

POLYPERIBOLA, A NEW PLANKTONIC FORAMINIFERAL GENUS FROM THE LATE MIOCENE OF TRINIDAD AND TOBAGO

ROBERT D. LISKI

Texaco Trinidad, Inc., Pointe-a-Pierre, Trinidad, W.I.

ABSTRACT

Polyperibola christiani n. gen., n. sp., is described and illustrated from sediments of late Miocene age in southern Trinidad and Tobago. The genus is characterized by a globose test, initially trochoid with the ultimate chamber covering the umbilical area. A second growth stage of supplementary chambers and bullae envelop the trochoid whorls. No primary aperture is visible; however, all supplementary chambers and

bullae contain distinctive, multiple, sutural apertures. The size of the test, the size, shape, and number of the supplementary chambers, and the density of multiple apertures are all variables. *Polyperibola* is tentatively placed in the family Candelinidae, and is considered most closely related to the genus *Globigerinita* Bronnimann.

INTRODUCTION

A recent sampling of deposits of late Miocene age in southern Trinidad and Tobago has yielded a rich foraminiferal fauna from which a new planktonic genus is described.

SYSTEMATICS

Family CANDEINIDAE Cushman 1927

Genus *Polyperibola* n. gen.

Type Species *Polyperibola christiani* n. sp.

Diagnosis. Initial portion of test trochoidal, with two to three whorls; chambers globular, lightly appressed; umbilical area covered by final chamber(s); supplementary chambers and bullae develop over dorsal intercameral sutures tending to envelop earlier trochoid whorls; no visible primary aperture, nor supplementary apertures on dorsal portion of trochoid test; final chamber, all supplementary chambers, and bullae with multiple, semicircular, sutural apertures, bordered by imperforate rims; apertures restricted to added chamber or bullae and do not develop on, or with, covered surface; test wall radial calcite, thin,

finely porous and lightly pustulose in trochoid portion of test; walls of supplementary chambers and bullae thinner walled, with smoother, more vitreous appearance and a similar to slightly finer pore pattern than walls of trochoid chambers.

Remarks. *Polyperibola* is, at present, a monotypic genus exhibiting an extreme variation in test size and shape, and the number and shape of supplementary chambers and bullae. Diagnostic features are a pustulose trochoid initial growth stage, supplementary chambers and bullae enveloping earlier portions of the test, and hemispherical, multiple, sutural, apertures with imperforate rims. The apertures are restricted to the final chambers, all supplemental chambers and bullae.

Although this morphology is distinct and not easily confused with other genera, *Polyperibola* exhibits growth tendencies of earlier genera. The Eocene genus *Globigerinatheka* Bronnimann, also developed a final chamber over the umbilicus and developed chambers and bullae on the earlier portion of the test (Bronnimann 1952, Bolli 1972). *Polyperibola* differs from *Globigerinatheka* in having a smaller, more globose, mor-

phologically variable test, a smoother test wall, and a larger number of smaller sutural apertures.

In *Globigerinatella* Cushman and Stainforth, from sediments of early Miocene age, as in *Polyperibola*, the earlier portion of the test is enveloped by later growth stages and has multiple rimmed apertures (Bronnimann 1950). *Globigerinatella* is larger than *Polyperibola*, has a coarser test wall, is less enveloped by numerous bullae and supplementary chambers and lacks the multiple, sutural, rimmed apertures on all bullae and supplemental chambers, as found in *Polyperibola*.

The writer examined specimens of the Tortonian genus *Velapertina* Popescu (1969). *Polyperibola* has a different wall structure, a smaller test, and no secondary apertures on the spiral side of the test. *Velapertina* has umbilical and sutural bullae which do not envelop the earlier portion of the test. The infralaminar apertures of the bullae in *Velapertina* differ from the diagnostic, sutural apertures of *Polyperibola*.

Globigerinoita Bronnimann has a less globose but coarser test than *Polyperibola*. The bullae which cover the primary and supplementary apertures have two to three openings and differ considerably from the supplementary chambers and bullae, with multiple sutural apertures, which envelope the earlier portion of the test of *Polyperibola*.

A comparison of *Polyperibola* with Pliocene and Recent specimens of *Candeina* d'Orbigny was made and certain significant differences were found. *Candeina* has secondary "apertures" in the dorsal portion of the test which are not present in *Polyperibola*. This suggests the two genera have dissimilar ancestors, a "*Globigerinoides* type" for *Candeina* (as stated by Blow 1969), and a globigerine (*Globigerinita*?) ancestor for *Polyperibola*. *Candeina* has a similar test wall, but lacks the development of pustules and supplementary chambers or bullae enveloping the early portions of the test. In addition, the sutural apertures of *Candeina* are developed within the suture, are elliptical, completely rimmed, and develop both within the added and earlier chamber. The sutural apertures of *Polyperibola* are semicircular and restricted to the added chamber. From this, it appears that there is no direct evolutionary lineage between the two genera.

The most closely related genus however, seems to be *Globigerinita* Bronnimann (1951). *Globigerinita* (middle Miocene to Recent) could evolve to *Polyperibola* by the development of the bulla in *Globigerinita* into a final chamber, the retention of multiple, sutural openings developing imperforate rims, the envelopment of the globigerine portion of the

test by additional chambers and bullae which retain the sutural apertures, and the addition of pustules to the test wall. Because it appears to be closely related to *Globigerinita*, *Polyperibola* is tentatively placed in the family Candeinidae, and the author here follows the classification used by Parker (1967).

***Polyperibola christiani* n. sp.**

Pls. 1, 2 and 3

Description of holotype. Test small to medium sized, subcircular, lobulate in any view, initially trochoid, generally sinistral with two whorls of five and four chambers respectively (excluding final chamber); chambers globular, loosely appressed; a large final chamber develops over umbilical area; supplementary chambers and bullae hemispherical and irregularly shaped, cover much of suture of final chamber, and develop onto early portion of test over intercameral sutures of trochoid whorls; all sutures of trochoid whorls straight to slightly curved and incised; sutures of supplemental chambers and bullae distinct; increase in chamber size per trochoid whorl small, diameter increase of second to first whorl is 2:1; no visible primary aperture; as final chamber, supplementary chambers, or bullae develop over earlier portions of test, they contain multiple, semicircular, sutural, apertures with imperforate rims; test radial calcite; chamber walls thin, fragile, finely perforate, and appear vitreous; small pustules develop on the chambers of the trochoid whorls; increase in number and are concentrated along intercameral sutures, appear to increase in aerial extent on older chambers; supplementary chambers with few pustules, thinner walled, more vitreous, and are finely perforate. Maximum diameter of the holotype 0.315 mm.

Remarks. The variation in *Polyperibola christiani* is extreme, and from a syntypic series of 230 specimens no two could be said to be identical. The selection of the holotype is based on a specimen which best represents the unit characters of the species. The size, shape and number of the supplementary chambers and bullae differ considerably between specimens, as shown by the forms illustrated in Pls. 1–3. Although both dextral and sinistral forms occur, the trochoid portion of the test generally coils to the left.

The distinction between the term "supplementary chamber" and the term "bulla" is based solely on size, not shape nor location on the test. Both are included in the measurement of maximum test diameter which ranges from 0.173 to 0.407 mm. Some forms are so completely enveloped by supplementary chambers

and bullae that the initial trochoidal growth stage is not visible, giving the test a botryoidal appearance.

The number of chambers per whorl in the trochoid portion of the test is not constant, and two or, rarely, three whorls may be present. The trochoid chambers increase very little in size within a whorl, and each whorl is approximately twice the diameter of the previous whorl. In broken forms the ultimate chamber, rarely the penultimate, covers a slit-like or multiple-slit primary aperture. All chambers developed subsequent to the trochoid whorl are considered to be supplementary, and only the supplementary chambers and bullae contain the distinctive, rimmed, multiple apertures.

Type locality. *Polyperibola christiani* was found in brown, calcareous claystones, cropping out on the south side of the Lizard Road, between Rio Claro and Guayaguayare at coordinates N.191625 links, E.553063 links. Type sample: T.C.283/R.D.L.319.

Age. *Polyperibola christiani* is considered to have a restricted occurrence in the *Globorotalia acostaensis* Zone of the late Miocene.

Specimens are on deposit at the U.S. National Museum, Smithsonian Institution, Washington D.C., the British Museum of Natural History, London, and the Naturhistorisches Museum, Basel.

The generic name *Polyperibola* is Latin, meaning, "many enclosing features." The trivial name is after Mr. James T. Christian, colleague and discoverer of the type locality.

In the biostratigraphic analysis of the Krythea Formation of northern Cyprus, Baroz and Bizon (1974), illustrated a microfossil (Pl. 3, Fig. 19) restricted to one sample within the *Globorotalia acostaensis* Zone. The specimen was called "Indéterminé" and though no formal description was given it appears to be identical to *Polyperibola christiani*. This represents a likely occurrence of this species outside of the Caribbean

PLATE 1

1–9 *Polyperibola christiani* Liska n. gen., n. sp., bars between figures are 0.1 mm in length, the arrows denote the same chamber in different views. All figures $\times 170$.

- 1–3 Holotype. 1. Spiral view. 2. Side view. 3. Umbilical view. All views show supplementary chambers and bullae developed over the trochoid portion of the test. Only the supplementary chambers and bullae contain the multiple apertures. USNM 263990.
- 4, 5 Paratype, with several, tubular, intercameral bullae, developed on trochoid and supplementary chambers. 4. Spiral view. 5. Side view. BMNH P-50756.
- 6, 9 Paratype, simple form developing only two supplementary chambers. 6. Spiral view. 9. Side view.
- 7, 8 Paratype, showing two directional test growth along an axis normal to the trochoid axis. 7. Spiral view. 8. Side view. USNM 263991.

PLATE 2

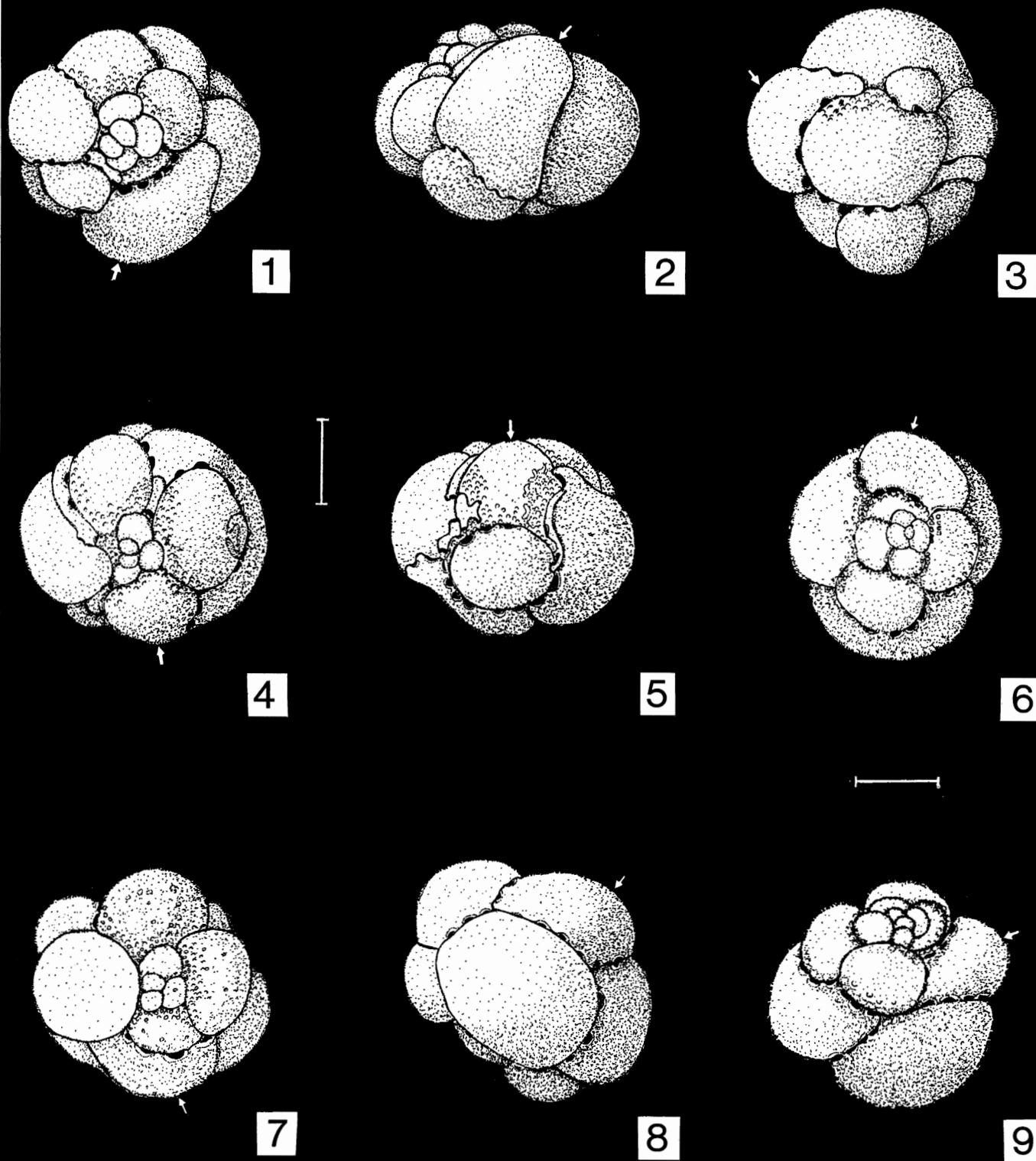
10–18 *Polyperibola christiani* Liska n. gen., n. sp.

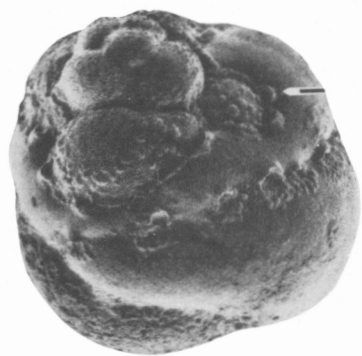
- 10, 11 Paratype. 10. Oblique spiral view, showing supplementary chambers overlapping each other as they envelop the trochoid whorl. Arrow designates apertures in Fig. 11. $\times 210$. 11. Sutural apertures, with imperforate rims. $\times 1550$. USNM 263992.
- 12 Paratype. Umbilical view, with single supplementary chamber girdling test. $\times 275$.
- 13, 14 Paratype. 13. Sutural aperture. $\times 1,550$. 14. Spiral view with a bulla over the initial whorl and supplementary chambers developed around the second trochoid whorl. $\times 210$.
- 15 Paratype. Oblique spiral view with proloculine area covered by supplementary chamber, $\times 175$.
- 16, 17 Paratype. 16. Imperforate rimmed apertures, $\times 1,550$. 17. Side view, trochoid portion of test completely enveloped by supplementary chambers. $\times 210$.
- 18 Paratype. Spiral view, with bulla and supplementary chambers covering initial whorl. $\times 200$.

PLATE 3

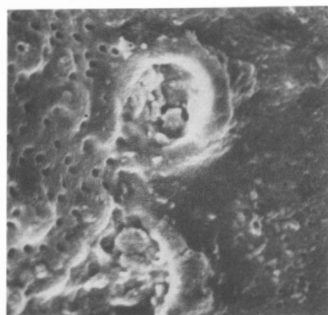
19–23 *Polyperibola christiani* Liska n. gen., n. sp.

- 19 Paratype. Oblique spiral view; single supplementary chamber surrounds trochoid whorls. $\times 200$.
- 20 Paratype. Oblique spiral view, with irregularly shaped supplementary chambers and bullae. $\times 200$.
- 21 Hypotype. Stereopair, spiral view, showing bullae along the sutures of the supplementary and trochoid chambers. $\times 100$.
- 22 Hypotype. Stereopair, umbilical view, a single supplementary chamber surrounds the test. $\times 150$.
- 23 Hypotype. Stereopair, spiral view showing two dimensional growth along an axis normal to the trochoid axis. Supplementary chambers and bullae are visible. $\times 100$.

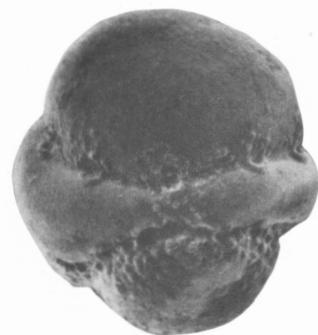




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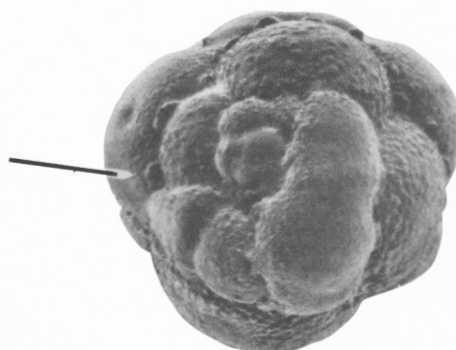
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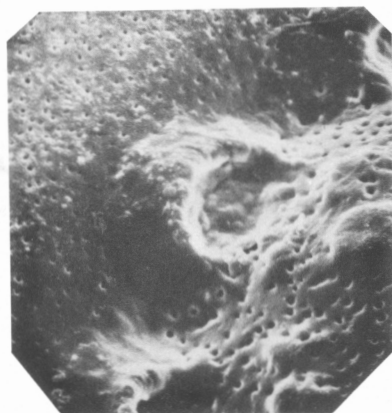
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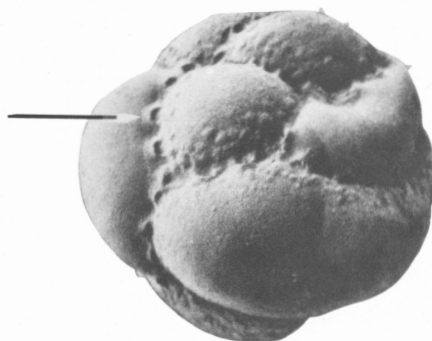
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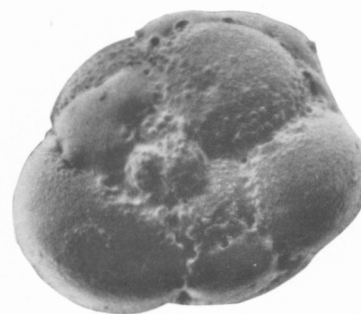
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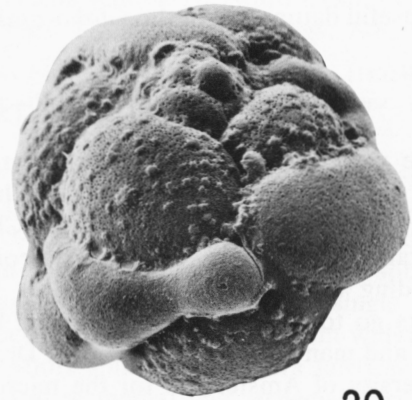
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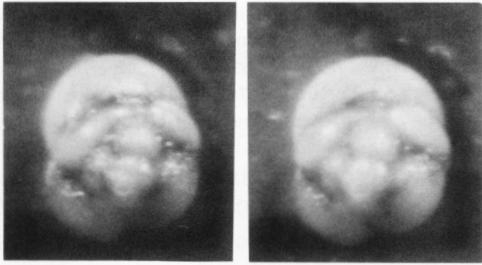
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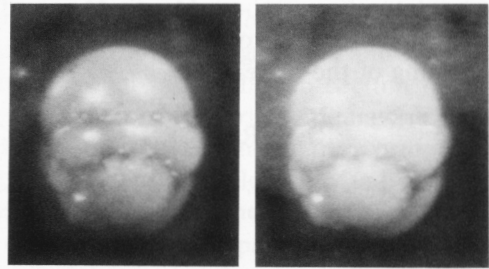
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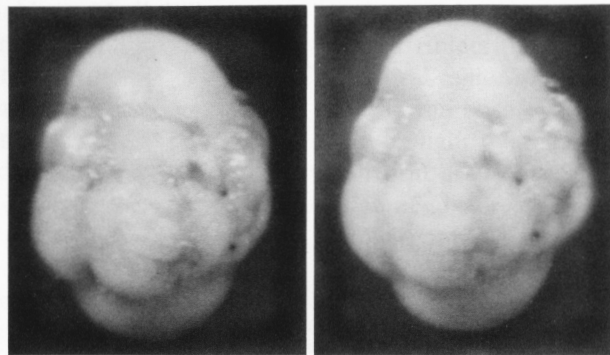
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region, and suggests that *Polyperibola christiani* may be a useful datum within the *Globorotalia acostaensis* Zone.

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