-fig.

Dorsal border straight, about two-thirds of the shell length; anterior border obliquely rounded; ventral border straight to slightly convex; posterior border truncate. Shell smooth with scattered pores. Right valve slightly overlapping left along dorsal and ventral borders.

Size. Length, 0.57 mm.; height, 0.35 mm.; width, 0.26 mm.

Asciocythere rotunda (Vanderpool)

Pl. 18 figs. 1, 2

Bythocypris rotundus Vanderpool, 1928, p. 102, pl. 13, figs. 5, 6.

Cytheridea amygdaloides brevis Alexander (not Cornuel), 1929, p. 70, pl. 14, fig. 13.

Asciocythere rotunda (Vanderpool). Swain, 1952, p. 76. pl. 8, figs. 22-23. -- Howe and Laurencich, 1958, pp. 61, 62, text-fig.

Dorsal border convex; anterior border obliquely rounded; ventral border straight; posterior border narrowly rounded below the midline. Left valve narrowly overlapping right valve along all borders. Surface smooth with widely scattered pores.

Size. Length, 0.54 mm.; height, 0.34 mm.; width, 0.18 mm.

Asciocythere cylindria Stacy, new species

Pl. 18 figs. 3, 4

Dorsal border slightly convex; anterior border obliquely rounded; ventral border straight to slightly convex; posterior border narrowly rounded at the midline. Left valve narrowly overlapping right along all borders. Surface smooth with few scattered pores. Hinge of left valve with terminal crenulate sockets connected by smooth narrow median bar; narrow accommodation groove above the bar.

Size. Length, 0.65 mm.; height, 0.35 mm.; width, 0.30 mm.

Remarks. The cylindrical shape and subparallel dorsal and ventral borders produce an outline that is quite different from other species of this genus, but the hinge dentition is correct for Asciocythere.

Type. Holotype UMP 54336

Genus Cytheridea Bosquet 1852

The following four species have been questionably placed in the genus Cytheridea and have not been assigned specific names because it has not been possible to observe the hinge structure and other internal features which would allow a more positive generic identification.

Cytheridea? sp. 1

Pl. 17 figs. 20, 21

Dorsal border slightly curved; anterior border broadly rounded, acute; ventral border straight, rising toward the rear; posterior border dropping sharply from the dorsal border then sweeping to the rear to form a point near the posteroventral angle. Shell widest in the posterior third. Surface covered with widely scattered, irregularly arranged pits.

Note: Only one pyritized specimen of this form has been found and the internal structure and hingement is not known.

Size. Length, 0.56 mm.; height, 0.35 mm.; width, 0.30 mm.

Cytheridea? sp. 2

Pl. 18 figs. 5, 6

Dorsal border broadly arched; anterior border somewhat abruptly rounded; ventral border straight to slightly concave; posterior border acutely rounded below the midline. Left valve overlapping the right valve. Without being able to inspect the hinge, one cannot determine to which of the Cytheridea genera this form belongs.

Size. Length, 0.74 mm.; height, 0.38 mm.; width, 0.28 mm.

Cytheridea? sp. 3

Pl. 18 figs. 9, 10

Dorsal border strongly arched; anterior border rounded; somewhat compressed; ventral border convex in middle of shell, although outline of venter is straight due to overlapping of left valve; posterior border angled below midline. Left valve strongly overlapping right valve along dorsal and ventral borders, but not at anterior or posterior ends. Surface finely punctate.

Size. Length, 0.59 mm.; height, 0.34 mm.; width, 0.22 mm.

Cytheridea? sp. 4

Pl. 18 figs. 11, 12

Dorsal border convex; anterior border broadly rounded; somewhat truncate; ventral border straight with a slight concave curve in the middle; posterior border very broadly angled in the lower third. Left valve strongly overlapping the right along the dorsal border, and just slightly overlaps it along the ventral border. Shell smooth, glassy with a few scattered pits.

Size. Length, 0.70 mm.; height, 0.21 mm.; width, 0.18 mm.

Genus Doloccytheridea Triebel 1938

Doloccytheridea intermedia Oertli

Pl. 18 figs. 7, 8

Doloccytheridea intermedia Oertli, 1958, pp. 1505-1507, pl. 3, figs.

63-74, pl. 4, figs. 75-82.

Dorsal border straight; anterior border broadly rounded; ventral border straight, subparallel with the dorsum; posterior border acutely rounded at about the midline. Faint, broad, shallow sulcus in anterior third of the dorsal border extending less than one-third of the way across the shell. Left valve overlapping right valve except at the anterior border.

Size. Length, 0.59 mm.; height, 0.30 mm.; width, 0.27 mm.

Remarks. This specimen compares favorably with Oertli's illustrations and descriptions of the male specimens of D. intermedia.

Genus Haplocytheridea Stephenson 1936Haplocytheridea? crassa Stacy, new species

Pl. 18 figs. 15-18

Dorsal border straight, about three-fourths of the length of the shell; anterior border obliquely rounded, somewhat compressed with a suggestion of a rim; ventral border straight, rising sharply toward the rear; posterior border compressed, acutely angled near the ventral border. Large, broad, deep sulcus starting near the cardinal angle and separating, with the larger part extending to the midline and the smaller portion curving toward the anterior. Second broad depression forming below the midline and extending nearly to the ventral border. Narrow, "pinched" ridge of shell material separates the two depressions. Surface finely punctate. Left valve overlapping the right along all borders. Hinge of left valve consists of anterior oval, crenulate socket, narrow crenulate groove and posterior oval, crenulate socket.

Size. Length, 0.54 mm. (0.33 mm); height, 0.33 mm. (0.21 mm); width, 0.31 mm. (0.18 mm).

Remarks. It is interesting to note that all six specimens found in white limestone sample from the side wall core of Dominion Oil #1 are more robust and about one-third larger than any of the numerous specimens from the black, carbonaceous limestone of Core #3. Except for the consistent difference in size, all other characters were the same. Size for a typical Core #3 specimen is given in parenthesis. That this latter group is not just young molts is shown by the fact that a young molt was found among the larger forms (about the size of the Core #3 specimens) and differs in the completeness of the sculpturing.

Type. Holotype UMP 54336, Paratype UMP 54337

Haplocytheridea pariaensis Stacy, new species

Pl. 18 figs. 13, 14

Dorsal border straight, about two-thirds of the shell length; anterior border obliquely rounded; ventral border slightly concave in the middle; posterior border narrowly rounded near the ventral border. Left valve slightly overlapping the right. Hinge of right valve typical of Haplocytheridea, with elongate, coarsely denticulate anterior tooth followed by narrow denticulate bar and terminating with posterior, elongate, denticulate tooth. Left valve complementary, with anterior and posterior crenulate, oval sockets separated by a crenulate, narrow groove.

Size. Length, 0.70 mm.; height, 0.40 mm.; width, 0.36 mm.

Remarks. Although the outline is not typical Haplocytheridea in shape, the hinge dentition suggests that this is the correct generic

placement.

Type. Holotype UMMF 54338

Haplocytheridea pariaensis Stacy subsp. acara Stacy, new subspecies

Pl. 19 figs. 31, 32

A much less elongate version of H. pariaensis. A broken specimen shows the typical Haplocytheridea hinge.

Size. Length, 0.60 mm.; height, 0.36 mm.; width, 0.32 mm.

Type. Holotype UMMF 54339

Schuleridea hatterasensis Swain

Pl. 19 figs. 29, 30

Schuleridea hatterasensis Swain, 1952, p. 74, pl. 9, figs. 35-38. --

Howe and Laurencich, 1958, p. 490, text-figs.

Dorsal border convex; anterior border rounded, compressed; ventral border slightly convex; posterior border narrowly rounded below the midline. Shallow sulcus behind the eyespot, typical for the genus. Surface coarsely punctate.

Size. Length, 0.40 mm.; height, 0.26 mm.; width, 0.20 mm.

Schuleridea oliverensis (Alexander)

Pl. 19 figs. 33, 34

Cytheridea oliverensis Alexander, 1929, p. 68, pl. 4, figs. 6, 10. --

Vanderpool, 1933, p. 411.

Schuleridea? oliverensis (Alexander). Howe and Laurencich, 1958, pp. 491, 492, text-fig.

Dorsal border straight, short; anterior border obliquely rounded; ventral border straight; posterior border obtusely angled below the midline. Left valve very strongly overlapping right along the dorsal and ventral borders, giving very curved outlines to these borders.

Prominent eyespot developed at the cardinal angle. Surface smooth, finely punctate.

Size. Length, 0.60 mm.; height, 0.45 mm.; width, 0.34 mm.

Schuleridea aff. splendens (Lubimova)

Pl. 19 figs. 35, 36

Aequacytheridea splendens Lubimova, 1955, p. 103, pl. 10, figs. 10a, b.

Schuleridea splendens (Lubimova). Howe and Laurencich, 1958, p. 493, text-fig.

This single, broken specimen has the typical eye tubercle of a Schuleridea and the punctate surface ornamentations of Lubimova's species. With both the anterior and posterior parts of the shell missing, however, positive identification is not possible.

Size. Length, over 0.62 mm.; height, 0.50 mm.; width, 0.27 mm.

Schuleridea washitaensis (Alexander)

Pl. 18 figs. 19, 20

Cytheridea washitaensis Alexander, 1929, p. 71, pl. 4, 12, 14.

Schuleridea washitaensis (Alexander). Howe and Laurencich, 1958, p. 494, text-fig.

Dorsal border straight, short, about two-thirds of the shell length; anterior border obliquely rounded; ventral border straight, subparallel with dorsal border; posterior border angulate below the midline. Left valve overlapping right valve strongly along dorsal and ventral border, less strongly along anterior and posterior. Curve of overlapping left valve producing convex dorsal outline. Large eye tubercle at anterior cardinal angle. Shell smooth, finely punctate.

Size. Length, 0.72 mm.; height, 0.47 mm.; width, 0.35 mm.

Schuleridea minutaforma Stacy, new species

Pl. 18 figs. 21, 22

Dorsal border convex; anterior border rounded, slightly compressed; ventral border straight; posterior border rounded, about two-thirds of the shell height. Faint, shallow sulcus behind and beneath the obscure eyespot. Left valve narrowly overlapping right along all borders. Surface coarsely punctate. Internal features not observed.

Size. Length, 0.47 mm.; height, 0.24 mm.; width, 0.15 mm.

Remarks. This species is very close to S. punctulata (Cornuel) as described and pictured by Triebel, 1938a as Cytheridea (H.) punctulata, but the Trinidad specimens are consistently half the size for that given for the European species.

Type. Holotype UMP 54340

Genus Eucythere Brady 1868

Eucythere brightseatensis (Berry)

Pl. 19 figs. 1, 2

Cytheridea truncatus Berry, 1925 (not C. truncata Jones, 1893), p. 485, fig. 6. -- Alexander, 1929, p. 74, pl. 5, fig. 16.

Cytheridea brightseatensis Berry. Berry 1933, p. 112 (new name)

Eucythere brightseatensis (Berry). Alexander, 1936, p. 689, pl. 93, fig. 11. -- Howe and Laurencich, 1958, pp. 330, 331, text-fig.

Dorsal border highly arched; anterior border obliquely rounded; ventral border concave; posterior border narrowly rounded. Shell surface smooth. Left valve overlapping right along all borders. Hinge and internal features not seen.

Size. Length, 0.39 mm.; height, 0.24 mm.; width, 0.21 mm.

Remarks. Howe and Laurencich (1958) question whether the forms described by Alexander in 1929 and 1936 are the same as the original one

described by Berry. The present specimens agree very well with Alexander's illustration and description; but neither his nor the Trinidad forms show the presence of spines along either the anterior or posterior border. The present identification is based entirely on Alexander 1929 and 1936.

Genus Krithe Brady, Crosskey and Robertson 1874

Krithe? sp.

Pl. 19 figs. 3, 4

Dorsal border slightly convex; anterior border rounded; ventral border straight to slightly sinuous; posterior border acutely angled near the venter. Faint but distinct gap between valves along the posterodorsal border. Surface smooth. Left valve overlaps the right. Hinge and internal features not seen.

Size. Length, 0.42 mm.; height, 0.20 mm.; width, 0.16 mm.

Remarks. Since only one specimen has been found, no specific name is proposed.

Subfamily CYTHERURINAE Muller

Genus Cytherura Sars 1866

Cytherura? sp.

Pl. 19 figs. 5, 6

Dorsal border straight; anterior border broadly rounded forming a narrow rim; ventral border straight and converges slightly toward the dorsum in the rear; posterior border acute and pointed slightly above the midline. Distinct pitlike sulcus in the dorsal surface, about one-third of the length from the anterodorsal angle. Gentle swelling along the ventral border.

Size. Length, 0.29 mm.; height, 0.15 mm.; width, 0.12 mm.

Remarks. Only pyrite molds of this species have been recognized;

therefore, hinge and internal structure are unknown and a specific name is not given.

Genus Eucytherura Muller 1894

Eucytherura infracretacea Stacy, new species

Pl. 19 figs. 15, 16

Dorsal border straight; anterior border rounded, somewhat extended ventrally; ventral border slightly convex, rising toward the rear; posterior compressed, pointed above middle. There is a strong eyespot near the anterodorsal angle, a small tubercle in front of the postero-cardinal angle and a very strong, pointed, alar-like protuberance on the venter about two-thirds of the way from the front. Shell covered with fine pits forming a reticulate surface.

Size. Length, 0.31 mm.; height, 0.20 mm.; width, 0.20 mm.

Remarks. This species is very similar to E. imporcata Weingeist, but does not have the double tubercle at the posterior cardinal angle. The form labeled as Orthonotacythere diglypta Triebel in Simon, Bartenstein, et al (1962, pl. 41, figs. 13, 14) is probably the present species or one very closely related. It is almost certainly not the same as the form described by Triebel.

Type. Holotype UMMP 54341

Eucytherura pustulosa Stacy, new species

Pl. 19 figs. 11, 12

Dorsal border straight; anterior border rounded, truncated; ventral border straight, sloping upward toward the rear; posterior border compressed, acutely angled with the point of the angle above the middle of the shell. Suggestion of eyespot at anterior cardinal angle. Broad, shallow sulcus extending from middle of dorsal border almost to the

ventral border. Surface covered by small, irregularly placed pustules, but no large, distinct tubercles.

Size. Length, 0.34 mm.; height, 0.20 mm.; width, 0.15 mm.

Remarks. No described species of Eucytherura appear similar to this form with a pustulose surface and lacking well-defined tubercles.

Type. Holotype UMMP 54342

Eucytherura aspera Stacy, new species

Pl. 19 figs. 9, 10

Dorsal border straight, but appears slightly concave due to the dorsal tubercles; anterior border rounded with a slightly thickened rim; ventral border slightly curved rising toward the rear; posterior compressed, varies from narrowly rounded to pointed at the middle of the shell. Prominent eyespot at the anterior cardinal angle. Two prominent tubercles along the dorsal border and one alar-like tubercle near the posteroventral angle. Broad, shallow sulcus from between the eyespot and the first dorsal tubercle downward to just in front of the ventral tubercle. Surface of the shell varies between finely reticulate and finely pitted.

Size. Length, 0.29 mm.; height, 0.15 mm.; width, 0.15 mm.

Remarks. Very similar to E. ansata Weingeist but differs in not having spines on anterior borders and only two rather than four tubercles on the dorsal margin.

Type. Holotype UMMP 54343

Eucytherura dictyosa Stacy, new species

Pl. 19 figs. 7, 8

Dorsal border straight; anterior border obliquely rounded; ventral border curved, rising toward the rear; posterior border compressed,

rising sharply to form a point just below posterior cardinal angle. Prominent eyespot extending above the dorsal border in some specimens. Pointed, alar-like tubercles in the posteroventral area. Broad, shallow sulcus extending downward in the front third of the shell. Surface finely reticulate to punctate.

Size. Length, 0.27 mm.; height, 0.17 mm.; width, 0.17 mm.

Remarks. Somewhat similar to E. imporcata Weingeist, but can be separated by the more pointed posterior and the lack of the double tubercle at the posterior cardinal angle.

Type. Holotype UMP 54344

Eucytherura venusta Stacy, new species

Pl. 19 figs. 25, 26

Dorsal border straight; anterior border abruptly rounded, rimmed; ventral border slightly concave, rising slightly toward the rear; posterior border compressed; acutely rounded above the midline. Lower part of shell expanding to form a winglike flange; venter divided into two lobes by broad sulcus extending downward from the anterior third of the dorsal border. Ventral surface beneath the flanges ornamented with curving, subparallel ridges. Surface finely reticulate.

Size. Length, 0.36 mm.; height, 0.19 mm.; width, 0.20 mm.

Remarks. The winglike posterior flange separates this species from other described Eucytherura.

Type. Holotype UMP 54345

Eucytherura volatica Stacy, new species

Pl. 19 figs. 17, 18

Dorsal border straight; anterior border rounded, faintly rimmed; ventral border straight, parallel with dorsum; posterior border

compressed, acutely angled near the dorsal border, forming a well-developed caudal process. Large, glassy eyespot protruding outward, but extending only slightly above the dorsal border. Small ridge extending outward from middle of the shell to posterior cardinal angle along the dorsum. Faint median ridge extending from below posterior cardinal angle to the middle of the anterior. Below this, a winglike ridge extending backward to the posteroventral angle, there terminating in an alar-like projection. Surface of shell covered by fine, regular reticulations. Internal features unknown.

Size. Length, 0.32 mm.; height, 0.16 mm.; width, 0.17 mm.

Remarks. The development of alar-like processes separate this species from other Eucytherura.

Type. Holotype UMMP 54346

Eucytherura? euprepa Stacy, new species

Pl. 19 figs. 19, 20

Dorsal border straight; anterior border obliquely rounded; ventral border straight, rising toward the rear; posterior border compressed, acutely angled just below the dorsal border. Eyespot present. Shallow, short sulcus extending downward to the midline from behind the eyespot, subparallel with the anterior border. Shell strongly swollen behind this anterior sulcus. Ventral rim along central two-thirds of the ventral border. Surface marked by oblique, longitudinal ridges, with pits developed in the grooves between ridges.

Size. Length, 0.46 mm.; height, 0.24 mm.; width, 0.26 mm.

Remarks. Hinge structure could not be observed, so the generic placement is questionable.

Type. Holotype UMMP 54347

Genus Stillina Laurencich 1957

Stillina? sp.

Pl. 19 figs. 13, 14

Dorsal border straight; anterior border rounded, rimmed, dentulate; ventral border slightly convex, rising toward the rear; posterior border compressed, acutely angled above the midline. Very large, irregular eyespot at the anterior cardinal angle. Posterior cardinal angle marked by large spine. Several small tubercles or spines along the dorsal margin. Ventral, wing-like extension bordered by three to four spines. Faint, broad, shallow sulcus extending from the dorsum to the ventral ala. Surface marked by irregular reticulations and pustules, giving the surface a rough appearance.

Size. Length, 0.41 mm.; height, 0.22 mm.; width, 0.22 mm.

Remarks. Although the caudal process is not captured, as in the genotype, the rough, spiny appearance suggests that this single specimen belongs to Stillina rather than Eucytherura.

Figured Specimen. UMMP 54348

Genus Cytheropteron Sars 1866

Cytheropteron pantaleonensis Stchepinsky

Pl. 20 figs. 1, 2

Cytheropteron pantaleonensis Stchepinsky, 1954, p. 496, pl. 22, fig.

4. -- Howe and Laurencich, 1958, p. 304, text-fig.

Dorsal border convex; anterior border obliquely rounded; ventral border straight to slightly convex; posterior border acutely angled at about the midline. Strong alar wings protruding from about the middle of the venter. Surface finely reticulate.

Size. Length, 0.31 mm.; height, 0.21 mm.; width, 0.19 mm.

Cytheropteron rotundum Stacy, new species

Pl. 19 figs. 21, 22

Dorsal border straight; anterior border broadly rounded; ventral border straight and subparallel with dorsal border for the anterior three-fourths of the shell, then rising sharply upward and terminating in a narrow caudal process at the posterodorsal angle. Narrow rim completely around borders. Alar processes narrow pointed, and triangular, located at about midpoint of the ventral border. Very faint, shallow sulcus on dorsal surface of the alar processes. Hinge and internal structures not seen.

Size. Length, 0.44 mm.; height, 0.24 mm.; width, 0.27 mm.

Remarks. The shallow sulcus and broadly rounded dorsal outline separates this form from other species of Cytheropteron.

Type. Holotype UMMP 54349

Cytheropteron orthogonum Stacy, new species

Pl. 20 figs. 3, 4

Dorsal border straight; anterior border broadly rounded; ventral border straight, subparallel with dorsum, rising slightly toward the rear; posterior border slightly curved, rising sharply to form a small point at the posterior cardinal angle. All borders compressed to form small rim. Pointed, triangular alar processes at about the middle of the ventral processes. Indistinct eyespot present at the anterior cardinal angle. Faint, shallow, broad sulcus starting below the eyespot and extending downward onto the dorsal surface of the ala. Surface covered with small, widely spaced pits. Internal structures unknown.

Size. Length, 0.32 mm.; height, 0.21 mm.; width, 0.24 mm.

Remarks. The somewhat quadrate outline is quite different from any other Cretaceous species of Cytheropteron.

Type. Holotype UMMP 54350

Cytheropteron ancylum Stacy, new species

Pl. 19 figs. 23, 24

Dorsal border straight to slightly convex; upper third of the anterior border straight to slightly concave, then becoming obliquely rounded below; ventral border straight, converging toward dorsal border in the rear; posterior border compressed, acutely angled above the upper third of the shell. Broad shallow sulcus extending downward from below the obscure eyespot onto dorsal surface of the alar projections. Broad, acutely angled alar projections at the middle of the ventral surface.

Size. Length, 0.45 mm.; height, 0.29 mm.; width, 0.33 mm.

Remarks. The outline of the shell in lateral view is quite distinct from other species of Cytheropteron because of the concave upper surface of the anterior border.

Type. Holotype UMMP 54351

Cytheropteron retusum Stacy, new species

Pl. 19 figs. 27, 28

Shell oval in outline with dorsal border gently convex; anterior border obliquely rounded; ventral border gently convex, rising toward the rear and the posterior border narrowly rounded above the midline. Large, backward-pointing ala in the middle third of the venter, extending below the ventral border. Shell thin and fragile.

Size. Length, 0.39 mm.; height, 0.25 mm.; width, (one valve), 0.16 mm.

Remarks. The oval outline, with the lack of any caudal angulation, differentiates this form from other Cytheropteron species.

Type. Holotype UMMP 54352

Cytheropteron epimecum Stacy, new species

Pl. 20 figs. 13, 14

Dorsal border gently convex; anterior border somewhat obliquely rounded; ventral border slightly convex, subparallel with the dorsal border; posterior border compressed and obtusely angled at the midpoint. Short heavy, backward-pointed ala extending out from the middle third of the venter. Broad shallow sulcus on the dorsal surface of the ala. Shell much heavier than C. retusum above.

Size. Length, 0.39 mm.; height, 0.24 mm.; width, 0.25 mm.

Remarks. The development of an obtuse caudal angulation separates this species from C. retusum above.

Type. Holotype UMMP 54353

Cytheropteron rectum Stacy, new species

Pl. 20 figs. 23, 24

Dorsal border straight; anterior border compressed, obliquely rounded; ventral border convex, rising toward rear; posterior border compressed, acutely angled at the dorsal border. Very short, pointed, ventral ala from middle of the shell extending back to the postero-ventral angle, a distance of less than one-fourth of the shell length. Surface finely pitted, with these pits so close together that the surface appears to be finely reticulate.

Size. Length, 0.36 mm.; height, 0.19 mm.; width, 0.19 mm.

Remarks. In this form the caudal process is an extension of the straight dorsal border; in other pitted species, the caudal process

(or posterior angulation) is located near the midline of the shell.

Type. Holotype UMMP 54354

Cytheropteron pariaensis Stacy, new species

Pl. 20 figs. 7, 8

Dorsal border straight; anterior border slightly compressed, obliquely rounded; ventral border straight, rises toward the rear; posterior border compressed, acutely angled above the midline. Eye-spot present. Ventral ala starting at the anterodorsal angle and extending backward and outward, terminating in a point about two-thirds of the way to the rear of the shell; ala overhanging and obscuring the ventral border. Surface ornamentation formed by large pits arranged in concentric rows.

Size. Length, 0.50 mm.; height, 0.27 mm.; width, 0.29 mm.

Remarks. No other described species of Cretaceous Cytheropteron has similar surface markings.

Type. Holotype UMMP 54355

Genus Eocytheropteron Alexander 1933

Eocytheropteron bilobatum (Alexander)

Pl. 20 figs. 31, 32

Cytheropteron bilobatum Alexander, 1929, p. 104, pl. 10, figs. 14, 15.

Cytheropteron (Eocytheropteron) bilobatum Alexander, 1933, p. 196, pl.

25, fig. 11, pl. 26, figs. 3, 5a, b.

Eocytheropteron bilobatum (Alexander). Howe and Laurencich, 1958, p.

324, text-fig.

Dorsal border convex; anterior border obliquely rounded, ventrally almost angulate; ventral border convex; posterior border compressed, forming an upturned caudal process near the midline. Narrow ventral

rim extending length of shell. Low, broad sulcus extending downward in front half of shell. Surface finely punctate. Hingement and internal features not seen.

Size. Length, 0.60 mm.; height, 0.38 mm.

Eocytheropteron cf. jugosum (Alexander)

Pl. 20 figs. 25, 26

Cytheropteron (Eocytheropteron) jugosum Alexander, 1933, p. 198, pl. 27, figs. 12a, b.

Eocytheropteron jugosum (Alexander). Howe and Laurencich, 1958, p. 326, text-fig.

Dorsal border slightly convex; anterior border obliquely rounded; ventral border straight, subparallel with the dorsum; posterior border acutely rounded near the venter. Strong, ventral rib curving downward and obscuring the ventral border, giving valve an oval outline. Low, rounded, but prominent median ridge extending along the midline in the central two-thirds of the shell. Surface reticulate.

Size. Length, 0.39 mm.; height, 0.20 mm.; width, 0.13 mm. (one valve).

Remarks. Although much smaller than Alexander's species, the Trinidad form appears very similar in ornamentation and outline, except that none of the four specimens found had any indication of caudal development.

Eocytheropteron cf. trinitiensis (Vanderpool)

Pl. 20 figs. 27, 28

Cytheridea trinitiensis Vanderpool, 1928, p. 106, pl. 14, figs. 3, 6.

Cytheropteron (Eocytheropteron) trinitiensis (Vanderpool). Vanderpool, 1933, p. 410, pl. 49, figs. 16, 19. -- Swain, 1952, p. 86, pl. 9,

figs. 9, 10.

Eocytheropteron trinitiensis (Vanderpool). Howe and Laurencich, 1958,
p. 327, text-fig.

Dorsal border arched; anterior border obliquely rounded; ventral border slightly convex, almost straight; posterior border somewhat compressed, acutely angled below midline. Ventral area broadly inflated. Surface of some specimens apparently smooth, but on others, faint longitudinal ornamentation formed by indistinct pits. Ventral surface covered by faint, curved, subparallel ridges. Hinge of left valve with terminal, crenulate sockets connected by a narrow, crenulate bar.

Size. Length, 0.57 mm.; height, 0.40 mm.; width, 0.40 mm.

Remarks. These specimens compare favorably with Vanderpool's description and illustration of 1933 and Swain's specimens of 1952. They do not, however, have the extended caudal process depicted by Vanderpool in his 1928 original description.

Eocytheropteron mucronatum Stacy, new species

Pl. 20 figs. 11, 12

Dorsal border straight, short; anterior border compressed, rounded after short, concave depression near the anteriorocardinal angle; ventral border curved, convex; posterior border compressed, acutely angled to form a long caudal process (about one-third of shell length) at about the midline. Winglike ventral ridge along the middle third of the shell. Surface smooth.

Size. Length, 0.38 mm.; height, 0.22 mm.; width, 0.20 mm.

Remarks. The long caudal process and compressed anterior border of this form is quite distinct from other described species of

Eocytheropteron.Type. Holotype UMMP 54356Genus Acrocythere Neale, 1960Acrocythere domoilensis Stacy, new species

Pl. 20 figs. 5, 6

Dorsal border straight; anterior border rounded, somewhat compressed, rimmed; ventral border straight, rising slightly toward the rear; posterior border compressed, acutely angled at the midline. Broad, shallow sulcus on dorsal surface near anterior cardinal angle, not extending below the upper third of the shell. Acute, curved ventral periphery extending from behind the anterior border to the posterior border obscuring the ventral border and giving a curved, ventral outline, subparallel to the dorsal border. Dominant median ridge from the midline near the anterior rim, curving beneath the dorsal sulcus, then rising to the upper third of the shell and extending to the posterior. Fainter, secondary ridges forming irregular reticulations on the shell surface. Hinge of left valve formed by terminal crenulate sockets connected by a narrow crenulate median bar.

Size. Length, 0.49 mm.; height, 0.20 mm.; width, 0.27 mm.Remarks. This species differs from A. hauteriviana (Bartenstein) by having one, instead of three, prominent ribs.Type. Holotype UMMP 54357Genus Hustonia Swain, 1946Hustonia? distorta Stacy, new species

Pl. 20 figs. 29, 30

Dorsal border straight to very slightly convex; anterior border obliquely rounded; ventral border convex, rising toward the rear; posterior border acutely angulate above the midline. Surface marked by

deep vertical sulcus in the middle, from dorsal border almost to the venter. Second, smaller sulcus in the anterior third of the valve, extending ventrally, from just behind the cardinal angle to below the midline. Surface irregular with scattered fine pores. Left valve slightly overlapping the right. Hinge of right valve with large, denticulate oval tooth at posterior and anterior, with a narrow crenulate groove between. Left hinge a complement, with denticulate sockets at the ends and a crenulate bar between.

Size. Length, 0.46 mm.; height, 0.28 mm.; width, 0.25 mm.

Remarks. New Genus x, new species of Oertli, 1958, appears to be a different species of the present genus.

Type. Holotype UMMP 54358

Subfamily LOXOCONCHINAE Sars

Genus Loxoconcha Sars 1866

Loxoconcha expolita Stacy, new species

Pl. 20 figs. 15, 16

Dorsal border gently arched; anterior border obliquely rounded; ventral border straight; posterior border obtusely angled just above the midline. Surface smooth.

Size. Length, 0.31 mm.; height, 0.22 mm.; width, 0.18 mm.

Remarks. The smooth surface, oval outline and lack of caudal process separate this from other species of Loxoconcha.

Loxoconcha parva Stacy, new species

Pl. 20 figs. 17, 18

Dorsal border straight; anterior border compressed, obliquely rounded; ventral border slightly convex, rising gently toward the rear; posterior border compressed, angled above the midline. Surface finely

reticulate.

Size. Length, 0.24 mm.; height, 0.16 mm.; width, 0.11 mm.

Remarks. Very similar to the Upper Cretaceous species Loxoconcha minuta Jennings, but the present form is not as wide and less quadrate as viewed from above.

Type. Holotype UMMP 54360

Subfamily EYTHOCYTHERINAE Sars

Genus Monoceratina Roth 1928

Monoceratina minor Stacy, new species

Pl. 20 figs. 19, 20

Dorsal border somewhat concave, with small depression at about middle; anterior border rounded; ventral border convex, rising toward the rear; posterior border compressed acutely, rounded, with greatest length above midline of shell. Blunt, round spine projecting from about the middle of each valve. Shell smooth and unornamented.

Size. Length, 0.31 mm.; height, 0.19 mm. width, 0.20 mm.

Remarks. Similar in outline and shape with M. umbonata (Williamson) as described in Jones (1849), but with a smooth, rather than punctate surface.

Type. Holotype UMMP 54361

Monoceratina parva Stacy, new species

Pl. 20 figs. 9, 10

Dorsal border straight; anterior border compressed, rimmed, obliquely rounded; ventral border straight, rising slightly toward the rear; posterior border compressed, forming an acute caudal process that extends slightly above the dorsal border. Small but distinct eyespot at the cardinal angle. Large, robust spine extending straight

out from the middle of the venter. Shell smooth, glassy.

Size. Length, 0.35 mm.; height, 0.19 mm.; width, 0.19 mm.

Remarks. Since the internal features could not be observed, the generic placement is questionable; Monoceratina was selected rather than Cytheropteron because of the spinose, rather than winglike projections.

Type. Holotype UMMP 54362

Genus Pseudocythere Sars 1866

Pseudocythere? sp.

Pl. 20 figs. 21, 22

Dorsal border straight; anterior border broadly rounded, somewhat compressed, ventral border straight, compressed and producing a narrow flange beneath the round, pointed caudal process at the posterodorsal angle. Shell smooth. Interior not seen.

Size. Length, 0.36 mm.; height, 0.25 mm.; width, 0.20 mm.

Remarks. Because poor preservation of these specimens makes the generic assignment very questionable, a specific name is not proposed.

Figured Specimen. UMMP 54363

BIOSTRATIGRAPHIC RESULTS
OF THE PRESENT STUDY

The correlation of the Trinidad Lower Cretaceous formations with the equivalent formations in Venezuela and the U. S. Gulf Coast area is shown in text-figure 2. Also presented on this figure are the ranges of some of the stratigraphically important foraminifera. Text-figure 3 is a correlation diagram of the sections studied. It is now possible to divide the Cuche Formation into four biozones, based on pelagic foraminifera, rather than the two previously used. A correlation of the Lower Cretaceous limestones in the Gulf of Paria with the Venezuelan section is proposed and their probable position in relation to the shaly section of Trinidad is suggested.

Cuche Formation

The lowest faunal zone of the Cuche is arbitrarily selected to include the samples whose faunas contain Hedbergella bollii and Hedbergella praewashitensis, but below the first appearance of Hedbergella infracretaceae. It may prove possible to subdivide further this zone into a lower part where Globigerina kugleri is found consistently in most samples, and an upper part where this species occurs only intermittently.

The fauna of the Middle Cuche biozone contains an assemblage that is similar to the one in the underlying beds, but it includes the persistent occurrence of the pelagic species Hedbergella infracretaceae and Globigerinelloides blowi. Hedbergella praewashitensis and Hedbergella bollii, as well as Epistomina carcolla and the subspecies of

Lenticulina ouachensis, persist in frequent to common occurrence throughout this part of the section.

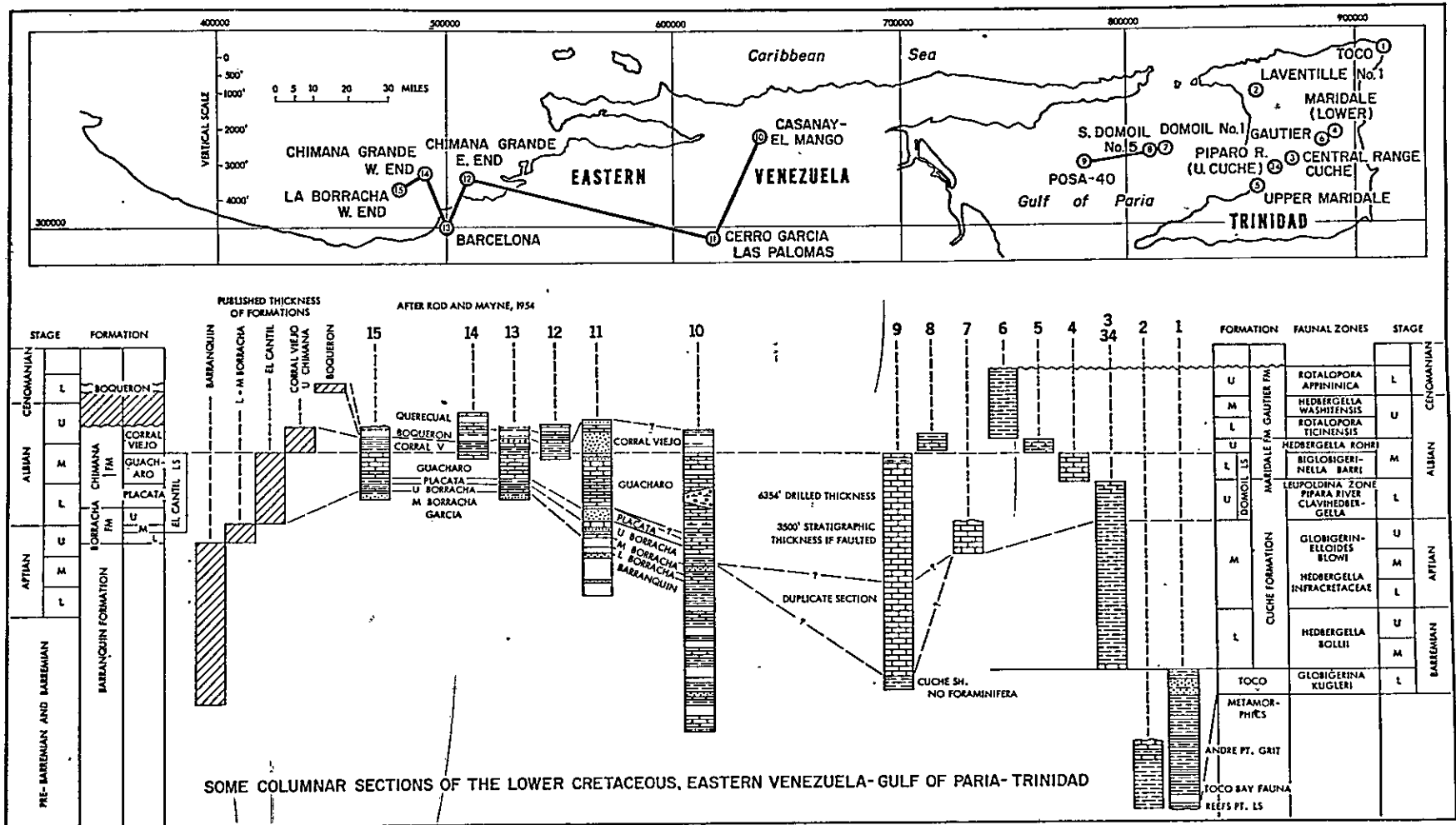
The Upper Cuche can be divided into two very distinct zones on the basis of pelagic foraminiferal occurrences. The older is marked, faunally, by the first development of Clavihedbergella subcretacea and Schackoina cenomana. The rare, sporadic occurrence of Biglobigerinella cushmani also starts here. This zone marks the last stratigraphically important appearance of Epistomina carcolla and the varieties of Lenticulina ouachensis.

The upper biozone, the Leupoldina protuberans zone of Bolli (1959), is characterized by the abundant appearance of several diverse species of Schackoina and Leupoldina protuberans. The latter species appears to be restricted to this zone. The first occurrence of Globigerinelloides maridalensis is also in these sediments. Hedbergella praewashitensis and Hedbergella bollii persist throughout this biozone, but terminate after the first sample in the Maridale Formation above.

Maridale Formation

Although the zonation of the Maridale as proposed by Bolli (1959) is retained, several additional, stratigraphically useful species have been delineated. Hedbergella trinidadensis, which occurs only rarely in the uppermost samples of the Cuche, appears abundantly throughout the Maridale and continues upward into the Cenomanian Gautier Formation. The lower zone of the Maridale marks the last frequent occurrence of Clavihedbergella subcretacea and Biglobigerinella cushmani in our set of samples, although Bolli (1959) records Clavihedbergella aff. subcretacea from the overlying Gautier Formation in Trinidad; and Tappan

Fig. 3 Correlation of some columnar sections.



(1943) originally described this species from sediments that are probably Cenomanian in age.

Planomalina pseudobuxtorfi, which is rare and sporadic in the lower zone of the Maridale, appears commonly in all of the samples from the upper biozone. This common occurrence is widespread geographically as this species has been found in samples from Trinidad, the Gulf of Paria and Eastern Venezuela.

El Cantil Limestone

In the Gulf of Paria, the #1 Domoil well of Dominion Oil Limited penetrated 400 feet of limestone conglomerate and then over 1000 feet of solid, crystalline tan to brown limestone. From subsequent marine drilling, it is now known that over 3500 stratigraphic feet of this limestone exists in the Gulf area. For want of a better name, the limestone was referred to as the "Domoil Limestone"; however, both by lithology and age it can be shown to be the eastward extension of the El Cantil Limestone. Some samples from Domoil #1 yielded free fossils of a Lower Cretaceous age, and an examination of thin sections has not revealed any additional significant species. No planktonic foraminifera have been found in any of the well samples and, in fact, the limestone faunas have very few species in common with the deeper water, shale assemblages. The proposed correlations, therefore, are based more on inferences than on good faunal ties.

The fauna of the limestone is a typical shallow water assemblage, replete with Choffatella decipiens, Orbitolina cf. texana, Pseudocyclammina hedbergi, a new subspecies of Cuneolina trinitensis and abundant ostracodes. These species, combined with the significant

absence of such forms as Dictyoocomus walnutensis, Haplostiche texana and Coskinolinoides spp. provide an excellent faunal correlation with the limestone series of Venezuela (Rod and Maync, 1954). The only part of the Venezuelan section where Choffatella decipiens and Orbitolina texana overlap is in the Upper Boracha Limestone. This explains the lack of Haplostiche texana and Dictyoocomus walnutensis which, according to Maync, occur higher in the section, in the Placata and Guacharo Members of the Chimana Formation. The Choffatella decipiens-bearing limestones of Laventille #1 is shown to be older than the Domoil Limestone, even without the Toco faunas of the enclosing shales, by the absence of Orbitolina texana and the presence of Trocholina infragramulata in the Laventill #1 samples. The fortuitous circumstance of penetrating the Domoil Limestone in this restricted zone of overlap between Choffatella and Orbitolina offered the first evidence for regional correlations of this section.

In their paper on the Cretaceous stratigraphy in Venezuela, Rod and Maync (1954) point out that the Upper Borracha Member is the lowest part of the El Cantil Formation, and that the major limestone development is above, in the Guacharo Member of the Chimana Formation. The Casanay-El Mango and the Cerro Garcia-Las Palomas surface sections in Eastern Venezuela, which have been mapped and described by E. H. Haynes and A. Pocock of the Richmond Exploration Company, can be correlated with the sections of Rod and Maync. Limestone samples from these surface sections did not yield any free fossils, and the samples were too fragmentary to permit a satisfactory picture of the faunal composition to be derived from thin sections. However, two stratigraphically important samples (V-14043 and V-14044) were taken in the shales immediately overlying the main limestone body that contains a large and distinc-

tive fauna. Both the pelagic and benthonic foraminiferal assemblages are almost identical to, and correlate with, the Upper Maridale assemblage, suggesting that the limestone is, in part, a lithofacies equivalent of the underlying Lower Maridale and Upper Cuche marly shales of Trinidad.

A second correlation opportunity for this limestone is in P.O.S.A well #40-1 which was drilled on the Venezuelan side of the Gulf of Paria. This well penetrated 6354 feet of limestone and ended up in a black, Cuche-like shale which was barren of diagnostic fossils. Again, the limestone chips were too small to obtain satisfactory thin sections from which the fauna could be determined, and the few free fossils were not diagnostic. However, core #1 from 2260 feet drilled a softer, marl-like zone, from which a well-developed fauna was obtained. This assemblage, with the common occurrence of Biglobigerinella barri and Hedbergella trinidadensis, rare Hedbergella rohri and no specimens of Globigerinelloides eaglefordensis, is characteristic of the upper part of the Lower Maridale biozone and appears closest in faunal composition to the sample from the Cuche River. No specimens of Choffatella were found in the upper part of the P.O.S.A. #40 well, which suggests that this limestone is younger stratigraphically than the limestone in Domoil #1.

Another well that contains pelagic foraminifera in the Lower Cretaceous section is Dominion Oil's South Domoil #5. This well penetrated approximately 200 feet of Lower Gautier beds that contained a Lower Cenomanian fauna, including Rotalipora greenhornensis and Rotalipora ticinensis. Below the Gautier sediments, 210 feet of highly calcareous Upper Maridale shale were sampled. The faunal assemblage is typical of the Upper Maridale and includes Planomalina pseudobuxstorfi, Hedbergella rohri, Hedbergella trinidadensis and Globigerinelloides eaglefordensis. This fauna was confirmed as being in place, and not

reworked into the Gautier sediments, by a core in this interval which contained only a Maridale assemblage and no species that are restricted to the younger Gautier beds.

SUMMARY

From the pelagic faunas associated with the Lower Cretaceous limestone, it is possible to infer that the major Lower Cretaceous limestone build-up in both Eastern Venezuela and the Gulf of Paria is, at least in part, equivalent in age with the highly calcareous to marly shales of the Upper Cuche and Lower Maridale Formations of Trinidad and that the Upper Maridale is represented by the interbedded calcareous shales and limestones above the main limestone body. The data presently available are not sufficient to correlate the lower limits of the limestones in Domoil #1 or P.O.S.A. #40-1 with the planktonic zonation of the Trinidad sediments, since no pelagic faunas have been found in association with the lower part of the limestone.

Various fragments of limestone samples from Domoil #1, P.O.S.A. #40-1 and the Casanay-El Mango section were examined for smaller nannoplankton in the hope that specimens would be found that would allow correlations with the Lower Cretaceous limestone sections of Mexico described by Bonet (1956) and Trejo (1960). Unfortunately, none of these forms was found in my samples.

Lower Cretaceous samples from Trinidad, the Gulf of Paria and Eastern Venezuela have yielded 206 species of foraminifera (87 of which are new) and 77 species of ostracods (37 new). These microfossils^{are} described and illustrated, and the biostratigraphy of the Lower Cretaceous formations of Trinidad is discussed in detail. Analysis of the

faunas reveals seven biozones based on the stratigraphic ranges of pelagic foraminifera.

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Appendix

Planktonic Foraminifera

A >30
C 30-11
F 10-4
R 3-1

		<i>Globigerina kusleri</i>	<i>Hedbergella praewashitensis</i>	<i>Hedbergella bellii</i>	<i>Globigerina? graysonensis</i>	<i>Clavibergella simplex</i>	<i>Hedbergella infracretacea</i>	<i>Globigerinelloides cf. blowi</i>	<i>Globigerinelloides blowi</i>	<i>Hedbergella sp.</i>	<i>Guembelitria harrisi</i>	<i>Schackeina cenomana</i>	<i>Clavibergella subretacea</i>	<i>Hedbergella planispira</i>	<i>Globigerinelloides escheri</i>	<i>Biglobigerinella cushmani</i>	<i>Schackeina cabri</i>	<i>Schackeina reicheli</i>	<i>Schackeina pustulans pustulans</i>	<i>Schackeina pustulans guirguisemonta</i>	<i>Schackeina sp.</i>	<i>Schackeina multispinata</i>	<i>Schackeina cenomana bicornis</i>	<i>Leupoldina protuberans</i>	
Maridale Fm.	Upper	V-14044						F																	
		V-14043						F					R												
		I4652								R			R	F		R									
		POSA #40(2260')	F					R					R			R									
		T.P.D. 159						F	F	A						F									
		98						C								F			R					R	
		10244						F		F			F	F	F	R								R	
		10243						F					R	F	R	F			C						
		50431	R	F				F	F	A			R	C	F		F	R	R	F				R	R
	Domoil		LS. Dol. #1(1366')																						
		Dol. #1(2360')																							
		33547																							
Cuche Fm.	Upper	2447											C	R	A	C									
		12219																							
		12236																							
		10245																							
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	12196																								
	19267																								
	12170																								
	12193																								
	K81878																								
Toco Fm.		11998																							
		Lav. #1(5000')	C																						

Distribution of the Microfauna.

		Planktonic Foraminifera								Benthonic Foraminifera															
		<i>Globigerinelloides maridalensis</i>	<i>Globigerinelloides saundersi</i>	<i>Planomalina cf. buxtorfi</i>	<i>Hedbergella trinidadensis</i>	<i>Boglobigerinella barri</i>	<i>Hastigerinoides maridalensis</i>	<i>Hastigerinoides diversiforma</i>	<i>Heterohelix? minor</i>	<i>Hedbergella rohri</i>	<i>Globigerinelloides eugileferiensis</i>	<i>Planomalina pseudobuxtorfi</i>	<i>Turrispirlina subconica</i>	<i>Spirillina minima</i>	<i>Dorothia cf. oxycona</i>	<i>Ammonastuta? subretacea</i>	<i>Lenticulina muensteri</i>	<i>Lenticulina cf. kugleri</i>	<i>Lenticulina eichenbergi</i>	<i>Garsenaria cuchensis</i>	<i>Globulina exseta</i>	<i>Trocholina infragranulata</i>	<i>Discorbis minutissima</i>		
Maridale Fm.	Upper	V-14044	R																						
		V-14043			A			F		C	C	F		R		A									
		14652			R					C	C	F												R	
		POSA #40(2260')			A	C				R				F		C								R	
		T.P.D. 159	C	A	A	A				R						R				F				R	
		98		R	A	A								F		C				F					
		10244	F	F	R	A	A																		
		10243	C	F		C	A										R							R	
		50431	A	F	A	A	A	A	R					F		C								R	
	Domoil		Do. #1(1366')																						F
		Do. #1(2360')																						R	
		33547											R	R	F	F								F	
Cuche Fm.	Upper	2447	C	F	R	F								R	F									R	
		12219	F												F	F								R	
		12236	C	F										F	F	F		F						R	
	Middle		10245												F		F								
			10242												F	R	P								
			12220												R		F								
			12195											R			F								R
			1547												F		C				R				
			17385												R		C				R				
			1546														C								R
			12203												R		F								
			16017											R			R								
		Lower		12183												F	C	C				R			
			12169												R		F				R				
			12217													F	C								
			10526												F	R	F				R				R
			10517												F	R	C				R				
			12190												R		F								
			12192												R	F	F								
			12178														F				R				
	12171													R		F									
	12197															F								R	
	12196														C										
	19267														F					R					
	12170														F				R	R					
	12193												R	C	C				R				R		
	K81878												R		F										
Toco Fm.		11998													R									R	
		Lav. #1(5000')											R	R	F	R	C	F	F	R	R	F	F		

Toco Fm.	Maridale Fm.		Species																									
	Lower	Upper	<i>Pseudocyclammia hedbergi</i>	<i>Saxicella trinitensis parcaensis</i>	<i>Pseudocyclammia pseudocyclathiformis</i>	<i>Flabellammia minor</i>	<i>Neobulimina minima</i>	<i>Bulimina cf. reussi</i>	<i>Cassidella primitiva</i>	<i>Barkerina barkerensis</i>	<i>Fistix euthemon</i>	<i>Guttulina apaxya</i>	<i>Pseudopolymorphina raanonensis</i>	<i>Quinqueloculina minima</i>	<i>Gaudryina characta</i>	<i>Reophax styphelus</i>	<i>Fistix acutangula</i>	<i>Palmula limbata</i>	<i>Lenticulina acer</i>	<i>Lenticulina anfracta</i>	<i>Planularia schreiteri</i>	<i>Protonina magna</i>	<i>Vaginulinopsis cf. pseudomarki</i>	<i>Astracalus blothrus</i>	<i>Astracalus astrabes</i>	<i>Reopliax? grandis</i>		
		V-14044																										
		V-14043																										
		14652																										
		POSA #40(2260')																										
		T.P.D. 159																										
		98																										
		10244																										
		10243																										
		50431																										
		Domoil																										
		Is. Dol. #1(1366')																										
		Dol. #1(2360')																										
		33547																										
		Upper																										
		2447																										
		12219																										
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		19267																										
		12170																										
		12193																										
		K81878																										
		11998																										
		Lav. #1(5000')																										

8

Maridale Fm.		Upper																			
Lower																					
V-14044																					
V-14043																					
I4652																					
POSA #40(2260')		R																			
T.P.D. 159		R																			
98																					
I0244																					
I0243		R																			
50431		RF																			
Dol. #1(1366')				F	A	R	C	R													
Dol. #1(2360')				A		R	F	R	C	F	R	F	F	C	F	F	F	C	A	F	F
33547				R	R	R	R														
2447																					
I2219		R R																			
I2236		R																			
I0245																					
I0242																					
I2220																					
I2195																					
1547																					
I7385																					
1546																					
I2203																					
I6017																					
I2183																					
I2169																					
I2217																					
I0526																					
I0517																					
I2190																					
I2192																					
I2178																					
I2171																					
I2197																					
I2196																					
I9267																					
I2170																					
I2193																					
K81878																					
Toco Fm. 11998																					
Lav. #1(5000')																					

Dalacytheridea intermedia
Cytheropteron epimecum
Cythere cf. multilamella
Hustonia? distorta
Cythereis fredricksburgensis
Cythereis pariaensis
Cythereis corneuli
Cytherella scotti
Cytherella foveata
Cytherelloidea ovata
Cytherelloidea ovata robusta
Cytherelloidea reticulata
Protocythere trinidadensis
Cythereis cf. fajasi
Cythereis dentonensis
Necocythere cf. mertensi
Eocytheropteron bilobatum
Eocytheropteron cf. jugosum
Aerocythere domoilensis
Haplocytheridea? crassa
Schuleridea washitaensis
Schuleridea hatterasensis
Schuleridea minuta forma

Maridale Fm.								
Upper	V-14044	R	E		R	F	R	
Lower	V-14043	R	F		R	F		
	14652	R	F		R			
	POSA #40(2260')	R	R		F			
	T.P.D. 159	F	FR		R			
	98	F	CFR					
	10244	R	FR					
	10243	R	R					
	50431	F	R					
Domoil								
	DoI. #1(1366')				R			
	DoI. #1(2360')				F			
	33547							
Cuche Fm.								
Upper	2447							
	12219							
	12236							
Middle	10245							
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	1546							
	12203							
	16017							
Lower	12183							
	12169							
	12217							
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	19267							
	12170							
	12193							
	K81878							
Toco Fm.								
	11998							
	Lav. #1(5000')							

Cytheridea? sp. 2
Cytherella parallela
Cytheroptera rectum
Cytheridea? sp. 3
Paracypris trinidadensis
Cythereis domilensis
Monoceratina parva
Cythereis cantilensis
Loxocncha parva
Asciocythere goodlandensis
Schuleridea aff splendens