THE GENUS *VOORTHUYSENIELLA* (PROBLEMATICA) AT LITTLE STAVE CREEK, ALABAMA

DREW HAMAN and BARRY KOHL

CHEVRON OIL COMPANY, NEW ORLEANS
GEOLOGY DEPT., TULANE UNIVERSITY

I. ABSTRACT

The occurrence of the problematic genus *Voorthuyseniella* Szczechura, 1969, at Little Stave Creek, Alabama, is discussed. Observations are made on the stratigraphic range, paleoenvironmental associations, and possible affinities of this taxon. A new species, *Voorthuyseniella stavensis,* is established.

II. INTRODUCTION

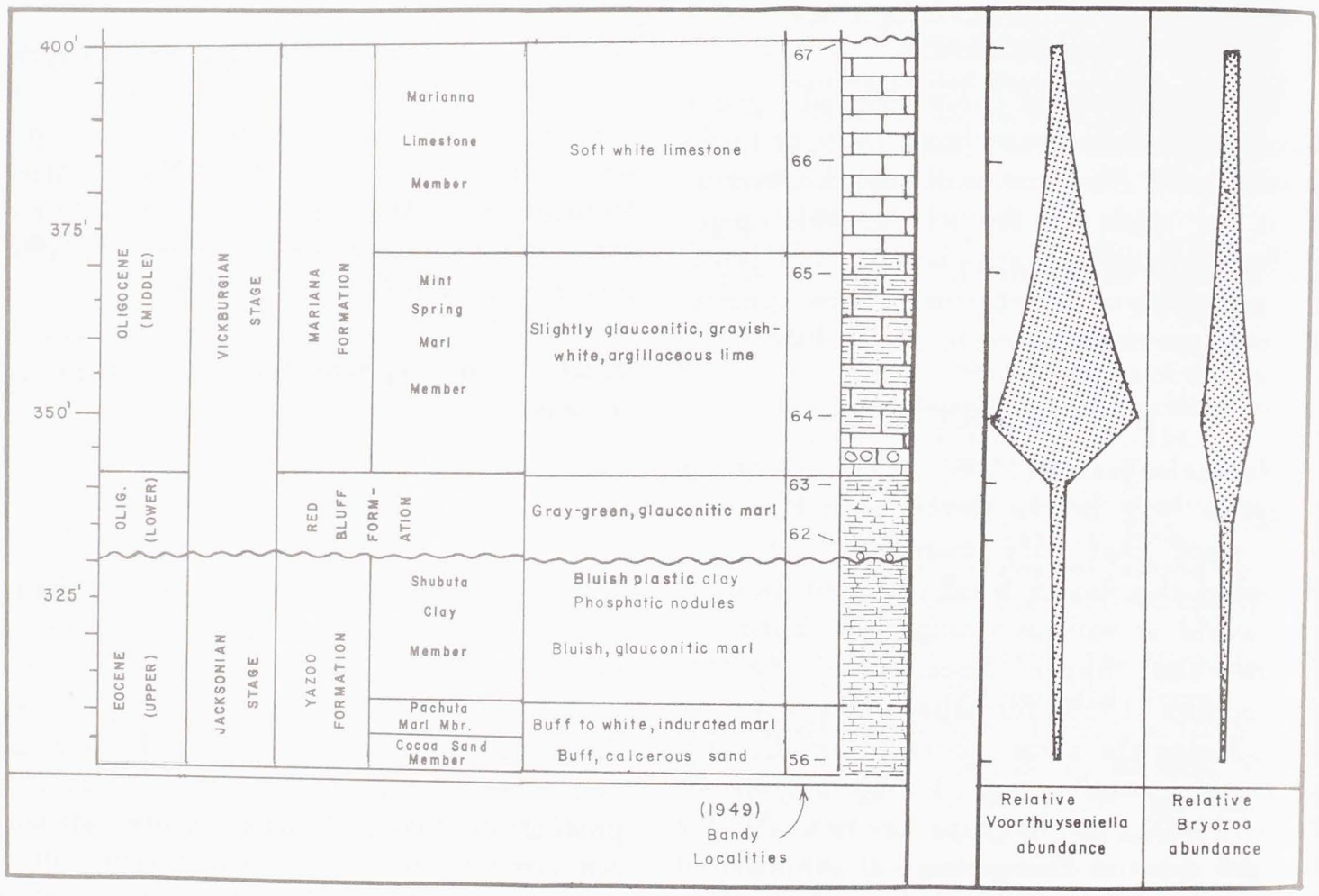
Voorthuysen (1949) first recorded "*Lagena*" - *x* in the Netherlands Pliocene, and since that date many authors have recorded this taxon from different parts of the world at various stratigraphic horizons, from the upper Eocene to Recent. Szczechura (1969) formalized this taxon by introducing the name *Voorthuyseniella* with *V. lageniformae* n. sp. *(V. lageniformis* of Keij, 1970), as the type species. All the known data on this genus was summarized and evaluated in a detailed article by Keij (1970).

Keij *(ibid.)* was the first to record *Voorthuyseniella* from the Gulf Coast province, recording three species. *Voorthuyseniella occidentalis* Keij, from the Gulf of Mexico, occurred at N28°33', W94°12'15" (36 meters depth); N28°37'10", W94°13'15" (33 meters depth); N28°42'15", W94°01'30" (28 meters depth); and N28°13', W94° (29 meters depth). A type locality was selected for this species at N28°43'15", W94°15' (27 meters depth with a silty clay bottom). Occurrence was common to abundant (180+ specimens) and was regarded as Recent in age. A single test of *Voorthuyseniella* cf. *irregularis* Keij, was noted in the basal Red Bluff Formation at Shubuta Hill, Wayne County, Mississippi. Four specimens of *Voorthuyseniella ablabamensis* Keij, n. sp., were reported from the Mint Spring Marl Member of the Marianna Formation at Little Stave Creek. A single specimen of this species was noted in the Red Bluff Formation at the Lone Star Cement Company Quarry at St. Stephens Bluff on the Tombigbee River.

III. DISCUSSION

The description of *V. alabamensis* from Little Stave Creek by Keij prompted us to further examine selected samples from this locality in order to determine, if possible, the stratigraphic range, paleoenvironmental associations, and possible affinities of this problematic taxon. Prescise locality data was not given by Keij for *V. alabamensis,* other than simply from the Mint Spring Marl member of the Marianna Limestone. We examined samples from the following Bandy (1949) localities: 67 to 61 (inclusive), 56, 54, 45, 42, 35, 33, 21, 9, 8. These localities represent the stratigraphic units of the Little Stave Creek section as indicated below:

Stratigraphic Unit	Bandy localities
Marianna Formation	
Marianna Limestone Member	67, 66
Mint Spring Marl Member	65, 64
Red Bluff Formation	63-61
Yazoo Formation	
Cocoa Sand Member	56
North Twistwood Creek Clay Member	54
Moodys Branch Formation	45, 42
Gosport Formation	35
Lisbon Formation	33, 21
Tallahatta Formation	9, 8



Text-figure 1. Little Stave Creek stratigraphic section with samples containing *Voorthuyseniella* indicated. Relative occurrence of *Voorthuyseniella* and bryozoa plotted for each sample. Modified after Bandy, 1949.

Of these samples only samples 67-62 and 56 contained *Voorthuyseniella* specimens. Over 175 specimens were retrieved in varying abundances from these seven samples (a total volume of approximately 50 ml of dry residue). The stratigraphic range of *Voorthuyseniella* in Little Stave Creek is determined to be from the Cocoa Sand

PLATE 1

VOORTHUYSENIELLA ALABAMENSIS Keij
(Bar = 100 microns)

Figs. 1, 2 Locality #67. (1) Side view (2) portal view; same specimen.
Figs. 3-5 Locality #66. (3) Side view (4) portal view
(5) View to 'A' lateral aperture; same specimen.
Fig. 6 Locality #66. View of tubus and tubus pore.
Fig. 7 Locality #66. View of tubus and tubus pore.
Fig. 8 Locality #64. View of tubus and tubus pore.
Figs. 9, 10 Locality #66. (9) Side view (10) Portal view; same specimen.

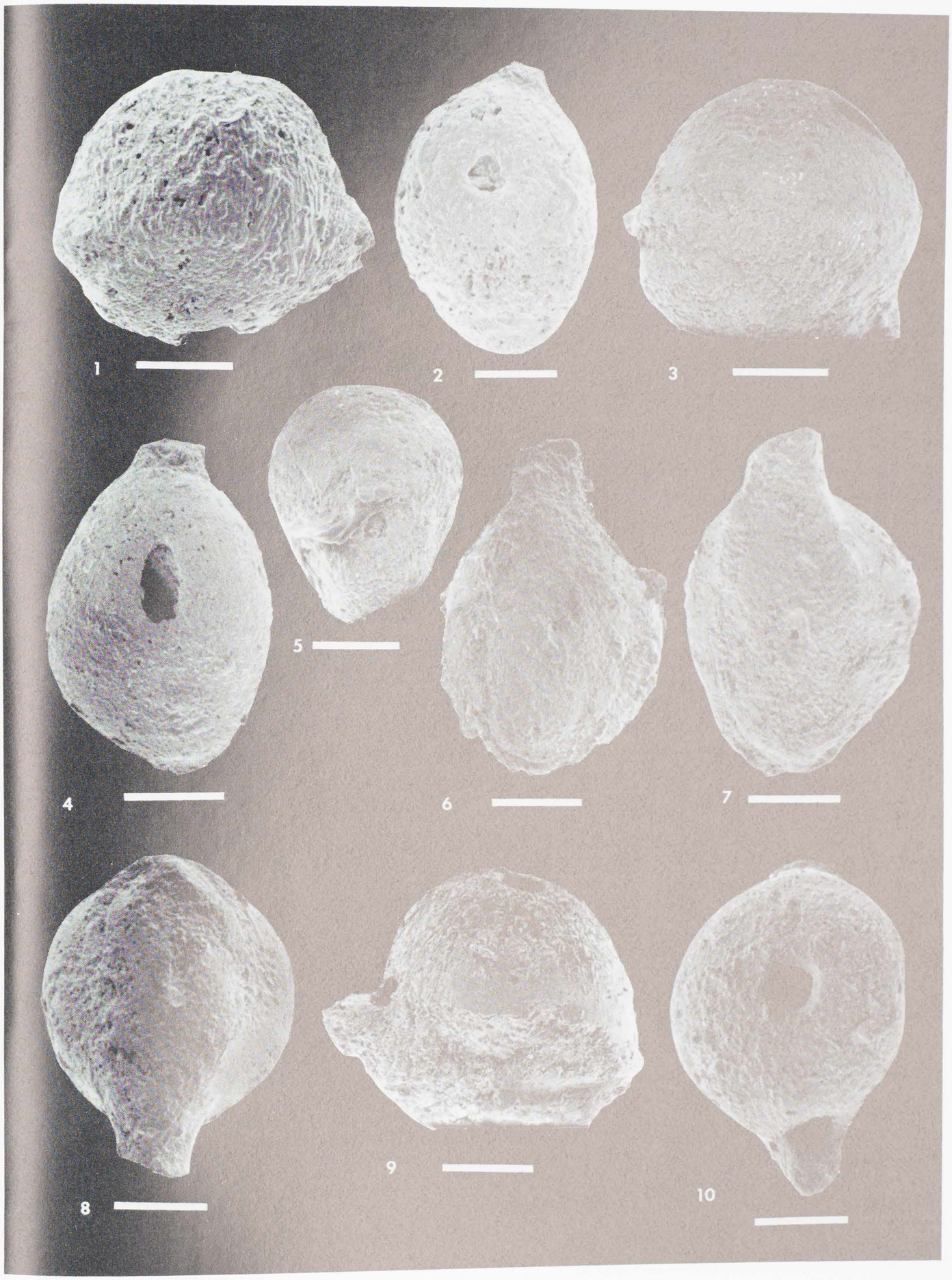
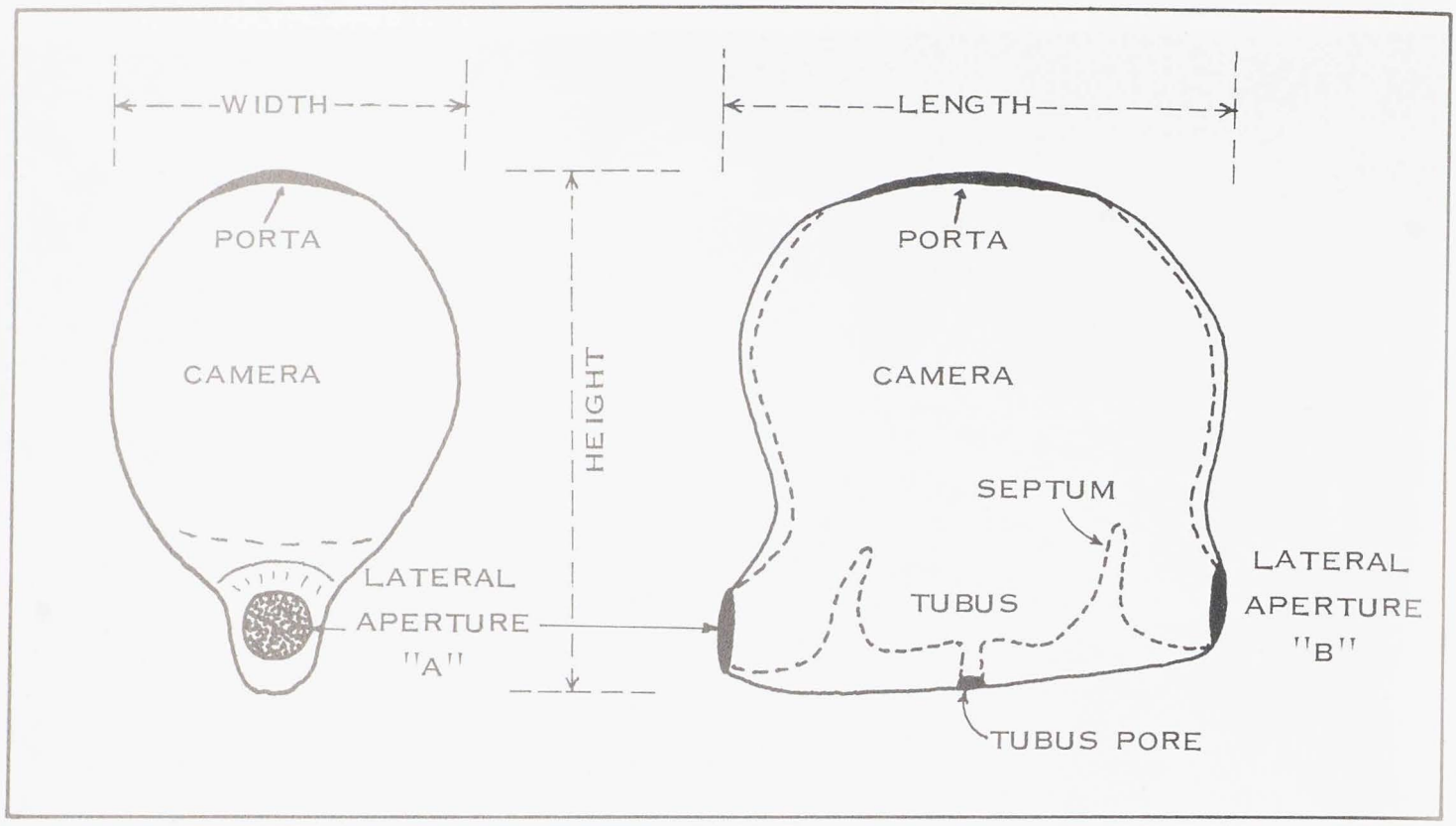


PLATE 1



Text-figure 2. Orientation and taxonomic morphology of *Voorthuyseniella* test (after Szczechura, 1969, and Keij, 1970).

Member of the Yazoo Formation (U. Eocene) to the Marianna Limestone Member of the Marianna Formation (M. Oligocene).

A number of stratigraphers including MacNeil (1944), Cheetham (1957), Murray (1961), Deboo (1965), Howe (1970), and Howe and Howe (1973), have commented on the Eocene-Oligocene boundary (Jackson-Vicksburg) in this area. Stratigraphic terminology utilized in this report is based partially on the works of these authors and also on Field Trip Guides published by the Gulf Coast Association of Geological Societies in particular those of 1962 and 1975. Blow (1969) indicates that in Little Stave Creek an unconformity exists at the base of the Red Bluff Formation, resulting in the absence of Zone P17 *(Globigerina gortanii gortanii–Globorotalia (Turborotalia) centralis* Partial range zone). Although this unconformity was not recognized by Bandy, he did note some features that might result from an unconformity. For example, he commented on the Red Bluff "Clay" as containing a fauna which "is a transitional assemblage with numerous mixed Oligocene and Eocene forms" (1949, p. 44). Further, in his summary (p. 47) he noted the presence of the "good index markers" for the Eocene, *Planulina cocoaensis, Palmula henbesti,* and *Hantkenina alabamensis,* in Oligocene strata. He postulated an extension of the species' vertical ranges for these anomalous occurrences, rather than regarding them as reworked elements at an unconformity. We believe the observations of

PLATE 2

VOORTHUYSENIELLA ALABAMENSIS Keij
(Bar = 100 microns)

Figs. 1, 2 Locality #64. (1) Portal view (2) Side view; same specimen.
Fig. 3 Locality #64. View of tubus and tubus pore.
Figs. 4, 5 Locality #64. (4) Side view (5) Portal view; same specimen.
Figs. 6, 7 Locality #64. (6) Side view (7) View to 'B' lateral aperture; same specimen.
Figs. 8, 9 St. Stephens Bluff. (8) Oblique side view (9) Portal view; same specimen.

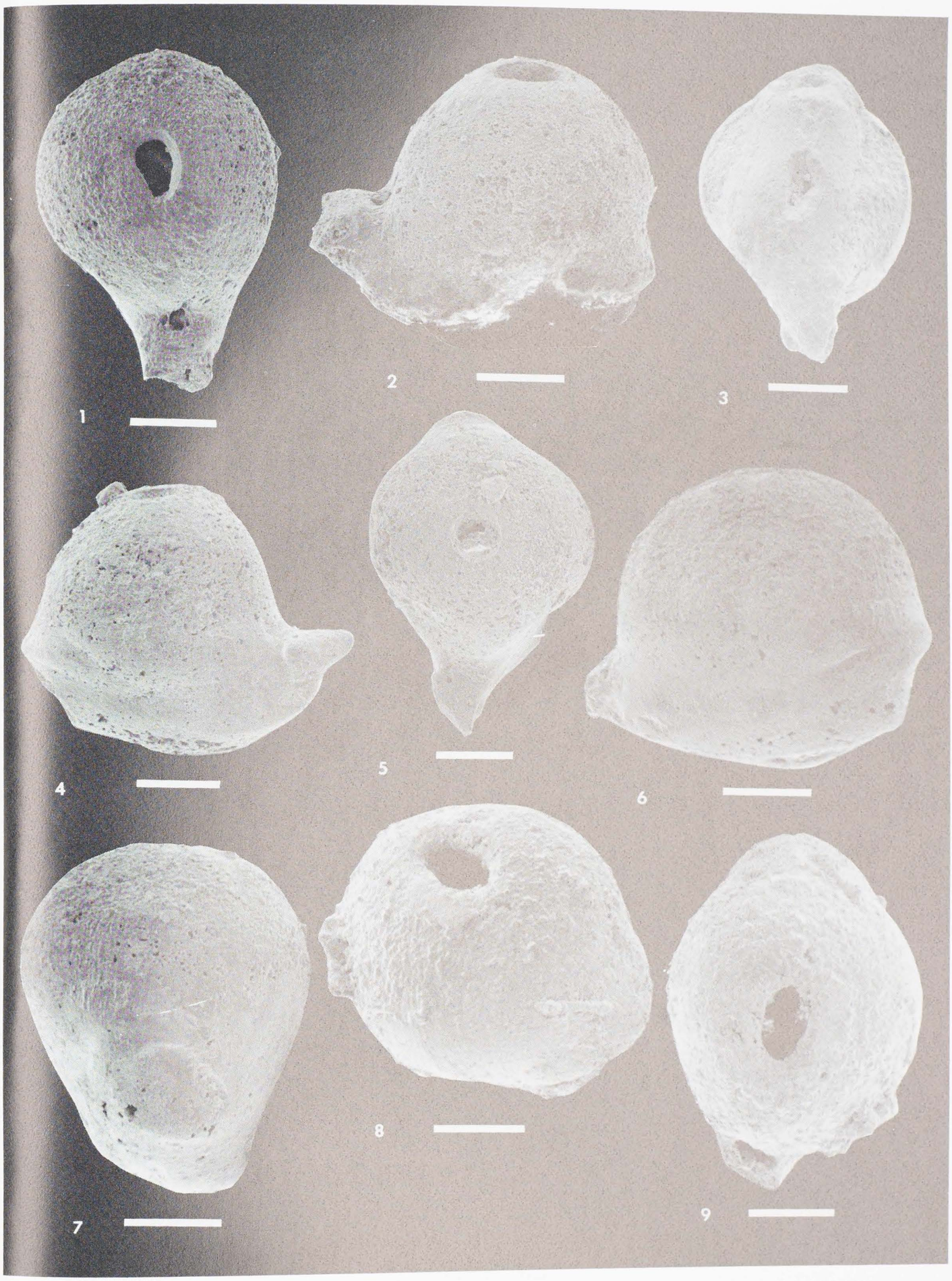
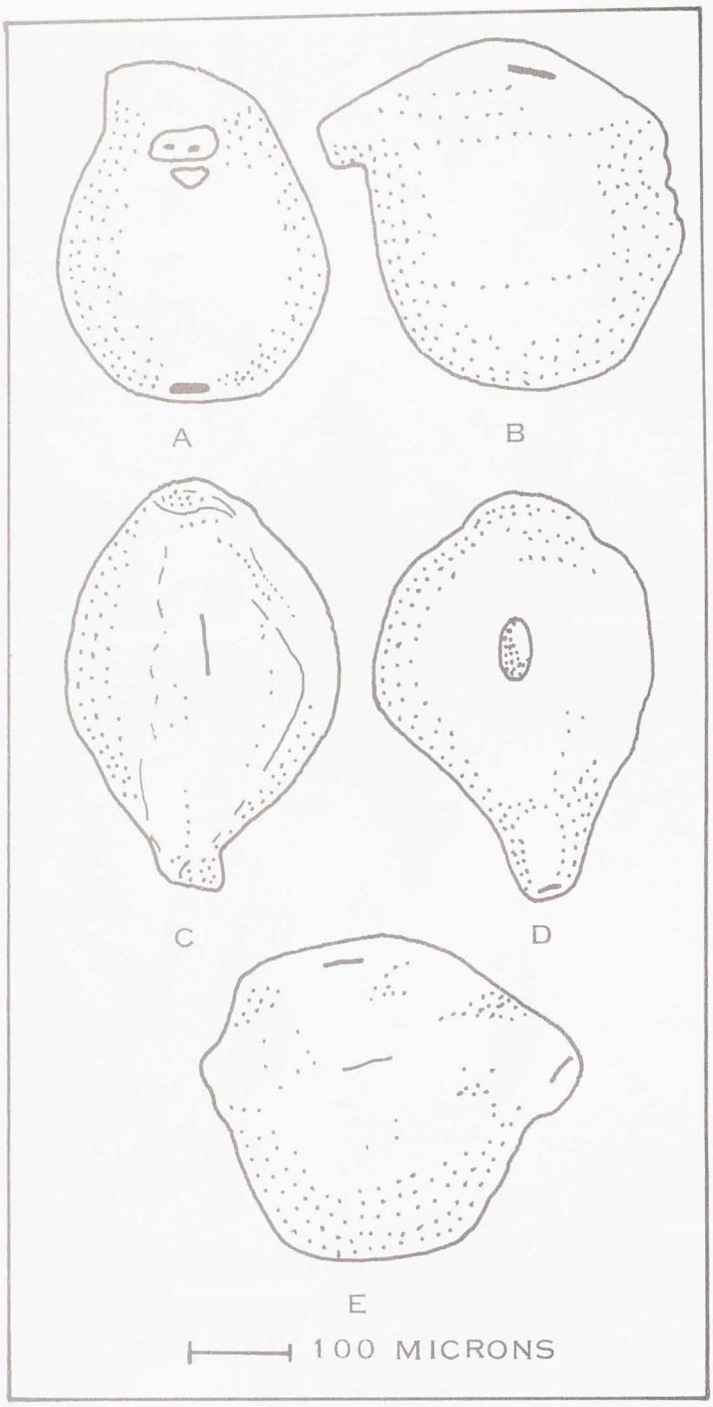


PLATE 2



Text-figure 3. *Voorthuyseniella alabamensis* (Holotype), a, – end view, b, e, – lateral view, c, – dorsal, d, – ventral view. Redrawn from Keij, (1970).

Bandy, instead, tend to substantiate the postulated unconformity (Blow, 1969) at the base of the Red Bluff Formation.

Consequently, the presently determined stratigraphic range of *Voorthuyseniella* in Little Stave Creek may not be a complete range, but merely represents the observed range in the examined section. Text-figure 1 illustrates the range of *Voorthuyseniella* in the Little Stave Creek section and its relative abundance in samples from which it was retrieved.

We have examined a sample from the Red Bluff Formation, St. Stephen's Bluff, which approximates the Red Bluff sample from which Keij obtained a single specimen of this species. Our sample yielded only an additional two specimens of this species. Keij noted that his single Red Bluff specimen was identical to those from the Marianna Limestone Member but was somewhat smaller in size. We agree with this observation.

Bandy regarded the foraminiferal fauna at Little Stave Creek, (samples 56-57), as having been deposited in a predominately warm, shallow sea with relatively little turbidity. Other worldwide occurrences of *Voorthuyseniella* similarly indicate a shallow water environment for this genus, see Huang (1962), Wozny (1966), Kummerle and Gunawardena (1967), Szczechura (1969), and Keij (1970).

The amount of bryozoan detritus in the Little Stave Creek samples is considerable, but varies with the sample. The abundance of *Voorthuyseniella* appears to correlate with the abundance of bryozoan debris present in each sample (see Text-fig. 1) and bryozoa have been recorded in association with *Voorthuyseniella* from other localities as well (Voorthuysen, 1953; Keij, 1965; Wozny, 1966; Szczechura, 1969). Although this relationship is striking in our samples we do not wish to propose any affinity between *Voorthuyseniella* and the bryozoa, other than a similarity of environmental require-

PLATE 3

VOORTHUYSENIELLA STAVENSIS n. sp.
(Bar = 100 microns)

Figs. 1, 2 Locality #64. (1) Side view (2) Portal view; same specimen.
Figs. 3, 4 Locality #64. (3) Side view (4) Portal view; same specimen.
Fig. 5 Locality #64. Side view.
Fig. 6 Locality #64. Portal view.

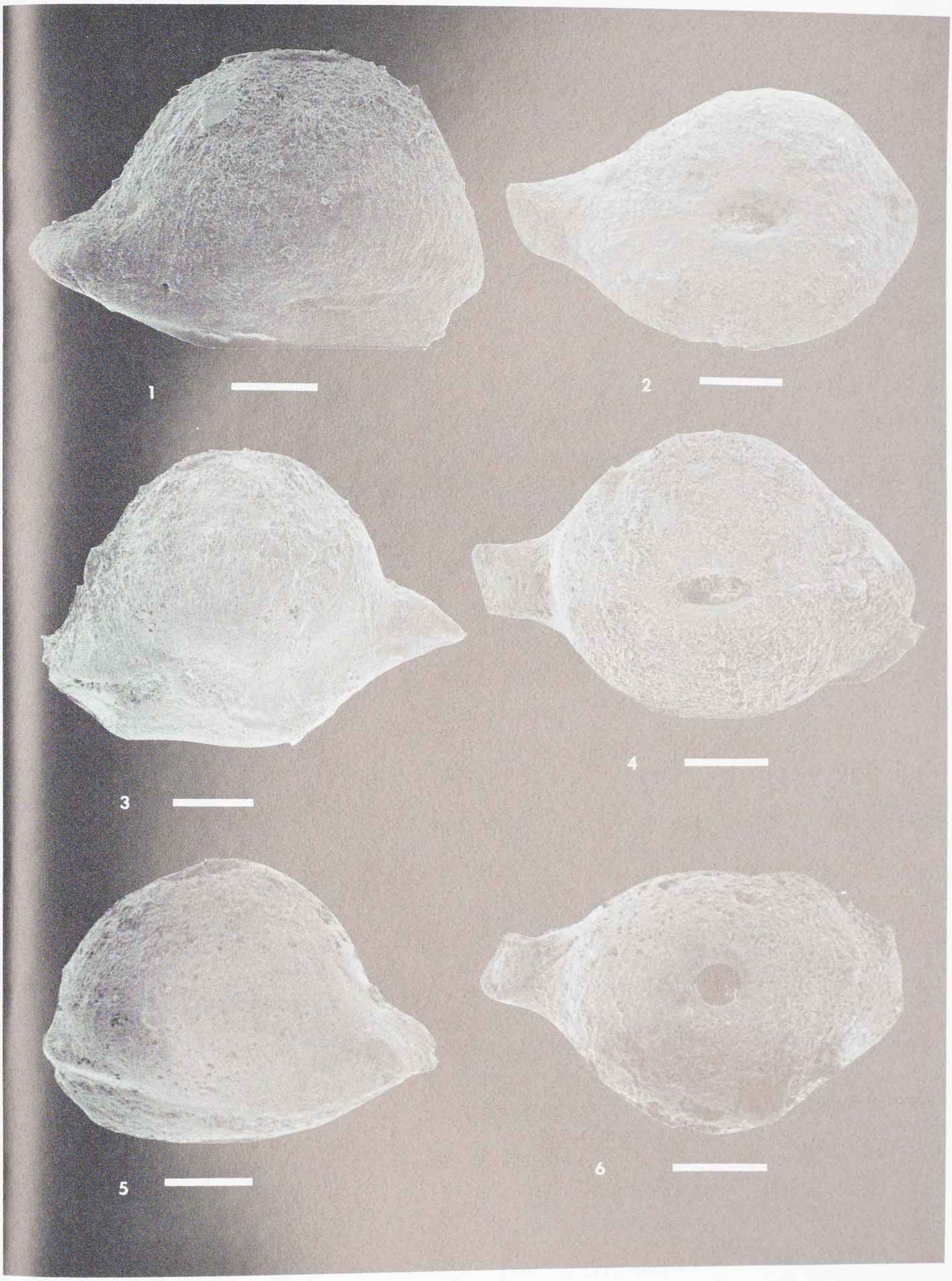
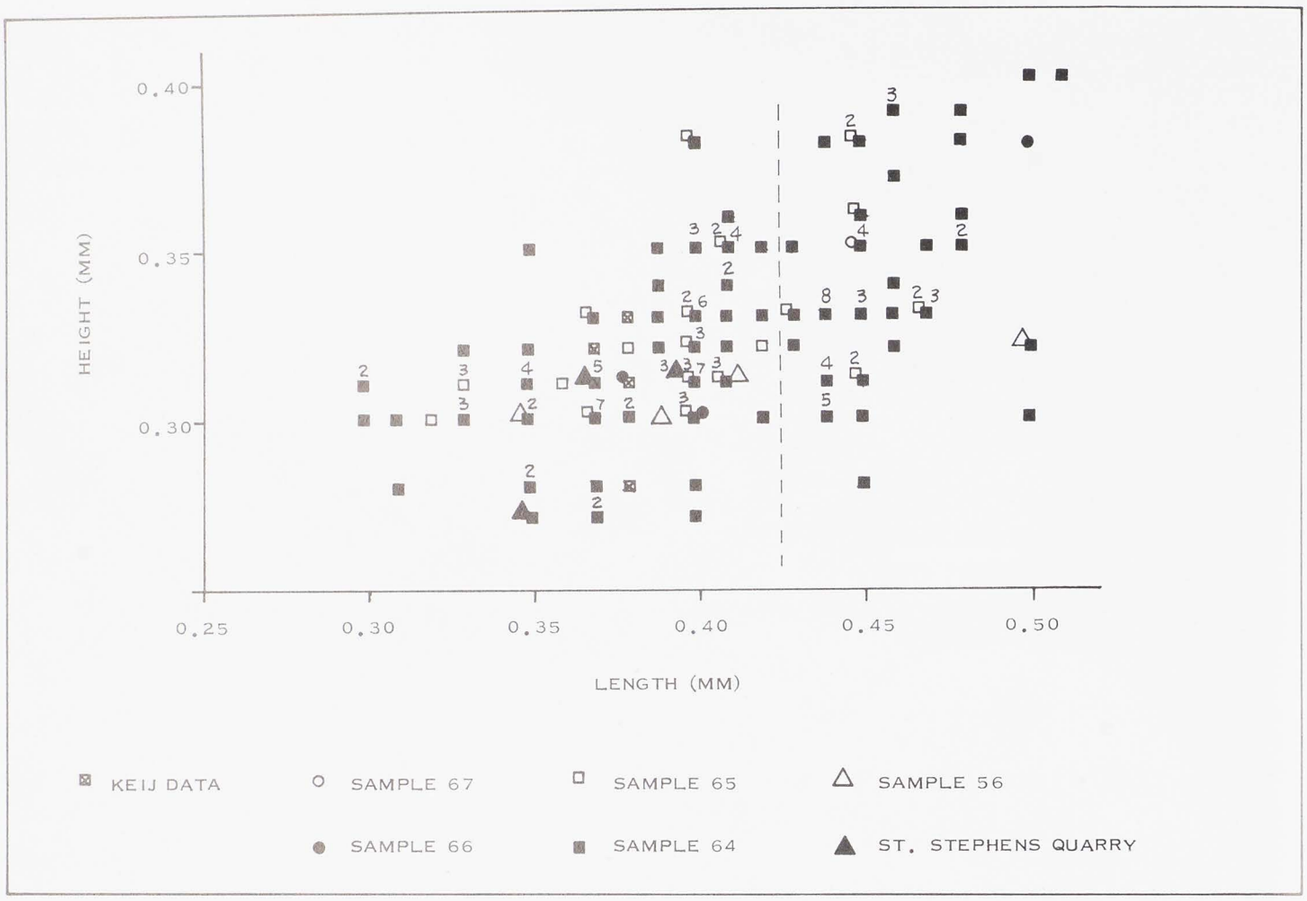


PLATE 3



Text-figure 4. Data plot, length and height, of measurements of *Voorthuyseniella* from Little Stave Creek, and St. Stephens Bluff (dotted line indicates group differentiation).

ments. Systematic affinities to the Echinodermata, Bryozoa, Crustacea, and Foraminifera have been postulated, the strongest being that it has "an approach to the Protozoa" (Szczechura, 1969, p. 82). Keij (1970, p. 480) presents a concise summary of the problematic affinities of this taxon. We feel, as does Keij, that "no positive statement can be made about the systematic position of *Voorthuyseniella.*"

IV. SYSTEMATIC DESCRIPTIONS

Test orientation, morphologic terms and measurement terminology used in this report is based on Szczechura (1969, pl. 2, figs. 1a, 1b) and Keij (1970, text-figure 1).

VOORTHUYSENIELLA ALABAMENSIS Keij, 1970

Plate 1, figs. 1-10; Plate 2, figs. 1-9

Voorthuyseniella alabamensis KEIJ, 1970, Koninkl. Nederl. Akad. Weten., Proc., (Ser. B), vol. 73, p. 487, pl. 8, figs. 1,2.

As the concise article by Keij may not be readily accessible, his description and type figures of *Voorthuyseniella alabamensis* are here reproduced (see Text-figure 3).

"Diagnosis: Tests highly asymmetrical. Tubus surface flat and sloping to one side, with a spout-like extension over "A" lateral aperture. Tubus pore slit-like.

"Description: Test highly asymmetrical, teapot-like in side view because of the spout-like

PLATE 4

VOORTHUYSENIELLA STAVENSIS n. sp.
(Bar = 100 microns)

Figs. 1-4 Locality #64. Holotype. (1) Side view (2) Portal view (3) Oblique side view with Tubus pore (4) View to 'A' lateral aperture.

Figs. 5, 6 Locality #66. (5) Side view (6) Portal view; same specimen, porta infilled.

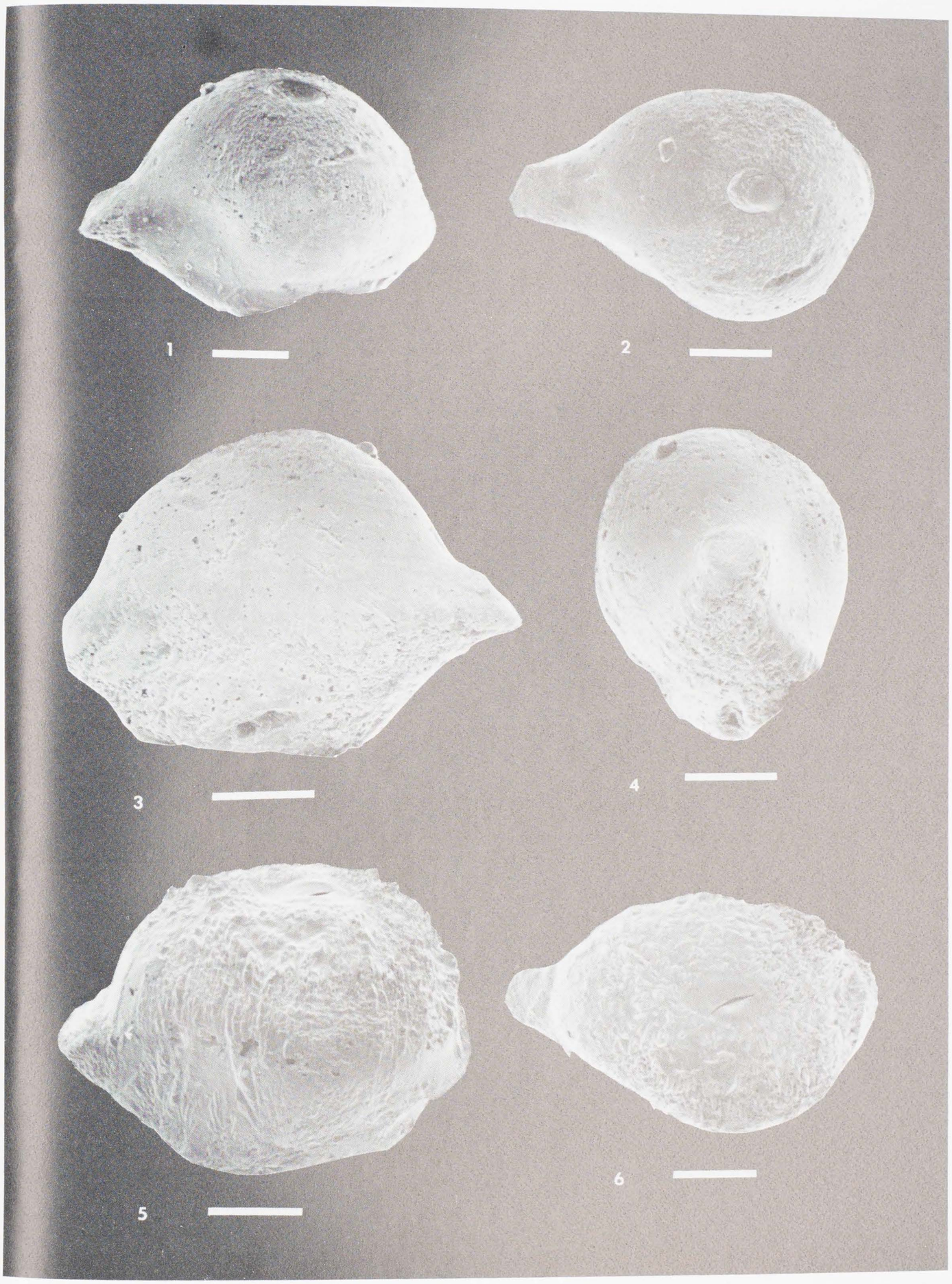
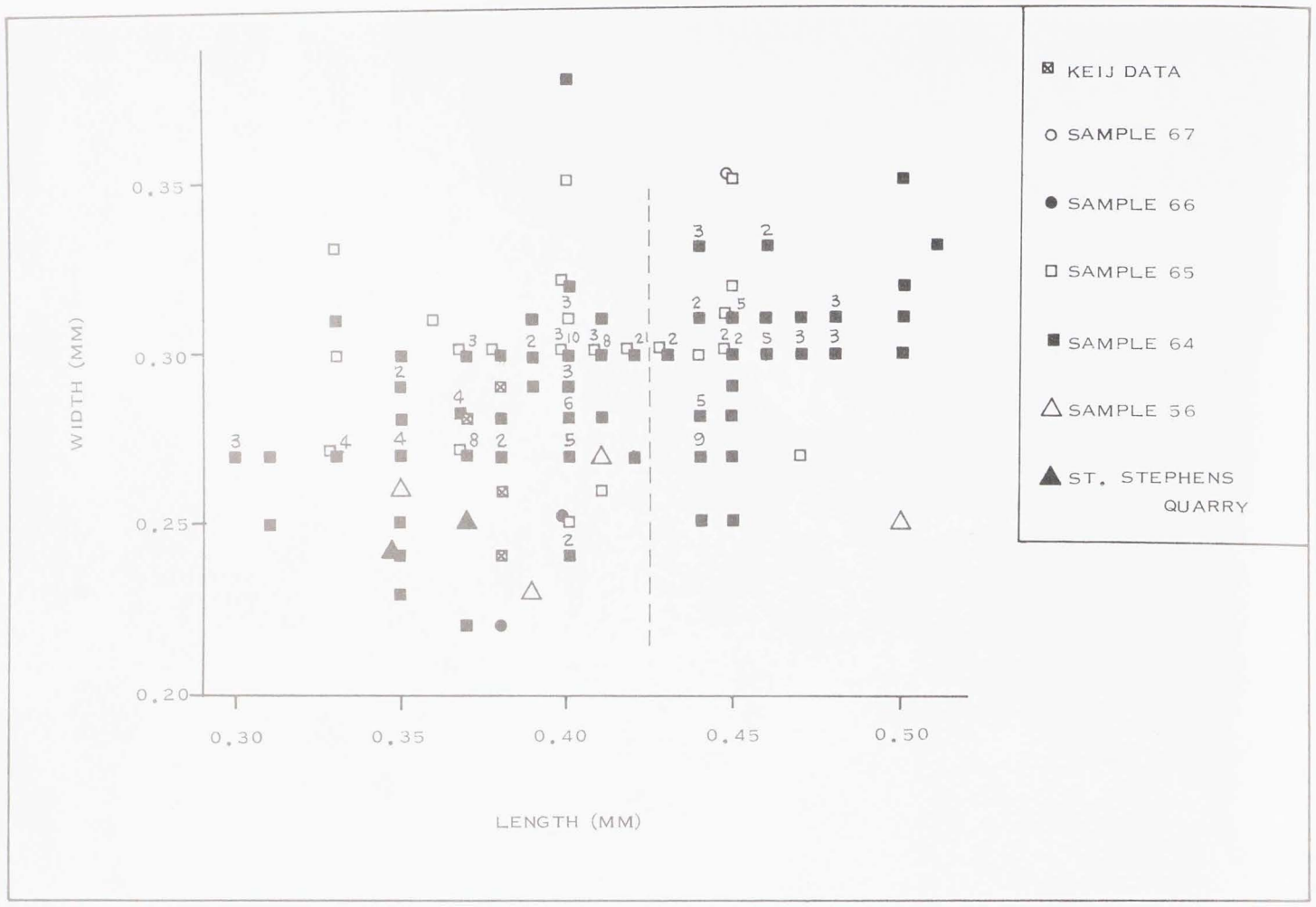


PLATE 4



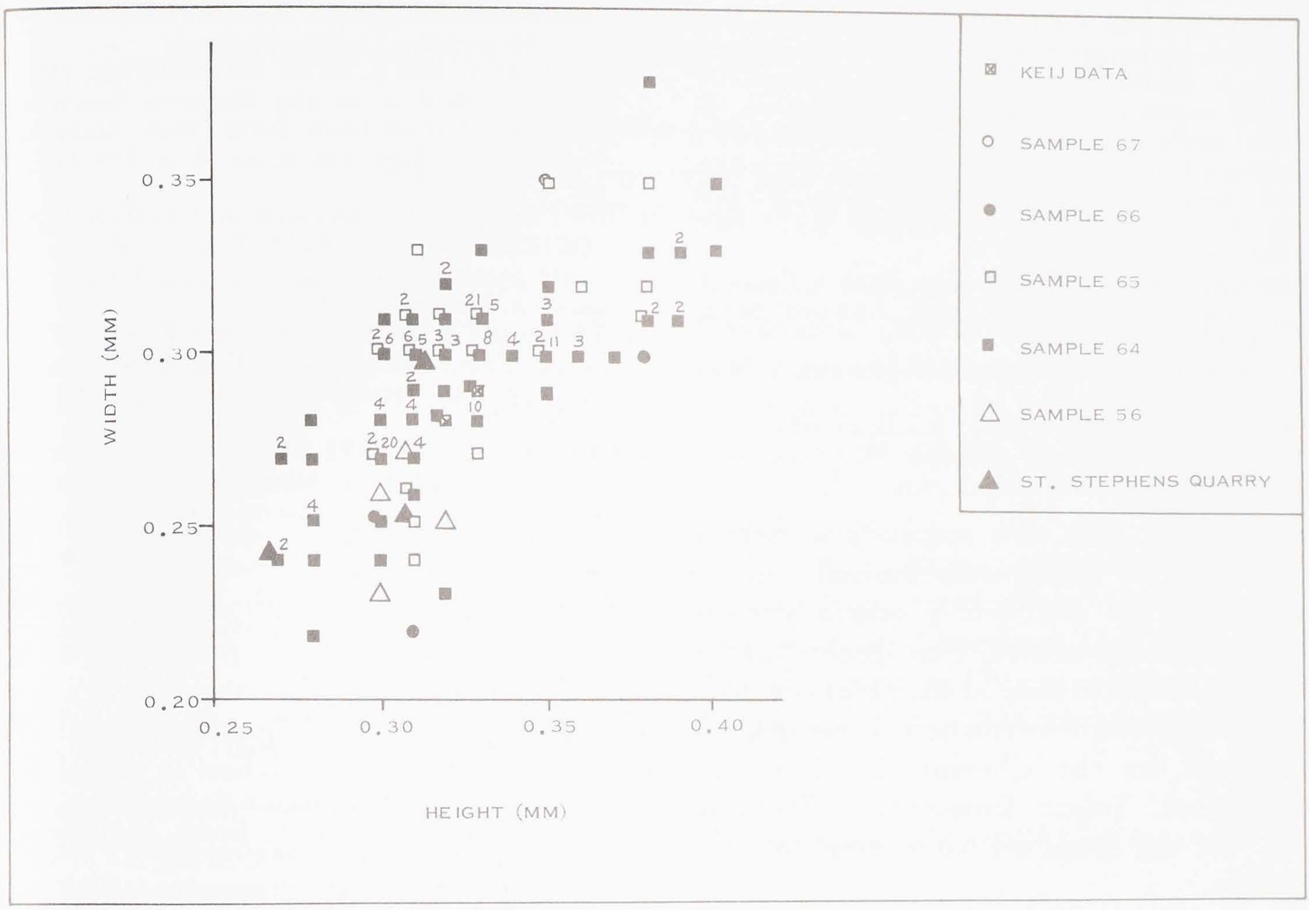
Text-figure 5. Data plot, length and width, of measurements of *Voorthuyseniella* from Little Stave Creek and St. Stephens Bluff (dotted line indicates group differentiation).

extension overhanging the 'A' lateral aperture. Seen from above the test appears to be twisted, no two tests being the same. The test is widest below the middle, the tubus surface is sloping to one side, making the test much higher on one side than the other. Concave areas occur below the highest point and around the lateral extension. The boundary between the tubus and the camera is rather sharply delimited especially near the spout-like extension. The tubus pore is situated below the culmination and is slit-like. The porta is elliptical to circular.

"The 'A' lateral aperture below the overhanging extension is semicircular [fig. A]. The 'B' lateral aperture is circular and lies excentrically in a roughly circular area surrounded by a low and irregular rim [fig. B]. The surface is smooth and shiny." (Keij, 1970, p. 487).

Discussion: Various measurements are plotted on Text-figures 4, 5, 6, for the 175 specimens of *Voorthuyseniella* that we have obtained from Little Stave Creek. The dimensions of Keij's specimens also are included on these text-figures. Two size groupings of the specimens are evident from Text-figures 4 and 5. In Text-figure 4 one size cluster is below 0.425 mm in length, and another cluster has lengths greater than that dimension. A slight increase in test height corresponds to an increase in length, but this is not a marked feature. The specimens of Keij fall within the group of shorter lengths. Text-figure 5 is similar but does not show an appreciable width increase with greater test length. Text-figure 6 shows a distinct cluster in the size range of 0.27-0.32 mm (width) and 0.30-0.35 mm (height) and, although a number of plots fall outside this cluster, the width to height ratio appears to remain constant.

Test dimensions and general appearance allow differentation of two readily recognizable groups. The first group, characterized by a short, compact test, as illustrated on Plates 1 and 2, includes *Voorthuyseniella alabamensis* s.s. The second group has a more elongate, fusiform, or spindle shaped test. Although the height and width are reasonably constant in both groups, the greater test elongation of this group distinctly affects the test appearance (Plates 3 and 4). No biostratigraphic control is indicated as specimens of each group were obtained from the same samples.



Text-figure 6. Data plot, height and width, of measurements of *Voorthuyseniella* from Little Stave Creek and St. Stephens Bluff.

In a problematic taxon such as *Voorthuyseniella,* for which the nature of the organism and its affinities are unknown, we were hesitant to formally separate the two groups by description of another taxon. However, as Keij *(ibid.)* differentiated *Voorthuyseniella cornudensis cornudensis* and *V. cornudensis cruciformis* basically on text elongation, i.e., length-width ratio. It appears prudent to taxonomically separate, in a similar manner, the groups under discussion. *Voorthuyseniella alabamensis* is restricted to include only the group with the shorter, more compact test, and *Voorthuyseniella stavensis* n. sp. is herein proposed for the longer more spindle-like forms.

Keij reports a twisting to the test when viewed from above. This feature is present (Pl. 1, fig. 10; Pl. 2, fig. 5), but is emphasized by asymmetric cameral (main chamber) inflation, which in fact may cause the twisting (Pl. 1, fig. 4; Pl. 2, fig. 1). A similar feature is exhibited by *V. stavensis.*

The test surface of *V. alabamensis* is reported as smooth and shiny by Keij. Instead of being smooth and shiny, our calcareous specimens illustrate solution effects to a varying extent. The greatest amount of test dissolution occurs on the camera, the tubus showing a lesser degree of solution. This feature may indicate a difference in test chemistry, or may be suggestive of a mode of life (tubus area covered?). Tests of *V. stavensis* illustrate similar differential solution. Hypotypes of this taxon are deposited in the Chevron Oil Company Collections, Tulane University Collections, and in the personal collections of the authors.

VOORTHUYSENIELLA STAVENSIS n. sp.

Plate 3, figs. 1-6; Plate 4, figs. 1-6

Description: Test calcareous, unilocular, asymmetrical, sub-hemispherical in side view. Spout-like extension overhangs the 'A' lateral aperture. Test is widest at or just below the middle. Camera shows asymmetric inflation and slight twisting when viewed from above. Tubus surface slopes to one side, with one side of the test higher than the other. Concave areas occur at the base of the

camera and below the spout-like extension. The junction of the tubus and the camera is distinct. Porta is circular to slit-like, variable in shape. 'A' lateral aperture is semi-circular to circular, 'B' lateral aperture is circular and is surrounded by a roughened rim. Tubus pore is elliptical to slit-like. Test surface dull, roughened, and shows solution effects. Length of test greater than 0.425 mm, width and height variable.

Holotype: D. Haman collection; Plate 4, figs. 1-4.

Type locality: Little Stave Creek, Alabama, Bandy (1949) locality #64

Type stratum: Mint Spring Marl Member of Marianna Limestone

Distribution: Bandy (1949) localities 67-62, 56. Little Stave Creek, Alabama. (U. Eocene—M. Oligocene)

Remarks: This new species is differentiated from *V. alabamensis* basically on the length of the test and a generally more spindle-like appearance. This species has not been recorded to date at St. Stephens Bluff in the Red Bluff Formation. Paratypes are deposited in the Chevron Oil Company Collections, Tulane University Collections, and in the personal collections of the authors.

V. ACKNOWLEDGMENTS

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