A portion of this oil was observed with the aid of a light microscope. Several very interesting structures were found indicating the oil is of possible biologic origin.

The remaining oil was then distilled into 5 fractions; 0-120 degrees, 120-160 degrees, 160-200 degrees, 200-250 degrees, and above 250 degrees Centigrade. These fractions wer analyzed with the use of IR, GC, NMR, and AA.

The results showed that the oil was composed primarily of aliphatic hydrocarbons. The per cent of S in the oil was also determined.

Comparison of the Persulfate and Sulfuric Acid-Nitric Acid Digestion Procedures for Analysis of Phosphorus in Water. David Ziegler, Carson-Newman College and Mike Readnour, Southeast Missouri State University (15 min.)

The sulfuric acid-nitric acid and the persulfate digestion methods for the determination of total phosphorus as outlined in "Standard Methods for the Examination of Water and Wastewater" were compared. The persulfate digestion procedure did not give as good recovery of phosphorus as the sulfuric acid-nitric acid method did on the samples tested.

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AN UPPER ORDOVICIAN SKELETAL SANDBAR DEPOSIT IN THE FERNVALE LIMESTONE, DADE COUNTY, GEORGIA

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ABSTRACT

Red and gray mixtures of interlensing calcirudites (biomicrites and biosparites) of the Fernvale Member of the Upper Ordovician Shellmound Formation near Interstate 24 in Dade County, Georgia are composed of laminated, poorly sorted, partially winnowed bryozoan, echinoderm and brachiopod debris associated with red and green shale laminae. These sediments are interpreted as having been deposited in an intertidal skeletal sandbar environment. Red and gray colors probably indicate relative degrees of subaerial oxidation of iron-bearing sediments. Dolomite, probably penecontemporaneous, occurs in the micritic phase of these limestones. Debris from nearby bryozoan thickets and crinoidal(?) meadows likely enabled continued growth of this skeletal sandbar.

INTRODUCTION

An exposure of the Upper Ordovician Fernvale Member of the Shellmound Formation (Milici, 1972) is located in Dade Co., Georgia along Georgia Route 298, near Interstate 24 (Fig. 1).

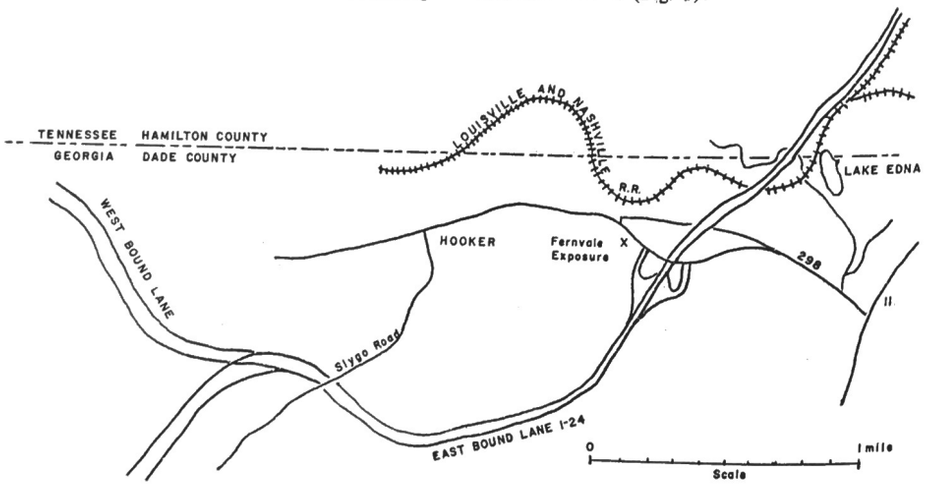

FIG. 1: *Location of Fernvale Limestone Exposure Near I-24, Dade County, Georgia.*

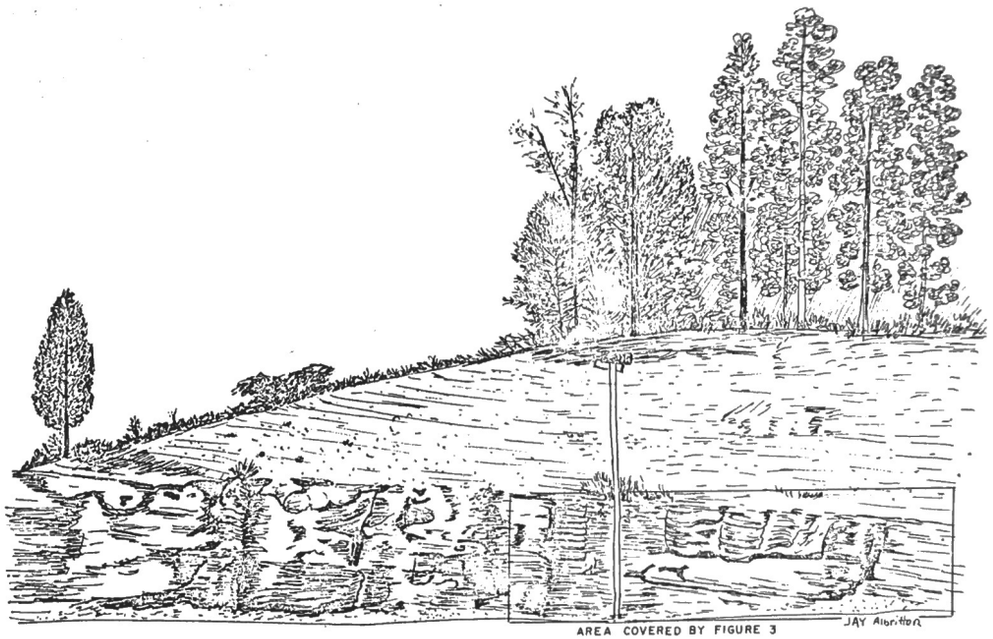

Fig. 2: *Artist's Sketch of Fernvale Limestone Exposed in Parking Lot Near I-24.*

Figure 2 is an artist's sketch of the exposure. Figure 3 is a detailed drawing showing the geometry of bedded units in the Fernvale as well as the location of ten carbonate rock samples that were slabbed and thin-sectioned (Appendix). The area shown in Figure 3 is marked off on Figure 2.

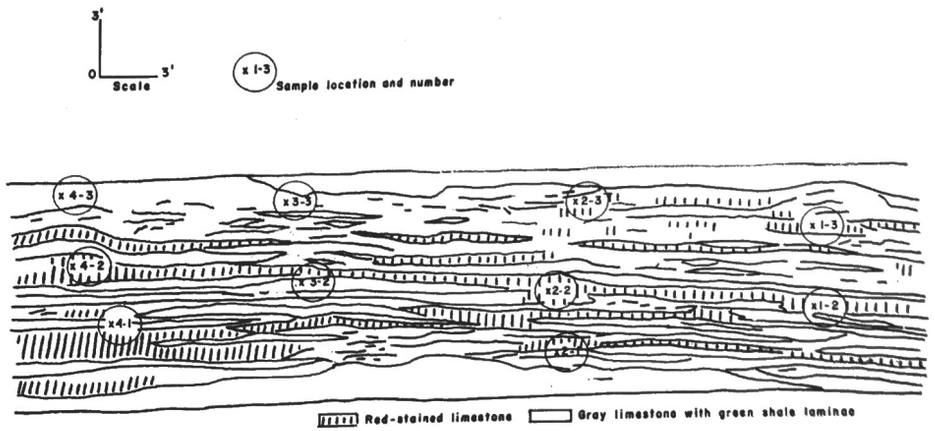

Fig. 3: *Gray and Red-stained Lenses of Fernvale Calcirudite, Dade County, Georgia.*

The purpose of this study is to show the sedimentary conditions that existed during accumulation of some Fernvale carbonate rocks.

This exposure of the Fernvale ranges from 8 to 10 feet in thickness, and consists of mixed red and gray calcirudites, composed largely of bryozoan, echinoderm, and brachiopod debris, that are interlensed (laminated within the lenses), and ripple-marked. Anastomosing green shale laminae in the gray calcirudites are in the form of poorly developed ripple marks. Green shale clasts, up to 1 inch long, are in both red and gray calcirudites.

FERNVALE PETROGRAPHY

Fernvale sedimentary rocks are composed largely of biomicrite (calcirudite) that shows a wide range in grain size, from large zoarial fragments of branching and encrusting bryozoans (many of which are sparfilled) plus whole or partly fragmented brachiopod shells, to smaller enchinoderm grains and micrite. There is a crude laminar arrangement of coarse bryozoan and brachiopod debris. Finer echinoderm grains may be winnowed and pore-filled (syntaxial overgrowths), on a microscopic scale, to form localized, laminated biosparites.

Anastomosing green micritic shale laminae shown crude ripple marking and are associated with incipient stylolites.

Petrographic study has revealed dolomite euhedra (ranging from 20-250 microns along rhomb diagonal) in green micritic shale, in micrite-filled bryozoan zoaria and in the micrite matrix of the biomicrites.

Where red, the Fernvale consists largely of red-stained (hematitic) biosparite and shale.

DISCUSSION AND CONCLUSIONS

Consideration of the geometry and internal arrangement of constituents of the Fernvale, as well as its limited geographic distribution (Chowns, 1972), suggests that much of the Fernvale accumulated as a skeletal sandbar or spit.

The intimate, transitional admixture of red and gray lithologies probably indicates relative degrees of oxidation. The shales are probably suspension deposits of terrestrial origin and their color likely reflects relative oxidizing (red) or reducing (green) conditions of deposition.

It is likely that shallow, subtidal bryozoan thickets and crinoidal(?) meadows abounded near the sandbar and that debris from these areas of prolific growth was heaped-up by water currents of varying energy (as exemplified by their partly laminated and partly winnowed condition).

Dolomite euhedra occur in both red and green lithologies and are interpreted to be of penecontemporaneous, intertidal origin. However, if hypersaline conditions existed, dolomite may indicate a subtidal origin.

Zenger (1972) stated that discovery of Holocene supratidal dolomite has led geologist to think that much ancient dolomization has been supratidal and penecontemporaneous. Features such as lamination, presence of evaporites, birdseye structures and presence of dolomite, if considered singly, are not indicative, but rather suggestive of supratidal conditions. It is the coincidence of these features in ancient rocks that is convincing. In certain examples, the distinction between ancient intertidal and supratidal environments is equivocal. Therefore, dolomite occurrence can be interpreted as intertidal rather than entirely supratidal.

Figure 4 is a sedimentational model indicating likely paleogeographic distribution of environments during accumulation of the Fernvale.

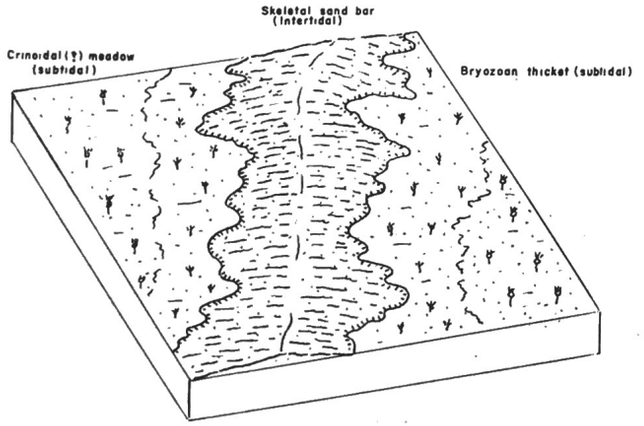

Fig. 4: *Model of Paleoenvironmenal Dstribution during Sedimentation of the Fernvale Limestone.*

APPENDIX

Gray Facies

Sample 1-3 — Partly washed biosparite (calcirudite); packed; fine-very coarse-grained; poorly sorted; crudely laminated; bryozoan (mostly spar-filled) and echinoderm debris; fossiliferous, anastomosing green shale laminae associated with incipient stylolites; fine-medium-grained echinoderm-rich laminae (biosparites); very coarse-grained bryozoan fragments form crude laminae; moderate dolomitization by euhedral dolomite in micrite matrix, green shale laminae and micrite-filled bryozoans.

Sample 2-1 — Biomicrite (calcirudite); generally not packed; fine-very coarse-grained; very poorly sorted; bryozoan (spar and micrite-filled) and echinoderm debris; patches of fine-grained echinoderm debris (biosparite) may represent burrow-filling; moderate dolomitization of micrite matrix by dolomite uhedra.

Sample 3-2 — Biomicrite (calcirudite); generally not packed; fine-very coarse-grained; poorly sorted; crudely laminated; bryozoan, echinoderm and brachiopod debris; largely bryozoan (much of which is spar-filled) and brachiopod fragments form crude lamination; fine-medium-grained echinoderm grains form localized biosparite laminations; incipient dolomitization of micrite matrix by dolomite euhedra which range from 20-100 microns along rhomb diagonal.

Sample 3-3 — Biomicrite (calcirudite); packed; fine-very coarse-grained; poorly sorted; crudely laminated; bryozan, echinoderm and brachiopod debris; large bryozoan (much of which is spar-filled) and brachiopod fragments form crude lamination; fine-medium-grained echinoderm debris form localized biosparite laminations; incipient stylolites associated with green shale laminae; dolomite euhedra in micrite matrix, micrite-filled bryozoan zoaria and green shale laminae; euhedra range from 20-250 microns along rhomb diagonal.

Sample 4-1 — Biosparite (calcirudite); packed; fine-very coarse-grained; very poorly sorted; bryozoan (micrite coated-algal) (?), echinoderm and brachiopod debris; microspar cement; a few small micrite patches show extensive dolomitization by dolomite euhedra.

Sample 4-3 — Biomicrite slightly washed (calcirudite); packed; fine-very coarse-grained; very poorly sorted; bryozoan (mostly spar-filled), echinoderm and brachiopod debris; anastomosing, fossiliferous, green shale laminae associated with incipient stylolites; moderate to extensive dolomitization by euhedral dolomite (20-250 microns along rhomb diagonal) in micrite matrix, green shale laminae and micrite-filled bryozoan grains.

Red Facies

Sample 1-2 — Biosparite (calcirudite); hematite-stained; packed; fine-very coarse-grained, bryozoan and brachiopod debris are very coarse-grained; poorly sorted; bryozoan (much of which is spar-filled); echinoderm and brachiopod debris; spar cement, syntaxial overgrowths on echinoderm debris; incipient stylolites; dolomite euhedra, in micrite in bryozoan zoaria and in scattered small patches of red-stained micrite, range from 20-250 microns along rhomb diagonal.

Sample 2-2 — Biosparite (calcirudite); hematite-stained; packed; fine-very coarse-grained, bryozoan and brachiopod debris are very coarse-grained; poorly sorted; bryozoan (much of which is spar-filled), echinoderm brachiopod and trilobite debris; spar cement, syntaxial overgrowths on echinoderm debris; red-stained shale lamiae associated with incipient stylolites; dolomite euhedra in red-stained micrite in bryozoan zoaria, in red-stained shale and in scattered patches of red-stained micrite.

Sample 2-3 — Biosparite (calcirudite); hematite-stained; packed; fine-very coarse-grained, bryozoan and brachiopod debris are very coarse-grained; poorly sorted; bryozoan (much of which is spar-filled), echinoderm and brachiopod debris; large red-stained intraclast of sparse biomicrite; spar cement with syntaxial overgrowths on echinoderm debris; incipient stylolites; dolomite euhedra in red-stained intraclast, in red-stained micrite-filled bryozoan zoaria, and in scattered patches of red-stained micrite.

Sample 4-2 — Biosparite (calcirudite); hematite-stained; packed; fine-very coarse-grained, bryozoan and brachiopod debris are very coarse-grained; poorly sorted; bryozoan (much of which is spar-filled), echinoderm and brachiopod debris; spar cement with syntaxial overgrowths on echinoderm debris; red-stained shale laminae associated with incipient stylolites; dolomite euhedra in red-stained micrite-filled bryozoan zoaria, and in scattered patches of red-stained micrite.

ACKNOWLEDGEMENT

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