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To the Graduate Council:

I am submitting herewith a thesis written by Robert Lamar McConnell entitled "Lithostratigraphy and Petrography of the Upper Cambrian Maynardville Formation within the Copper Creek Fault Belt of East Tennessee." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Geology.

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LITHOSTRATIGRAPHY AND PETROGRAPHY OF THE UPPER CAMBRIAN
MAYNARDVILLE FORMATION WITHIN THE COPPER
CREEK FAULT BELT OF EAST
TENNESSEE

A Thesis
Presented to
the Graduate Council of
The University of Tennessee

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
Robert Lamar McConnell

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CHAPTER I

INTRODUCTION

The Problem

Ever since the Maynardville Formation was first defined by C. R. L. Oder in 1934, it has been the subject of considerable controversy. While its age (Croixan) has never been seriously questioned, it has yet to be established definitely whether the Maynardville should be included within the alternating shales and carbonates of the subjacent Conasauga Group or within the overlying Knox Group, consisting almost entirely of limestone and dolomite.

The purpose of this investigation was to subdivide the Maynardville Formation within the Copper Ridge strike belt into a laterally traceable vertical succession of parastratigraphic units. A parastratigraphic unit is defined by Krumbein and Sloss (1963, page 333) as a grouping of strata, identified by objective lithologic criteria, but lacking in either mappability or lithologic homogeneity and constancy. Parastratigraphic units are lithostratigraphic units which are not formally named as formations, members, groups, etc. The effect of dividing the Maynardville Formation into parastratigraphic units is to delineate a grouping of subparallel bands traceable along strike, without proposing formal names for the lithostratigraphic divisions.

The writer also attempted to establish stratigraphic boundaries which might be useful in field mapping. The question of stratigraphic classification of the Maynardville Formation relative to the Conasauga and Knox Groups is discussed in the light of the writer's own research.

A petrographic study of the Maynardville Formation involving 24 thin sections was made. Sufficient thin sections of each parastratigraphic unit were studied to characterize each unit lithologically.

Area of Study

Structurally, the Valley and Ridge Province of East Tennessee is characterized by great northeast-trending thrust faults, which cause repetition of the predominantly Cambrian and Ordovician strata. The strike belt of the Maynardville Formation studied in this report crops out on the northwest side of Copper Ridge and is located within the area bounded by the Copper Creek fault on the northwest, and by the Saltville fault to the southeast. Figure 1 shows the area of study as well as location of sections measured for this report. The area studied extends along strike for approximately 61 miles, from U. S. Highway 25W at the southwestern extremity to Tennessee Route 66 near the village of Lee Valley at the northeastern limit.

Previous Investigations

C. R. L. Oder (1934, page 475) defined the Maynardville Formation

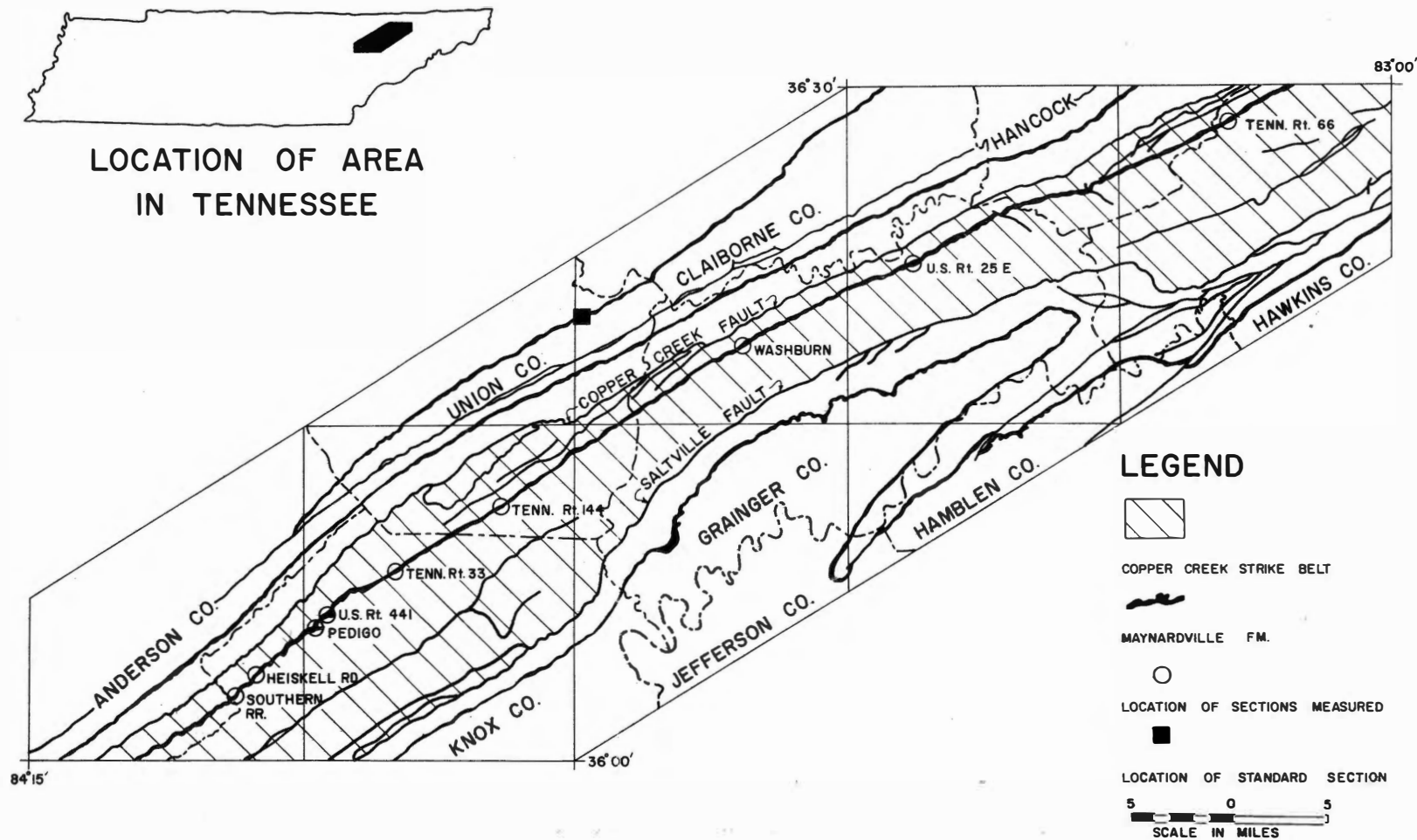


Figure 1. Location of sections measured in Copper Creek strike belt

as consisting of:

60-250 feet of thin-bedded to massive, light-bluish to dark-gray, fine to coarse-grained, more or less laminated limestone, with dark gray dolomite forming the upper third of the formation. The basal third carries limestone conglomerate in which small, black clay balls suggest oolitic textures. Sometimes thin bluish-green calcareous shale occurs in the lower part. Dark gray chert, with a medium sized Cryptozoon occurs sparingly in the upper beds. On the west side of the Valley, the top is usually marked by 2 feet of dark-gray shaly dolomite, with an undulating upper contact. The upper limit on the east side of the Valley is formed by 5-10 feet of sandstone...

Oder considered the Maynardville to be the basal member of the Knox Dolomite, as a result of lithologic similarities with the lower Knox beds and also because Croixan trilobites had been discovered in the Nolichucky, but up to that time had not been found within the Maynardville (Oder, 1934, pages 475-476). The type section of the Maynardville was established by Oder along Tennessee Route 33 in Union County approximately 5.5 miles north of the town of Maynardville. To this writer's knowledge there is no published measured section of the Maynardville type locality.

That the unit which Oder named Maynardville was lithologically distinct from adjacent beds was recognized by Ulrich (1911, page 635) who considered it the basal division of the Knox Dolomite and described it as

...grayish dolomite and limestone, practically free of chert, (constituting) the lower part of the Knox proper...In the Tennessee basin it varies considerably in thickness, possibly being absent altogether locally... When present, the lower member of the Knox is readily

distinguished by its more calcareous and much thicker beds. Most of the beds are magnesian, but few, if any, are dolomite. Many, on the other hand...may...be called limestone. The latter are fine grained and not infrequently contain more or less shaly layers...The practical absence or scarcity of chert and the presence of nearly pure and often shaly limestone distinguishes the lower member of the Knox from the profusely cherty main mass of the formation which overlies it and for which the name Copper Ridge chert is proposed.

Prior to Ulrich, there were few references in the literature to the recognizable Maynardville interval. Keith (1901) describes the Nolichucky Shale as

composed of calcareous shale and shaly limestone with beds of massive blue limestone in the upper portion.

Further, he describes the Knox as consisting

of a great series of blue, gray, and whitish limestone and dolomite (magnesian limestone)... Many of the beds are banded with thin, brown siliceous streaks.

The last sentence may refer to the mottled limestone unit within the Maynardville, but more probably strata currently assigned to the Maynardville were included within the massive blue limestone of the Nolichucky Formation.

At approximately the same time that Oder was delineating the Maynardville, Josiah Bridge was beginning work on the stratigraphy of the Mascot-Jefferson City zinc district. Bridge died before his work could be published, but it was finally completed by John Rodgers

and published in 1956. Bridge (1956, page 12) removed the Maynardville from the Knox Group and placed it within the Conasauga, as a member of the Nolichucky Shale. His reasons were that: (1) There is very little chert in the pre-Knox formations or in the Maynardville, whereas abundant chert is found in the residuum of the formations of the Knox Group; (2) The contact between the Maynardville Member and the underlying mass of the Nolichucky Shale is gradational; (3) The contact between the Maynardville and the Copper Ridge is

...marked by a change in type of rock. Below the contact there is blue crystalline commonly fossiliferous limestone of the type common in the Maynardville (and locally, though rarely fossiliferous, in the Maryville and Rutledge Limestones) or fine-grained, thin-bedded, well stratified, light colored, noncherty unfossiliferous somewhat calcitic dolomite. Above the contact there is more coarsely crystalline rather heavy bedded poorly stratified virtually unfossiliferous dark dolomite typical of the Copper Ridge.

Bridge apparently considered the Maynardville-Copper Ridge contact more distinct than the Maynardville-Nolichucky contact and used this as a basis for including the Maynardville within the Copper Ridge.

The type section of the Maynardville was flooded in 1936 by the rising lake behind Norris Dam. Bridge (1956, page 11) designated as the new standard section an exposure located seven miles north of Maynardville, on Tennessee Route 33, between the bridge over Cox branch and the south end of the bridge over Norris Reservoir. The new standard section is three miles northeast of the type section

along the same strike belt. Appendix C gives the standard section as described by Bridge.

Rodgers and Kent (1948, page 12) also considered the Maynardville a member of the Nolichucky Shale based on Bridge's reasoning supplemented by the observation that the fauna of the Maynardville more closely resembles that of the Nolichucky Shale than that of the Copper Ridge Dolomite. However, Rodgers (1953, page 50) elevated the Maynardville from member to formational status, apparently because he was able to map it separately at a scale of 1:125,000. Miller and Fuller (1954, pages 33-40) have studied the Maynardville within the Rose Hill district, western Lee County, Virginia, and northern Hancock and Claiborne Counties, Tennessee. They divided the Maynardville into two members named from base upwards, the Low Hollow Limestone Member (150 feet thick) and the Chances Branch Dolomite Member (160 feet thick) in the upper half of the formation. The Maynardville averages 310 feet thick in the Rose Hill district (Miller and Fuller, pages 37, 39). The strike belt studied by Miller and Fuller lies three strike belts to the west of the belt of Maynardville studied by the writer.

Field Work for Present Study

Preliminary reconnaissance of the area was carried out in the summer of 1966, and field work was completed in the fall of that year. Nine sections of the Maynardville were measured, only two of

which are complete, due to scarcity of outcrops. Whenever possible, measurement of the sections was continued into the underlying Nolichucky Formation and the overlying Copper Ridge Dolomite to ascertain the nature of formational contacts. A compilation of field data is presented in Figure 2 in which are plotted columnar sections of the Maynardville divided into parastratigraphic units.

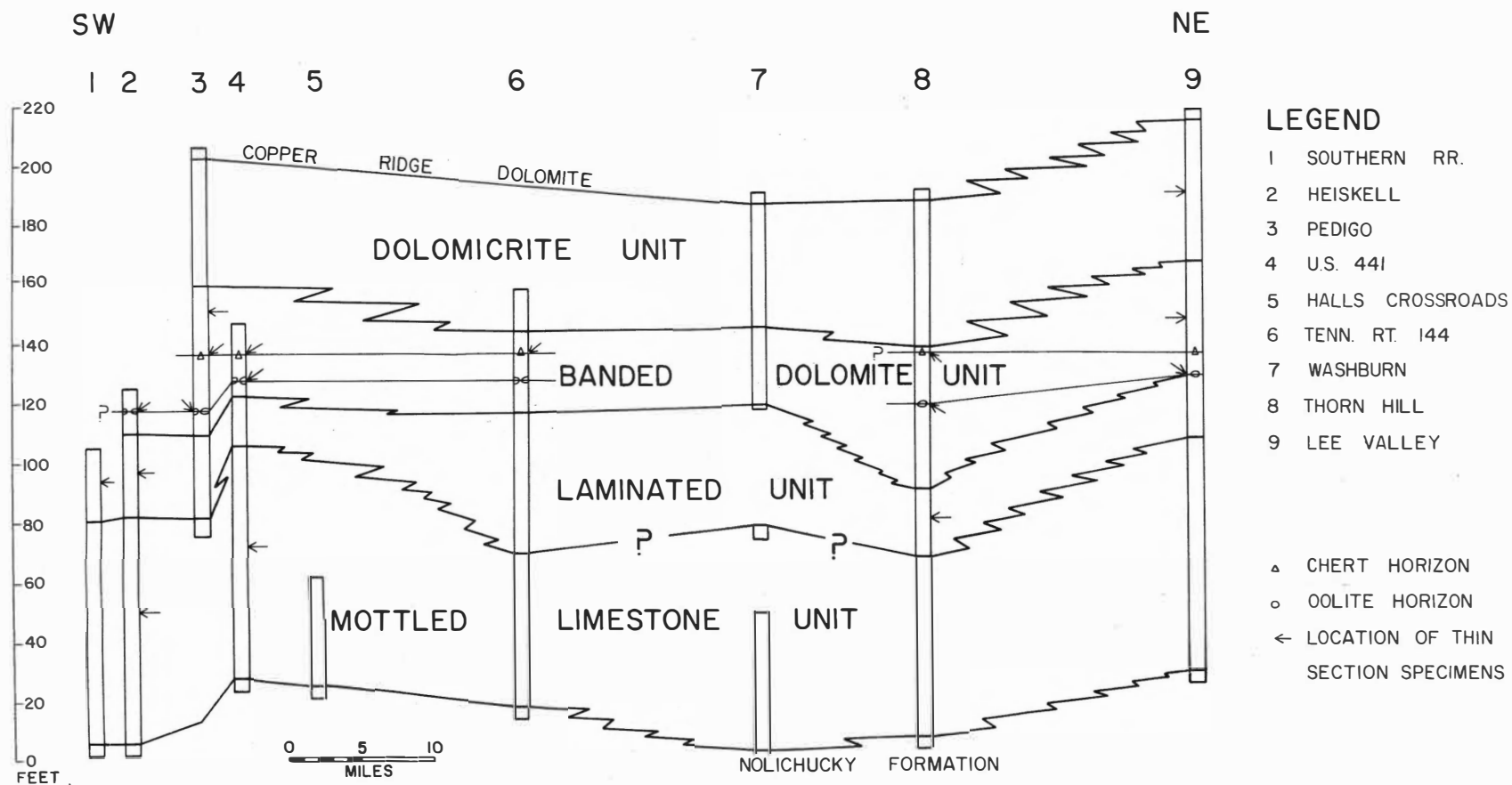


Figure 2. Interpretations of measured sections
(height of column indicates stratigraphic control)

CHAPTER II

LITHOSTRATIGRAPHY

Introduction

In this report the Maynardville Formation is divided into six parastratigraphic units. Four of these are intervals of similar beds; one of the intervals contains within it two marker horizons. These parastratigraphic intervals from base upwards are (1) a unit of mottled limestone, (2) a laminated limestone and dolomite unit, (3) a unit of banded dolomite, containing within it two marker horizons, a lower oolite horizon, and an upper chert horizon, and (4) a dolomicrite unit.

Lower Formational Boundary

Within the study area, the uppermost several tens of feet of the Nolichucky Formation are characterized by large quantities of light olive-gray calcitic shale and by thin-bedded to lenticular micrite alternating more or less regularly with thin seams of shale. At the Heiskell Road Quarry section and at the Southern Railroad cut north of Bell Campground, varying amounts of rather coarsely crystalline medium gray limestone were observed, representing a facies within the Nolichucky, with the beds disappearing to the

northeast and southwest. The limestone, while definitely not the typical mottled limestone of the lower Maynardville, has previously been classified a part of the Maynardville (Raymond, 1959, page 3). However, within this report, the lower boundary of the Maynardville will be considered as occurring beneath the first recognizable occurrence of the mottled limestone unit (Figure 3). This choice has the following advantages: (1) The mottled limestone unit commonly crops out along Copper Ridge and is conspicuous upon weathering. (2) The mottled limestone unit represents a considerable environmental change from that characteristic of the Nolichucky, and (3) the limestone herein considered a part of the Nolichucky, although conspicuous at some points, disappears within a short distance along strike, whereas the mottled limestone maintains the same appearance throughout the length of the strike belt.

Mottled Limestone Unit

The mottled limestone unit consists of 50-80 feet of medium gray, argillaceous micrite ribboned or mottled (hence the name) with pale orange-weathering, microcrystalline, argillaceous, dolomitic limestone (Figure 4). The strata tend to be medium to thick-bedded; however, at some localities, notably railroad cuts and quarries, they are commonly massive because of less severe weathering.

Common within the unit are intraformational conglomerates, with limestone pebbles. Occasional clay balls and pellets were noted,

Figure 3. Contact between the Maynardville and the underlying Nolichucky Formation.

a. Lee Valley section.

b. Halls Crossroads section.



a



b

Figure 3.

Figure 4. Mottled limestone unit at Heiskell Road Quarry section.



Figure 4.

generally confined to the lower half of the unit. Mud cracks have been observed on bedding surfaces, and suggestions of algal heads appear very rarely. No other fossils were found. Calcitic shale, resembling that found within the underlying Nolichucky Formation was found in varying amounts throughout the mottled unit, from 1-inch seams to beds 3-4 feet thick, quantitatively increasing northeastward. Often cyclical repetition of thin-bedded to lenticular micrite with calcitic shale was observed, noteworthy examples being in the Lee Valley and Thorn Hill sections. The origin of the mottling is questionable. Strong evidence of diagenetic replacement of calcite by dolomite is shown at the position of the arrow in Figure 5 where bedding laminations in limestone are transected by brownish secondary dolomite.

The mottled limestone unit is the most persistent unit within the Maynardville, cropping out along most roads and streams which cross Copper Ridge.

Laminated Unit

The laminated unit consists of 15-50 feet of limestone, dolomitic limestone and dolomite, very light gray to medium gray, slightly to very argillaceous, which weathers yellowish light olive-gray to medium dark gray. The unit is characterized by alternation of light and dark laminae on the order of 20-30 times per inch (Figure 6).

Figure 5. Dolomite transects bedding laminations in limestone at position of arrow. Mottled limestone unit, Heiskell Road Quarry section.



Figure 5.

Figure 6. Laminated unit at Lee Valley section showing common undulatory bedding.



Figure 6.

The darker laminae are composed of limonitic and argillaceous dolomite, while the lighter laminae consist predominantly of calcite or dolomite lacking appreciable limonitic and argillaceous content. Styolites are common, showing that solution has taken place, and penecontemporaneous deformation is represented by numerous tight microfolds and faults within the unit. Mud cracks are abundant. The unit seems barren of fossils; however, the peculiar laminated aspect of the unit may represent cycles of carbonate muds and argillaceous material cemented by algal films.

Outcrops of the laminated unit are sparse, artificial cuts being the only exposures of note. Where conditions of weathering are advanced, the unit has the appearance of a dolomitic shale. Insoluble residue tests of this lithology from Lee Valley show an argillaceous content of 37 percent, the highest percentage of insolubles from any unit measured.

Banded Dolomite Unit

The banded dolomite consists of 30-70 feet of very light gray dolomite, thin- to thick-bedded, weathering light olive-gray to yellowish gray, characterized by roughly parallel, argillaceous bands, one-eighth inch or more apart (Figure 7). Generally, the unit is structureless and unfossiliferous, but locally rare evidence of intraformational conglomerates and penecontemporaneous deformation are present. There are several horizons containing vugs, filled with

Figure 7. Typical banded dolomite from Pedigo section.



Figure 7.

sparry calcite, which are roughly parallel to bedding. Insoluble content is rather low, averaging less than 10 percent and consisting of clay-sized particles. Locally within the banded dolomite unit there are beds of medium-bedded, dark gray, rather coarsely crystalline limestone. By a gradual disappearance of the characteristic argillaceous bands, the banded dolomite unit grades into the overlying dolomicrite unit.

Within the banded dolomite there occur two lithologically distinctive marker horizons. These are an oolite horizon, 0 to 28 stratigraphic feet above the base of the banded dolomite unit in different sections, and a chert horizon occurring 7 to 42 stratigraphic feet above the base of the banded dolomite.

Oolite Horizon

The oolite horizon consists of oolites, ovules, pellets, and occasionally flattened grains of micrite, usually cemented by sparry calcite or chalcedony. Characteristically the bed is 2 to 3 inches thick (Figure 8). At various locations confined generally to the southwestern portions of the area, the oolite horizon becomes lenticular with pods having the same thickness as the bed described above. Locally, in addition to a chalcedony matrix, the oolites themselves are silicified; however, there seems to be no recognizable geographic pattern of silicification.

Figure 8. Parastratigraphic marker horizons at Lee Valley section.

- a. Oolite marker horizon.
- b. Chert marker horizon.



a.



b

Figure 8.

Chert Horizon

The chert horizon (Figure 8) is confined to the banded dolomite unit. The horizon is usually characterized by blackish to dark gray chert, occasionally containing silicified oolites and pellets. The chert horizon is 1 to 3 inches thick, pinching and swelling along strike, and stands out upon weathering in contrast to the surrounding dolomite. It is often quite fractured, the voids being filled with sparry calcite.

Beds resembling the chert horizon are common throughout the overlying Copper Ridge Dolomite (L. D. Harris, personal communication); however, this unit represents the only known occurrence within the Maynardville Formation.

Dolomicrite Unit

The dolomicrite unit consists of 30-55 feet of medium- to thick-bedded, very light gray to light gray, generally light yellowish gray weathering dolomicrite (Figure 9). Rarely very thinly bedded zones appear, resembling dolomitic shale, and an occasional medium dark gray, medium-bedded, finely crystalline dolomite bed was noted. Locally, undulating beds were observed, which may suggest algal growth. Several vuggy zones are present, scattered throughout the unit. No fossils were observed.

Figure 9. Typical outcrop of dolomicrite unit at Pedigo section.



Figure 9.

The dolomicrite unit weathers quite readily to a reddish brown soil, and good exposures of bedrock are generally limited to artificial cuts. The dolomicrite unit is commonly overlain by the cherty, red residuum of the Copper Ridge Dolomite.

Upper Formational Boundary

The base of the overlying Knox Group has previously been placed where thick-bedded, asphaltic, medium dark to dark gray dolomite with abundant chert replaces the dolomite characteristic of the upper Maynardville (Rodgers, page 48). Since this contact is gradational it is usually difficult to establish a definite contact. Often strata on both sides of the contact are covered by residuum, and the boundary is drawn at the first appearance of chert in the regolith. The writer has set the boundary at the base of the first appearance of typically Copper Ridge chert, whether in fresh rock or residuum. This problem is discussed further on pages 60-61.

CHAPTER III

PETROGRAPHY

Methods

Thin sections of specimens taken from each parastratigraphic unit within the Maynardville were prepared from two or more localities within the Copper Ridge strike belt.

Preparation of Samples

A slice approximately one-fourth inch thick was cut from each hand specimen and mounted on a frosted glass slide using epoxy cement. The specimens were then mounted on an Ingram Thin Section Grinder and ground until the minerals were transparent or nearly so. Final polishing was carried out by hand using first 400- and lastly 600-mesh abrasive powder.

Study Procedure

A Spencer petrographic microscope was used for observing thin sections. An eyepiece micrometer was used to determine the field of view at 32X, 100X, and 430X. Grain size determinations were made with a calibrated ocular. Calcite-dolomite differentiation was facilitated by preliminary etching of hand specimens with dilute hydrochloric acid (10 percent), and staining thin sections with Alizarin red-S dye.

Photomicrography

Thin sections were photographed at the University of Tennessee Engineering Experiment Station with a Polaroid camera. Both color and black and white photographs were made, but only black and white photographs were used because of superior quality of reproduction.

Descriptive Petrography

Introduction

For purposes of description, each parastratigraphic unit of the Maynardville is divided into microfacies generally following the procedure outlined by Carozzi (1961, page 498). Each microfacies is described with respect to the following characteristics:

1. Mineral content.
2. Grain size.
3. Unusual features.
4. Interpretation of mode of origin and environment of deposition.

Mottled Limestone Unit

The mottled limestone unit may conveniently be divided into two microfacies.

Microfacies 1

The predominant mineral is calcite with a few scattered dolomite euhedra. Calcite grains average .01 mm. in diameter. The grains are

generally subhedral. Quartz grains averaging .03-.04 mm. in diameter represent at most one percent of the mineral content. Masses of recrystallized sparry calcite are scattered throughout microfacies 1, generally paralleling bedding; some resemble outlines of brachiopod shells or trilobite carapaces. Insoluble residue of this microfacies averages 15 percent and consists predominantly of clay-sized particles.

Microfacies 1 probably originated by direct precipitation of calcium carbonate with some subsequent diagenetic recrystallization.

Microfacies 2

Dolomite predominates with grain diameters generally ranging between .01-.05 mm. The grains are generally subhedral to anhedral and exhibit an interlocking mosaic texture. Quartz grains constitute less than one percent of total mineral content and are thought to be detrital because no euhedral forms were observed. No other accessory minerals were noted. Dark argillaceous material is scattered among the grains. One very interesting stylolite was observed marked by hematite and detrital quartz grains which the writer believes have been concentrated by solution of surrounding carbonate and resultant accumulation of insoluble material. The quantity of quartz concentrated when quartz content in surrounding rock is on the order of one percent implies that solution has been extensive.

Most of the detrital grains were of unstrained quartz; however,

rare grains of strained quartz were observed, implying that there was more than one type of source rock. Quartz grains up to .05 mm. in diameter were generally oriented with their long axes parallel to bedding.

The alternation of calcite (microfacies 1) with dolomite (microfacies 2) is characteristic of the mottled limestone parastratigraphic unit. Figure 10 illustrates the contact between the two microfacies from two localities.

Grain-size measurements of the dolomite crystals in the laminae indicate that the dolomite may be the product of early diagenetic replacement of calcite by dolomite before compaction, probably on or slightly below the sea floor (Folk, 1965, page 159). Dolomite coarser than .015 mm. in diameter is considered by Folk to be strong evidence for a replacement origin. Recrystallization generally involves coarsening of grain size, so coarser dolomite than calcite is consistent with a secondary origin for the dolomite. Secondary dolomitization was also suggested from the observation that irregular masses of dolomite transect laminated bedding within the limestone (Figure 5, page 17).

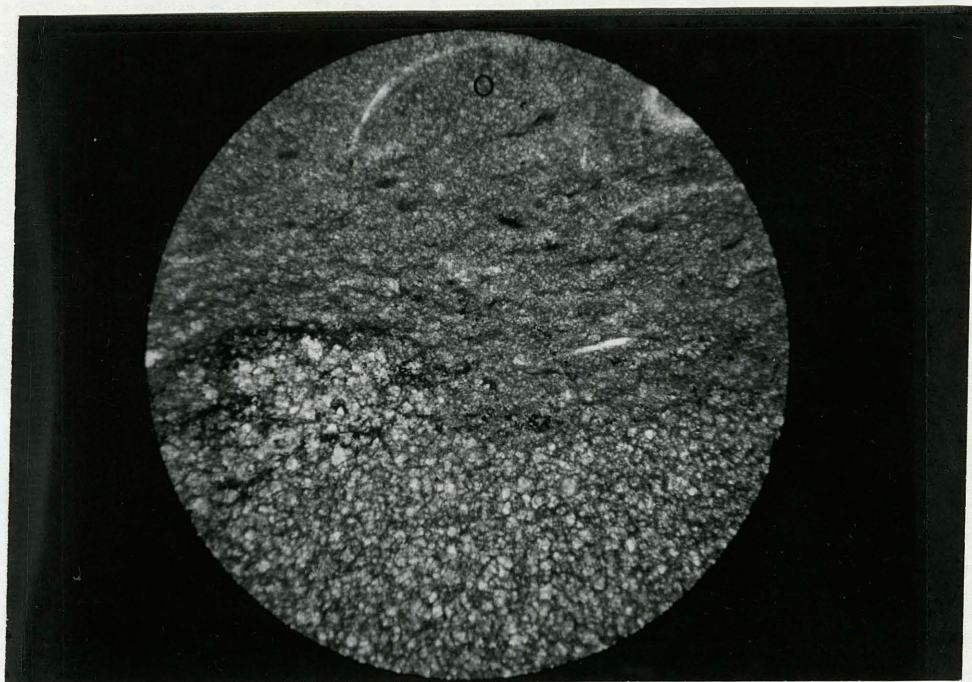
Laminated Unit

The laminated unit consists of two microfacies, one predominantly coarse-grained; the other, finer-grained. The unit is generally

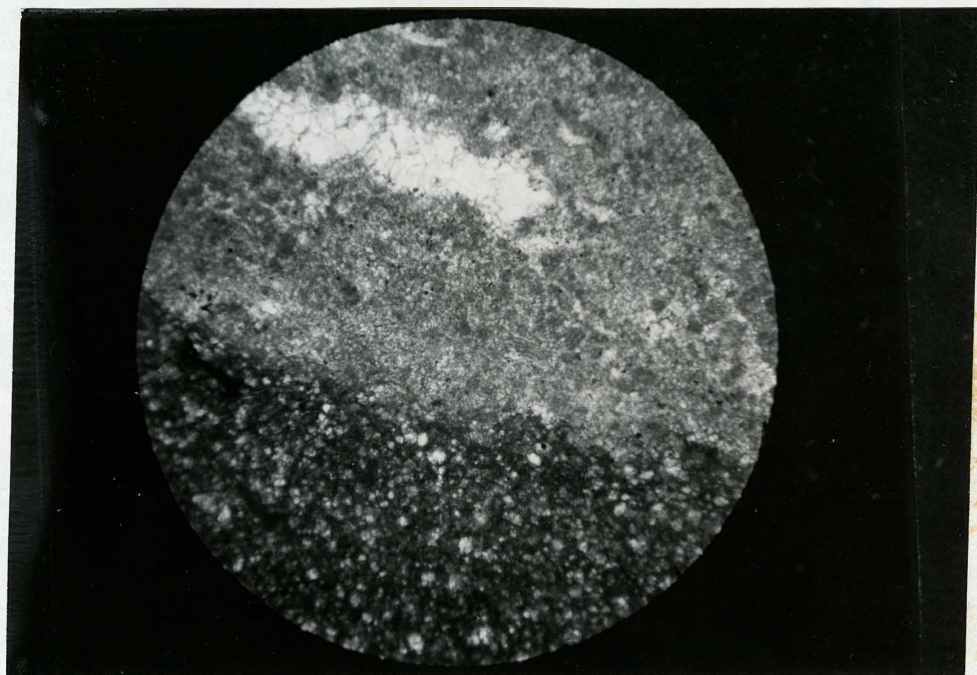
Figure 10. Photomicrographs of mottled limestone unit, showing contact between fine-grained calcite (microfacies 1) and coarse-grained dolomite (microfacies 2). Diameter of circle 1.8 mm., nicols not crossed.

a. Photomicrograph from Freeway Quarry.

b. Photomicrograph from Heiskell Road Quarry.



a



b

Figure 10.

dolomite, seemingly becoming more calcitic to the northeast.

Microfacies 3

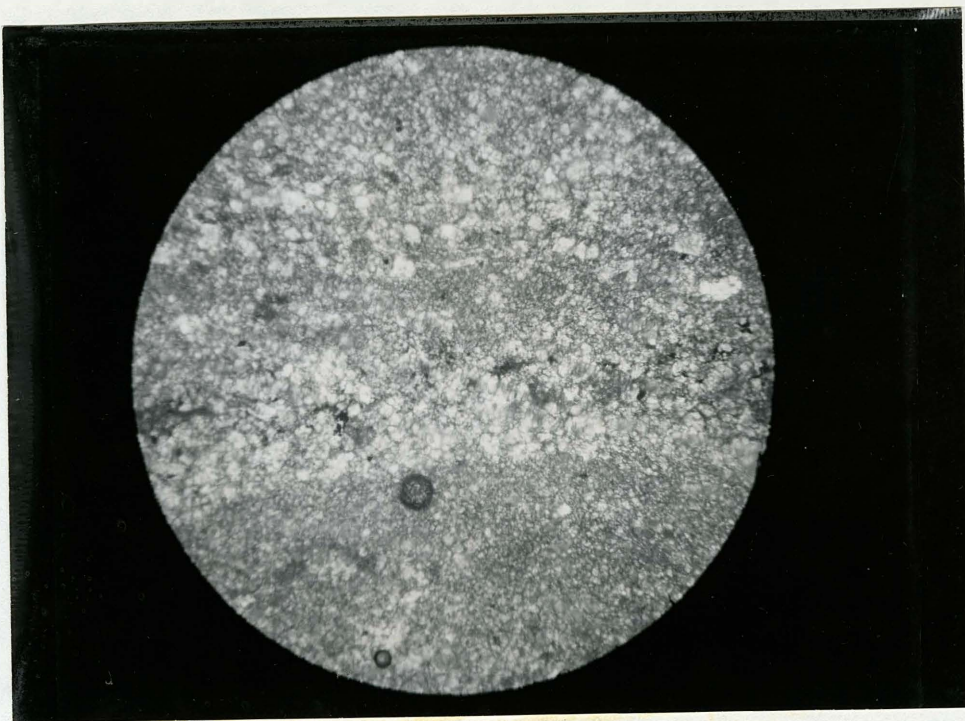
This microfacies consists of dolomite, largely anhedral, with grain size ranging .02-.05 mm. in diameter. The only other mineral present is quartz, which is probably detrital, no euhedral crystals being observed. Quartz content is less than one percent with grain diameter averaging about .02 mm. The grains are subangular to subrounded. No overgrowths were observed. Scattered throughout the microfacies are rhombohedral crystals which are probably dolomite.

Microfacies 4

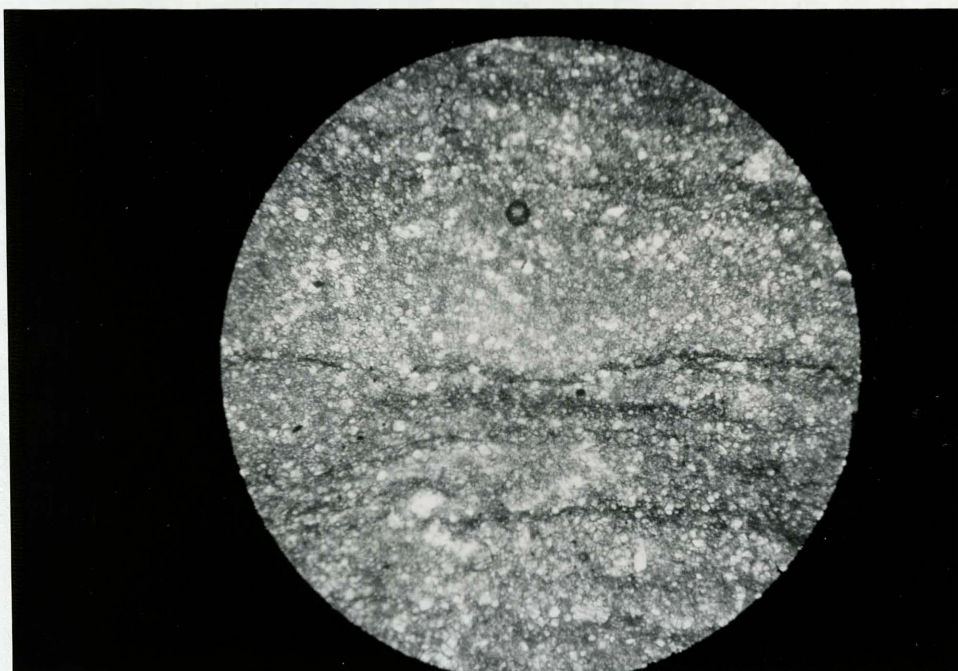
Microfacies 4 usually consists of dolomite with subhedral to anhedral grains predominating. Grain diameter averages .01-.02 mm., and the grains possess an interlocking mosaic texture. Argillaceous material seems locally to be scattered throughout the grains. Within the unit are anhedral masses of calcite or stringers of calcite parallel to bedding. This may represent cavity filling or replacement of dolomite by calcite during diagenesis along paths of greater permeability. Figure 11 shows microfacies 3 and 4 in thin-sections from the Heiskell Road Quarry and Thorn Hill sections. At both localities penecontemporaneous folding may have disrupted both units. In both microfacies a few sparry calcite veins cut across the sections generally at right angles to bedding.

Figure 11. Photomicrographs of laminated unit; fine-grained material is microfacies 3, coarse-grained material, microfacies 4. Diameter of circle 1.8 mm., nicols not crossed.

- a. Photomicrograph from Heiskell Road Quarry section.
- b. Photomicrograph from Thorn Hill section.



a



b

Figure 11.

Banded Dolomite Unit

The banded dolomite unit consists of two texturally differentiated microfacies.

Microfacies 5

Dolomite is the predominate mineral, and the average diameter of the grains is .01-.02 mm. Most of the grains are subhedral to anhedral. No appreciable quantities of detrital quartz were noted within the unit.

Microfacies 5 could be early diagenetic dolomite, originating as rapid replacement of calcite upon or a few centimeters beneath the sea floor. The unit was probably deposited during periods of relative quiescence.

Microfacies 6

This microfacies is coarser-grained than microfacies 5 and may locally contain appreciable quantities of detrital quartz. The subangular to well-rounded quartz grains range up to 0.5 mm. in diameter and are always confined to the coarser fractions of dolomite. The grains show a preferred orientation parallel to bedding. Locally the quartz content may reach 30 percent; limonitic material may contribute another 10 percent. The remainder of the unit consists of rather coarse-grained dolomite about .05-.10 mm. in diameter.

Although locally detrital quartz may comprise an important percentage of microfacies 6, other portions of the microfacies show little or no quartz and consist predominantly of hematitic or argillaceous material and dolomite. The coarse-grained zones of dolomite are often lenticular, being completely enclosed within layers of microfacies 5. Other occurrences of microfacies 6, however, are continuous beds. Figure 12a shows an arenite zone within microfacies 6 from the Lee Valley section; Figure 12b is a more typical lithology of microfacies 5 and 6 from the Pedigo section.

The origin of microfacies 6 may be interpreted on the basis of an occasional oolite present within the unit associated with detrital quartz. These particles suggest deposition in warm, shallow, agitated waters, and the grain size of the dolomite is almost certainly evidence for a replacement origin or recrystallization of primary dolomite during diagenesis.

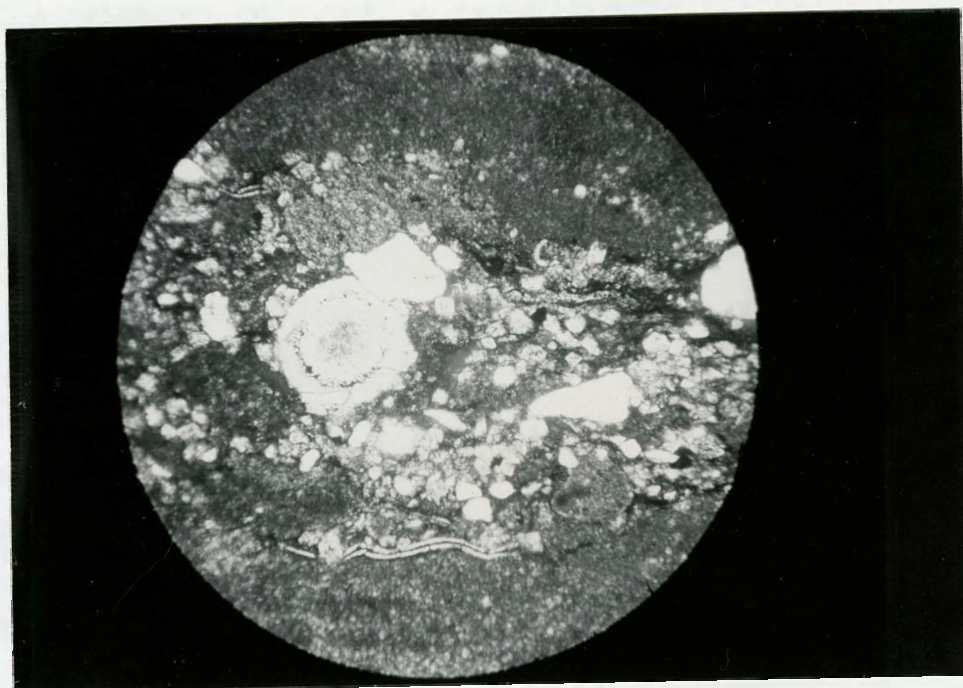
Microfacies 7 (Oolite Horizon)

Microfacies 7 consists of oolites, spherulites, intraclasts, and sparry calcite oolites, exhibiting a crystal mosaic texture. The oolites are generally composed of calcite or chalcedony; the chalcedony is thought to have replaced original calcite. The nuclei of the oolites generally consist of small quartz grains or specks of hematite or limonite. In many cases the nuclei are obliterated by recrystallization; in others, voids are present at the center of the oolites.

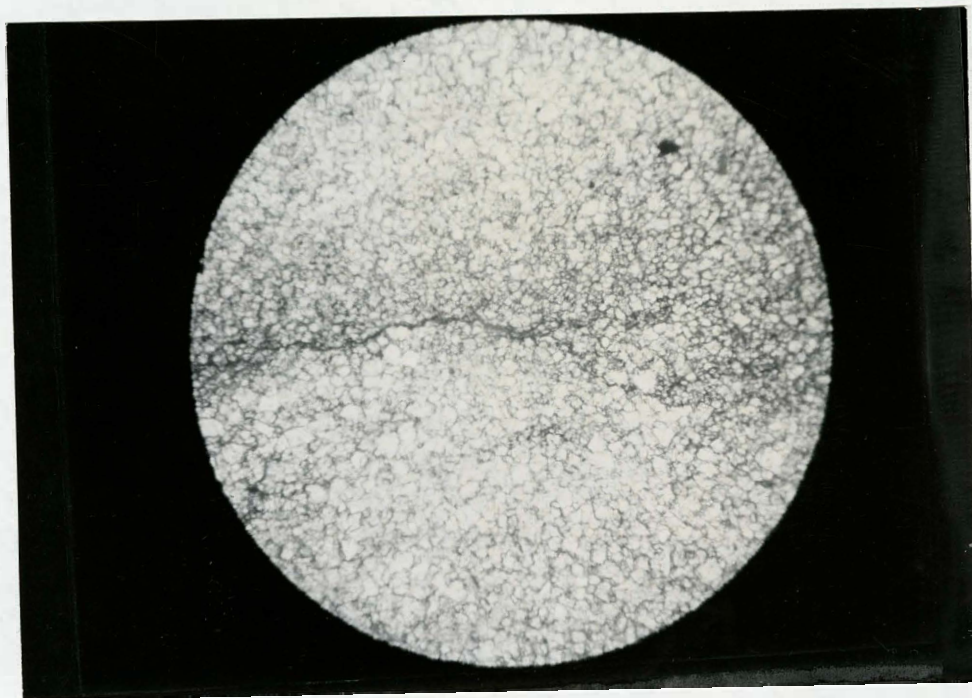
Figure 12. Photomicrographs of banded dolomite unit.
Diameter of circle 1.72 mm., nicols not crossed.

a. Arenite zone within microfacies 6. Note solitary oolite and probable fossil fragments in bottom center. Lee Valley section.

b. Alternation of fine-grained dolomite (microfacies 5) with coarse-grained dolomite (microfacies 6). Note seam of argillaceous material in center of microfacies 5. Pedigo section.



a



b

Figure 12.

The oolites are commonly .4-.5 mm. in diameter and range from almost spherical in shape to elliptical. As stated above, composition of the oolites may be calcite or chalcedony. In general, if the cementing material is chalcedony, the oolites will likewise be chalcedony. Only rarely are chalcedonic oolites cemented by calcite.

Oolites of calcite generally preserve the concentric habit of crystallization with the calcite crystallizing as radiating fibers about the nucleus. Where the calcite has been replaced by chalcedony, the original structure is usually destroyed, and the oolite consists of masses of "salt and pepper" aggregates of chalcedony. However, oolites have been observed as chalcedonic masses with portions of the original calcite preserved as relict material.

Spherulites are observed locally, predominating at the Thorn Hill section. Polarization crosses are common between crossed nicols caused by concentric bands of radiating fibrous calcite crystals (Kerr, 1959, page 128).

The sparry calcite oolites generally are .45-.60 mm. in diameter and may be divided into two general categories. Type I may be said to include those oolites which are composed of sparry calcite which exhibit simultaneous extinction under crossed nicols. Type II includes those oolites which are composed of calcite grains with different crystallographic orientations. Type II seems to dominate. The best occurrence of both forms was noted at the Thorn Hill section where microfacies 7 consists predominantly of spherulites and the

aforementioned oolites (Figure 13).

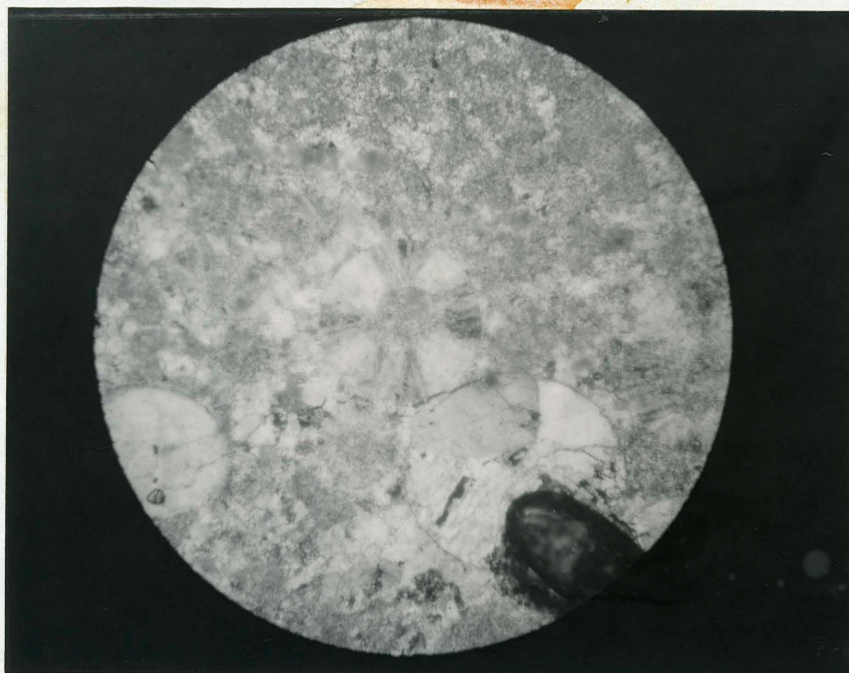
Intraclasts generally are observed as elongate rods and flat ovoids of very finely crystalline calcite. Intraclasts are "pieces of penecontemporaneous, usually weakly consolidated carbonate sediment that have been torn up and recemented by sediment" (Folk, 1965, page 142). These intraclasts are .10-.50 mm. in diameter and may exceed one cm. in length. A general alignment parallel to bedding was noted. Many of the intraclasts are fractured, and chalcedony has been deposited along both sides of the fracture. Some of the pellets have been partially or totally replaced by "salt and pepper" aggregates of chalcedony.

Other types of intraclasts consist of oolites cemented by calcite which have been torn up and recemented by chalcedony with the calcite-cemented oolites still intact. Excellent examples of both types of intraclasts are shown in Figure 14a taken from the Heiskell Road Quarry section.

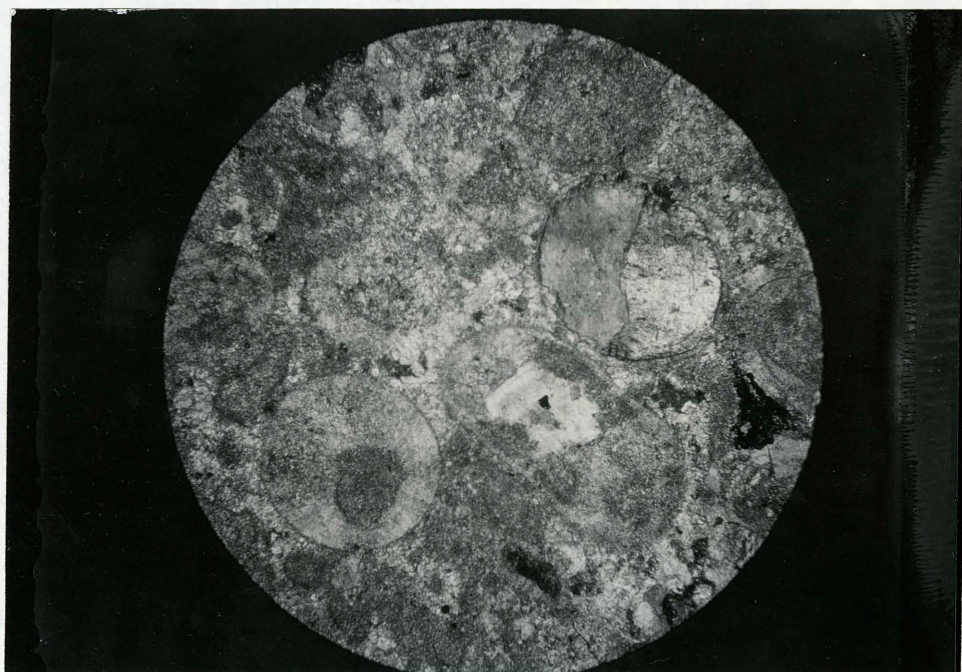
Cementing material may be calcite or chalcedony. Calcite cement is predominantly sparry; however, micrite cement was observed to constitute nearly 50 percent of total cement at the Thorn Hill section. Of the thin sections studied, most were cemented by chalcedony which generally exhibits a fibrous structure under crossed nicols, often beautifully developed within cavities between oolites and intraclasts. Just as common is chalcedony cement which exhibits aggregate structure, probably having replaced original calcite.

Figure 13. Photomicrographs of Microfacies 7 (oolite horizon) at Thorn Hill section. Circle diameter 1.8 mm., nicols crossed.

- a. Spherulite. Note micrite cement.
- b. Partially replaced pellets.



a



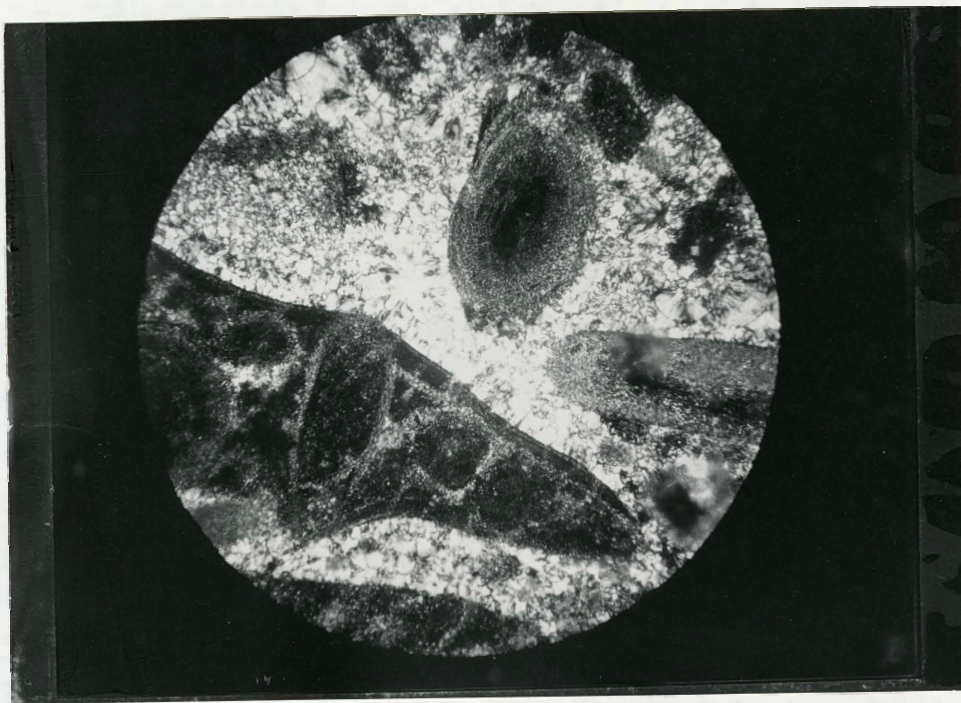
b

Figure 13.

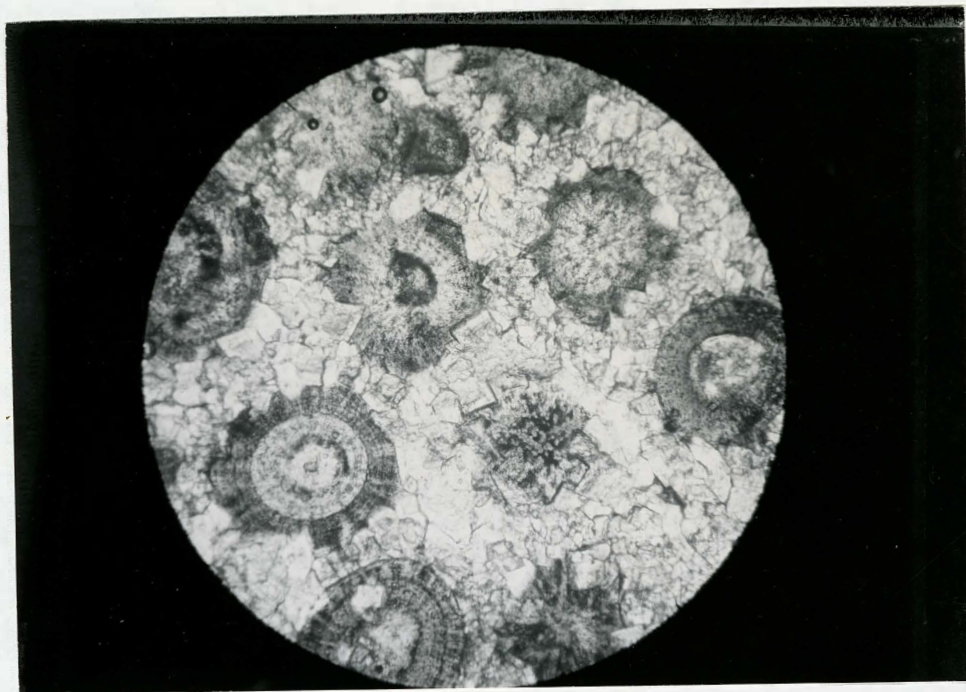
Figure 14. Photomicrographs of microfacies 7 (oolite horizon). Circle diameter 1.8 mm.

a. Intraclasts and oolites cemented by chalcedony. Heiskell Road Quarry section. Crossed nicols.

b. Dolomite euhedra replacing oolites of chalcedony. U. S. 441 (Freeway Quarry section). Nicols not crossed.



a



b

Figure 14.

One particularly interesting thin section from the section along U. S. 441 (Freeway Quarry) shows euhedral dolomite replacing oolites composed of aggregates of chalcedony (Figure 14b). Diameters of the dolomite crystals which are strikingly well crystallized average 0.1 mm.

Microfacies 8 (Chert Horizon)

Microfacies 8 consists of chalcedony and opaline material with significant quantities of coarse-grained quartz present as vug fillings and irregular masses. Chalcedony, comprising a considerable portion of the unit, usually exhibits a brownish stain resembling opal in thin section; with nicols crossed, however, a fine aggregate structure is observed, the common "salt and pepper" aggregate of chalcedony. Very little radial chalcedony was observed, and no spherulitic forms were present. The unit is commonly intricately fractured; massive chalcedony apparently was broken and the subsequent voids filled with anhedral quartz or occasionally with sparry calcite. An occasional oolite was observed, completely silicified and surrounded by aggregates of chalcedony. These are interpreted as evidence for a replacement origin of the chert (Figure 15).

The writer has interpreted the brownish masses which predominate within the unit as opal, on the following bases: color, general lack of any structure, and the general appearance of high relief of the material. This material comprises most of the chert unit.

Figure 15. Photomicrograph of microfacies 8 (chert horizon) from Thorn Hill section. Oolites silicified and cemented by chalcedony. Nicols not crossed. Circle diameter 1.8 mm.



Figure 15.

Figure 16a, from the Tennessee Route 144 section, is a photomicrograph of the chert unit consisting predominantly of opaline material with vugs filled with quartz, very fine-grained on the inside and quite coarse-grained toward the center.

Several interesting vug fillings suggested replaced fossils. One such vug, filled with coarse anhedral aggregates of quartz, strongly resembles a cross-sectional view of a brachiopod (Figure 16b). Others were noted which suggested replaced cystoid plates.

Microfacies 9 (Dolomicrite Unit)

Microfacies 9 consists almost entirely of subhedral to anhedral grains of dolomite containing up to one percent subangular to subrounded detrital quartz grains. Grain diameter of the dolomite was measured to be between .006-.02 mm.; that of the quartz, .02-.04 mm. Grains were texturally characterized by an interlocking mosaic appearance. A few particles of limonite were observed. Unlined vugs on the order of .05 mm. in diameter were observed locally. Figure 17 is an example from the Lee Valley section of the dolomicrite unit.

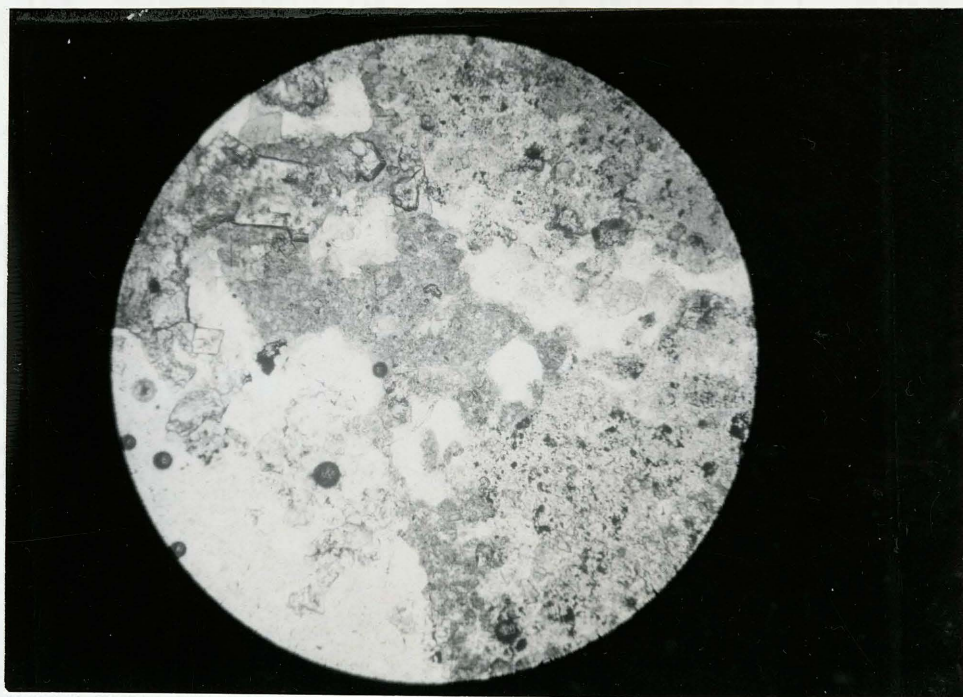
Folk (1965, page 159) has stated that

The great bulk of dolomite is of replacement origin and replacement usually seems to have occurred while the limy sediment was fairly soft or not buried very deeply... Most definite replacement dolomite is coarser than .015 mm. It can be rather safely stated that if the dolomite is coarser than .03 mm. it is certainly a replacement.

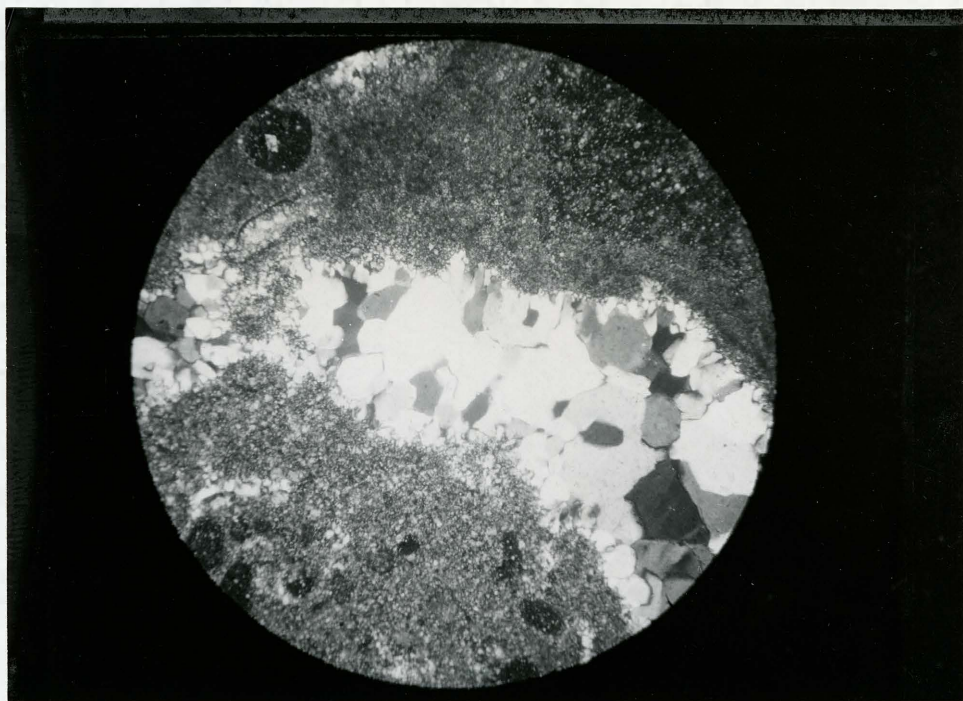
On the basis of grain size the writer believes the dolomite to be of replacement origin.

Figure 16. Photomicrographs of microfacies 8 (chert horizon).

- a. Tennessee Route 144 section. Note euhedral carbonate crystals in upper left. Light areas, quartz-filled vugs. Stippled areas, opaline material and chalcedony. Nicols not crossed. Diameter of circle 1.72 mm.
- b. Pedigo section. Note quartz-filled vug resembling brachiopod shell. Crossed nicols. Circle diameter, 1.72 mm.



a



b

Figure 16.

Figure 17. Photomicrograph of microfacies 9 (dolomicrite unit) from Lee Valley section. Nicols not crossed. Circle diameter 1.8 mm.

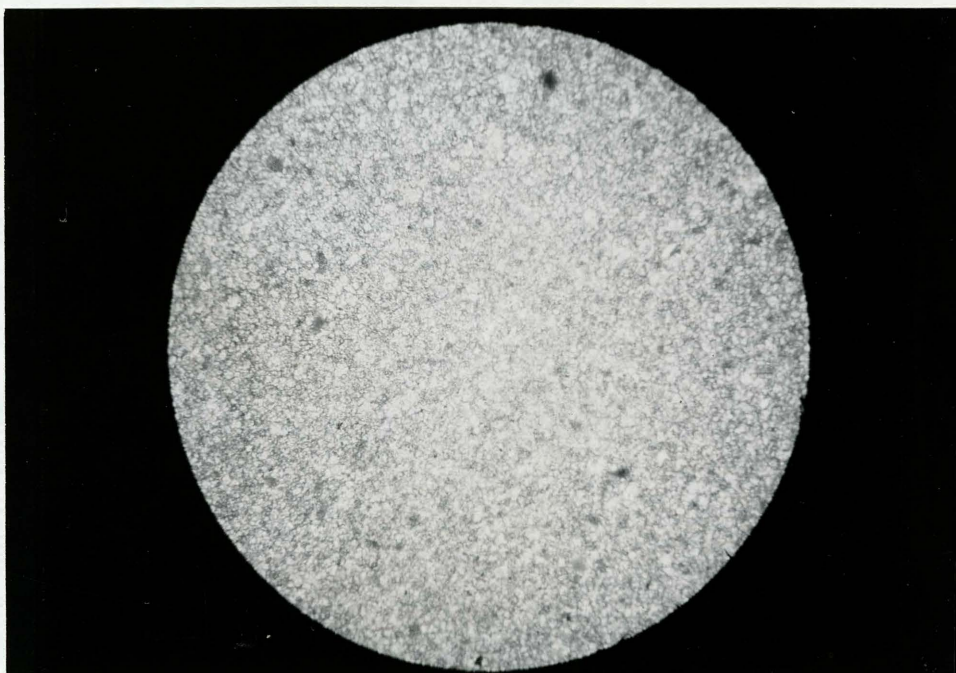


Figure 17.

CHAPTER IV

CONCLUSIONS

Interpretation of Stratigraphic Data

The Maynardville Formation is divisible into a vertical succession of parastratigraphic units which are homotaxial at all sections studied and which maintain rather constant thicknesses. The boundaries of these parastratigraphic units may represent time surfaces, but further research to determine their regional extent should be undertaken before drawing such conclusions. In the writer's opinion, the chert horizon, which lithology occurs only once in each stratigraphic section, may be the best isochronous surface within the Maynardville, and Figure 2 (page 9) is drawn on the basis of this conclusion.

The writer believes that the Low Hollow limestone Member of the Maynardville as defined by Miller and Fuller (see page 7) is the equivalent of the mottled limestone and laminated limestone and dolomite units as described herein. The banded dolomite unit and the dolomicrite unit are equivalent to the Chances Branch dolomite Member as established by the above named authors (page 7).

Interpretation of Depositional Environment

The most striking features of the Maynardville Formation

pertinent to environmental considerations are the oolites, mud cracks, and intraformational conglomerates. They suggest agitated conditions and occasional periods of desiccation. Intraformational conglomerates may result from disruption of sediment by wave action as the area is subsequently inundated. Oolites suggest agitated waters. Occasional micrite pellets within the oolite horizon suggest similar agitated shallow water origins.

The laminated zone is suggestive of strata termed algal stromatolites by Logan, Rezak, and Ginsburg (1964, pages 68-83). Reasons for this interpretation as outlined by the above authors include:

1. Micro-unconformities.
2. Confluence of laminae.
3. Undulatory bedding.
4. Microconglomerates.

The type of algal stromatolite most nearly resembling those forms suggested by structures within the laminated zone are referred to as laterally linked hemispheroids, abbreviated LLH. These LLH types are presently being developed within the "marine, intertidal mud-flat environment" (Logan, Rezak, and Ginsburg, page 77). Ancient forms are likewise postulated to have developed under the same general set of environmental conditions.

Problems of Group Classification

Hatcher (1965, pages 32, 36, 38) has described mottled limestone from all limestone lithosomes of the Conasauga Group, the Rutledge,

Maryville, and Maynardville formations, and the Craig Member of the Rogersville Shale. To this writer's knowledge no mottled limestone has been described from within the Knox Group. However, dolomite lithologies typical of the upper Maynardville have been observed by the writer in the Knox Group; little dolomite typical of the upper Maynardville has been described from the rest of the Conasauga Group. Similarly, black chert is common in the Copper Ridge Dolomite, but none is known to exist in the Conasauga Group. Finally, stromatolitic dolomite comprises up to 60 percent of the Copper Ridge (Harris, 1966, page C49), and is quantitatively important within the Maynardville, but little if any has been described from the rest of the Conasauga Group.

The writer thinks that the present classification of the Maynardville Formation as the uppermost formation within the Conasauga Group should be re-examined in the light of the criteria stated above. It is suggested that the strata which comprise the bulk of the Maynardville are more closely related to the strata which are found within the Knox Group. Should future research on the Maynardville Formation within other strike belts bear out this supposition, it is suggested that the Maynardville be placed within the Knox Group.

Problem of Formational Boundaries

As previously stated on page 30, the upper boundary of the Maynardville is gradational within the strike belt studied by the

writer; strata typical of the Copper Ridge Dolomite gradually replace beds of the upper Maynardville. The writer spent several days in the field with Dr. Donald C. Haney in the vicinity of Rogersville, Tennessee, primarily for the purpose of observing the nature of the Maynardville-Copper Ridge boundary. In the Rogersville area, the contact could be easily drawn on the appearance of a persistent arenite bed on the order of one-half to one foot thick; however, no distinct change in lithology was noted above the aforementioned arenite bed. This bed is not found within the study area in the Copper Ridge strike belt. Therefore, the upper boundary is difficult to establish accurately except for the presence of chert in the Copper Ridge. As has been stated previously, where no bedrock is visible, the contact is drawn on the lowest appearance of chert in the residuum. Creep in the residuum could cause a shift in the apparent position of the formation boundary. There is no easily established or consistent boundary between the Maynardville and the Copper Ridge.

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APPENDICES

APPENDIX A

FIELD PROCEDURE

Location of Sections

Measureable sections of the Maynardville Formation were located according to the following procedure:

1. T.V.A. topographic maps (scale 1:24000) were studied in order to locate roads, railroad cuts, and quarries which traverse or are located in the Maynardville Formation portion of Copper Ridge.
2. All potential section localities were field checked by automobile traverse or on foot.
3. Those localities at which measureable sections were located were marked on the aforementioned topographic maps.

Direct Measurement of Sections

Sections were measured with a steel tape. Whenever possible, measurement was done at right angles to the strike of the beds. In the rare instances of sections oblique to strike, appropriate correction was made at the outcrop. Strike and dip of strata were measured at each location.

Large covered intervals were measured by trigonometric computation from Brunton compass and tape traverse. Smaller covered intervals were measured by tape measure, and rarely, by estimation.

Thickness Terminology

Bedding thickness terminology is modified after Ingram (1954) and is as follows:

<u>Unit Thickness</u>	<u>Stratigraphic Term</u>
0.4 to 1.0 inch	Very thinly bedded
1.0 to 4 inches	Thinly bedded
4 to 12 inches	Medium-bedded
1 to 3 feet	Thickly bedded
Over 3 feet	Very thickly bedded

Color Designations

Colors were determined by comparison of dry rock with the Rock Color Chart (Goddard, et al., 1963). Colors were described for fresh and weathered rock.

Field Grain Size Terminology in Carbonates

Field description of grain size in carbonate strata was, in general, made according to the following chart.

<u>Textural Term</u>		<u>Description</u>
<u>Calcite</u>	<u>Dolomite</u>	
Micrite	Dolomicrite	Predominantly micro-crystalline limestone and dolomite (after Folk, 1957, pages 142, 159).
Fine-crystalline (both)		Predominantly visible grains to approximately 0.5 mm.
Coarse-crystalline (both)	Saccaroidal	Grain diameter 0.5 mm. and greater.

General Lithologic Terminology

Lithologic terms used in field descriptions generally conform to the following definitions.

1. Mottled limestone: rock composed primarily of calcite and dolomite, with the dolomite occurring as irregular, lenticular, blebs, and stringers, and as thin, unevenly bedded discrete zones between the limestone.
2. Dolomitic limestone and calcitic dolomite: relative percent calcite and dolomite estimated by degree of effervescence in dilute hydrochloric acid.
3. Laminated: limestone or dolomite alternations of light and dark beds on the order of twenty to thirty to the inch.
4. Dolomicrite: rock composed principally of microcrystalline dolomite.

APPENDIX B

MEASURED SECTIONS

Section 1

Section along Southern Railroad cut through Copper Ridge, 1.25 miles north of Bell Campground. $36^{\circ} 02' 48''$ north, $84^{\circ} 03' 12''$ west. Knox County. Powell Station quadrangle.

Feet

Maynardville Formation (99.3 feet; upper units not exposed)

Laminated Unit (top not exposed; 24.0 feet)

- | | | |
|-----|--|------|
| 22. | Covered. | |
| 21. | Dolomite, argillaceous, laminated when fresh, with some mud cracks on bedding surfaces, weathers shaly and light yellowish gray. | 3.0 |
| 20. | Dolomite, thinly to very thinly bedded, fine saccaroidal texture, medium light gray. | 2.0 |
| 19. | Dolomite, argillaceous, laminated, very light gray to yellowish gray, weathers yellowish to light yellowish gray. | 0.6 |
| 18. | Dolomite, laminated, weathers shaly, as interval 21. | 3.1 |
| 17. | Dolomite, laminated, as interval 21, partially covered. | 10.6 |
| 16. | Dolomite, appears mottled, medium dark gray, micritic to fine saccaroidal texture. | 0.8 |
| 15. | Covered. | 1.0 |
| 14. | Dolomite, laminated, very light gray to yellowish gray, weathers yellowish gray to light yellowish gray. | 2.9 |

Mottled Limestone Unit (75.3 feet)

- | | | |
|-----|---|-----|
| 13. | Covered. | 1.0 |
| 12. | Dolomite, calcitic, saccaroidal texture, medium to medium dark gray. | 2.3 |
| 11. | Dolomite, slightly calcitic, finely crystalline, medium light gray, medium to thickly bedded, weathers yellowish gray. | 2.5 |
| 10. | Covered. | 1.5 |
| 9. | Limestone, mottled with dolomite, finely crystalline, medium to thickly bedded, weathers medium gray to yellowish gray. | 2.1 |

	Feet
8. Covered.	1.0
7. Limestone, crudely mottled, as interval 9, one bed.	0.6
6. Interval mostly covered, with some change of dip. Thickness of interval estimated by matching beds with Heiskell Road Quarry section 1.5 mi. northeast.	26.0
5. Limestone, mottled with dolomite; limestone is medium light to medium dark gray, thickly bedded, micritic in texture; dolomite weathers yellowish gray to yellowish orange.	7.8
4. Covered.	13.0
3. Limestone, mottled with dolomite, as interval 5, medium-bedded.	1.5
2. Limestone, mottled with dolomite as interval 5, thickly to very thickly bedded.	16.0

Nolichucky Formation (not measured)

1. Limestone, non-mottled, coarsely crystalline, very thickly bedded, medium to medium dark gray, overlying yellowish gray to dark yellow green weathering shale, the latter usually interbedded with medium dark gray argillaceous, lenticular to medium-bedded micrite.

Section 2

Section along Heiskell Road, primarily in quarry .35 mi. southeast of junction with Brushy Valley Road. $36^{\circ} 03' 42''$ north, $84^{\circ} 02' 34''$ west. Knox County. Powell Station quadrangle.

Maynardville Formation (upper units not exposed; 119.1 feet) Feet

Banded Dolomite (top not exposed; 14.1 feet)

- | | |
|---|-----|
| 29. Dolomite, banded, medium gray, medium-bedded. | 2.1 |
| 28. Dolomite, banded, thickly to very thickly bedded, medium gray, containing one 0.2' bed of silicified oolites 0.8' above base. | 4.2 |
| 27. Covered. | 1.4 |
| 26. Dolomite, predominantly thickly bedded, vuggy, slightly calcitic, argillaceous, banded. | 6.4 |

Laminated Unit (28.5 feet)

- | | |
|--|-----|
| 25. Covered. | 3.5 |
| 24. Dolomite, laminated, argillaceous. | 0.4 |
| 23. Covered. | 1.4 |
| 22. Dolomite, very argillaceous, laminated, very thinly bedded, micritic texture, weathers shaly. | 3.0 |
| 21. Dolomite, laminated, argillaceous. | 1.6 |
| 20. Covered. | 1.2 |
| 19. Dolomite, laminated, bedding locally disrupted. | 1.6 |
| 18. Dolomite, laminated, very argillaceous, contains one 0.6' bed of mottled limestone, weathers shaly. | 1.4 |
| 17. Covered. | 8.0 |
| 16. Dolomite, laminated. | 1.4 |
| 15. Covered. | 1.0 |
| 14. Limestone, mottled, one bed. | 1.7 |
| 13. Dolomite, laminated, medium gray to light olive gray, stylolitic, laminae are locally quite disrupted. | 2.3 |

Mottled Limestone Unit (76.5 feet)

- | | |
|--|------|
| 12. Dolomite, micritic to fine saccaroidal texture, in places, calcitic; medium gray to medium light gray, with considerable amounts of coarse-grained limestone interbedded, locally vuggy. | 11.8 |
| 11. Limestone, dolomitic, fine saccaroidal to micritic texture, medium to thickly bedded; somewhat laminated. | 5.0 |

	Feet
10. Limestone, occasionally mottled, coarse- to fine-grained, thickly bedded, somewhat vuggy, medium dark gray.	4.3
9. Limestone, mottled to laminated, irregular to thickly bedded, medium dark gray.	4.3
8. Limestone, micritic to very fine-grained texture, medium dark gray, thickly bedded.	3.6
7. Limestone, mottled, mottling faint.	4.2
6. Limestone, mottled with dolomite, micritic to coarse-grained, medium gray to yellowish gray, medium to very thickly bedded.	10.5
5. Limestone, mottled as #6.	17.0
4. Shale, medium dark gray, slightly calcitic, alternating with nodular to thinly bedded generally micritic limestone.	3.1
3. Limestone, mottled, coarsely crystalline, medium to dark gray, thickly bedded.	3.5
2. Limestone, poorly mottled, micritic to coarse-grained texture, medium to yellowish gray, medium to thickly bedded.	9.6

Nolichucky Formation

1. Limestone, medium gray, coarse-grained, medium to very thickly bedded, with an occasional intraformational conglomerate, alternating with calcareous light olive gray to grayish olive shale, containing lenticular to thinly bedded micrite beds; suggestions of oolites are found within the limestone. Shale increases toward the base.

over 100

Section 3

Section along unnamed road .42 miles southeast of intersection with Brushy Valley Road, at village of Pedigo. 36° 05' 42" north, 83° 59' 26" west. Knox County. Fountain City quadrangle.

Feet

Copper Ridge Dolomite

56. Dolomicrite, medium to thickly bedded, medium light gray, white chert weathers out in rock. not measured

Maynardville Formation (lower portion not exposed; 125.0 feet).

Dolomicrite Unit (42.8 feet)

- | | |
|--|-----|
| 55. Dolomicrite, medium to thickly bedded, medium light gray, containing a few reddish brown bands. | 4.7 |
| 54. Dolomite, finely crystalline, medium to thickly bedded, medium gray, containing a few reddish brown limonitic bands. | 2.7 |
| 53. Dolomicrite, medium light gray, thickly bedded. | 1.8 |
| 52. Dolomicrite, saccaroidal, medium dark gray, medium-bedded. | 1.8 |
| 51. Dolomite, as interval 52. | 0.6 |
| 50. Dolomicrite, medium to thinly bedded, light gray. | 2.6 |
| 49. Covered. | 5.0 |
| 48. Dolomite, saccaroidal, medium-gray, thinly bedded. | 0.7 |
| 47. Dolomicrite, medium gray, thickly bedded. | 3.7 |
| 46. Dolomite, coarse-grained, dark gray, one bed. | 0.3 |
| 45. Covered. | 0.5 |
| 44. Dolomicrite, as interval 47. | 1.9 |
| 43. Covered. | 1.0 |
| 42. Dolomite, predominantly micritic with some saccaroidal beds, medium light gray to medium gray, medium to thinly-bedded, non-banded; partially covered. | 0.9 |
| 41. Dolomite, coarse-grained, calcitic, medium light gray, vuggy, unevenly bedded. | 2.2 |
| 40. Dolomite, as interval 42. | 6.7 |
| 39. Dolomite, medium to thickly bedded, medium light gray to medium gray, finely crystalline, stylolitic, with an occasional calcitic dolomite layer. | 4.9 |
| 38. Limestone, dolomitic, very argillaceous at base. | 0.8 |

Banded Dolomite Unit (50.4 feet)

	Feet
37. Dolomite, saccaroidal to micritic texture, medium gray, medium to thinly bedded, occasionally banded with limonitic material.	3.4
36. Dolomicrite, medium light gray, medium-bedded, occasionally banded.	2.1
35. Dolomite, finely saccaroidal texture, medium-bedded, medium light gray.	3.8
34. Dolomite, finely saccaroidal texture, medium dark gray, medium-bedded, stylolitic.	1.3
33. Dolomicrite, medium gray, medium-bedded.	1.3
32. Limestone, dark gray, coarsely crystalline.	0.3
31. Limestone, dolomitic, coarsely crystalline, vuggy, with calcite crystals lining vugs.	1.2
30. Limestone, coarsely crystalline, light gray, deeply weathered, alternating with dolomite, very thinly bedded, argillaceous, contains a few mud cracks.	4.0
29. Dolomicrite, medium gray, occasionally banded, one bed.	0.8
28. Dolomite, very thinly bedded, finely crystalline, argillaceous.	1.0
27. Dolomite, fine saccaroidal texture, light gray, medium-bedded, upper 0.5 feet banded.	2.5
26. Chert, dark gray to black, lenticular.	0.2
25. Dolomicrite, thin- to medium-bedded, light gray, vuggy.	0.4
24. Dolomicrite, light gray, thickly bedded, unevenly so at base, rarely banded.	2.9
23. Dolomicrite, as interval 24.	1.9
22. Dolomicrite, thickly bedded, light gray, occasionally banded.	3.9
21. Dolomicrite, thinly bedded, laminated at base, occasionally banded near top.	0.4
20. Dolomicrite, medium gray, thickly bedded, banded to laminated, locally contains thin layers of finely saccaroidal dolomite (less than one inch in thickness); one bed.	1.8
19. Dolomicrite, medium-bedded, as interval 20.	2.7
18. Dolomicrite, medium-bedded, medium gray, unevenly banded.	1.2
17. Dolomicrite, medium-bedded, medium dark gray.	1.2
16. Dolomicrite, medium gray, medium to thickly bedded, evenly banded, the bands averaging an inch apart. Not readily apparent on weathered surface.	2.0

	Feet
15. Dolomicrite, thickly bedded, medium gray, a zone of oolites occurs as lenticular pods within the unit, averaging about 0.3 foot thick.	1.7
14. Dolomicrite, thickly bedded, medium gray.	1.3
13. Dolomicrite, thickly bedded, medium gray.	5.1
12. Dolomite, saccharoidal, medium gray, medium- to thinly bedded, lower portion stromatolitic.	0.9
11. Dolomicrite, medium-bedded, light gray.	1.1
Laminated Unit (26.2 feet)	
10. Dolomite, laminated, medium light gray, very argillaceous, when weathered resembles a shale.	5.7
9. Dolomite, laminated, in places poorly so, medium gray, medium-bedded, when deeply weathered, the unit resembles a shale; penecontemporaneous deformation very pronounced, the laminae are intensely folded and distorted.	5.4
8. Limestone, sublithographic, unevenly bedded, medium to dark gray.	2.4
7. Dolomite, laminated, medium gray, medium-bedded, weathers yellowish orange.	5.2
6. Limestone, sublithographic, thickly-bedded, medium dark to dark gray.	5.3
5. Dolomite, laminated, medium gray, medium to thinly bedded.	2.2
Mottled Limestone Unit (6.5 feet)	
4. Limestone, sublithographic, medium gray, medium-bedded.	1.0
3. Limestone, sublithographic, very thinly bedded, medium gray.	0.2
2. Limestone, sublithographic to micritic, medium to thickly bedded, medium dark to dark gray.	5.3
1. Covered.	not measured

Section 4

Section along U. S. 441 (Norris Freeway), primarily in quarry 0.4 miles southeast of intersection with Brushy Valley Road. 36° 06' 32" north, 83° 58' 32" west, Knox County, Fountain City quadrangle.

	Feet
Maynardville Formation (upper units not exposed; 122.1 feet)	
Banded Dolomite Unit (top not exposed; 25.5 feet)	
27. Not measured, vertical quarry wall.	
26. Dolomicrite, banded, medium gray, medium-bedded.	1.0
25. Dolomicrite, medium gray, unevenly bedded, vuggy.	3.9
24. Dolomicrite, as interval 25.	3.4
23. Dolomicrite, banded, medium-bedded, medium dark gray, slightly calcitic; banding more pronounced towards top.	3.2
22. Chert, black, lenticular.	0.2
21. Dolomicrite, occasionally banded, medium dark to medium light gray, medium-bedded, stylolitic; vuggy and more thinly bedded at top.	6.3
20. Dolomicrite, slightly calcitic, thickly bedded, vuggy, stylolitic; oolite zone occurs two feet above base, confined to pods and lenses.	4.2
19. Limestone, coarsely crystalline, banded to coarsely laminated, vuggy, with calcite crystals lining vugs; thickly bedded.	3.3
Laminated Unit (16.4 feet)	
18. Limestone, dolomitic, laminated at base, becoming more or less banded toward the top, medium gray.	2.7
17. Dolomite, calcitic, laminated, laminae locally obscured, a few two inch chippy-weathering zones, very argillaceous.	4.4
16. Dolomite, calcitic, laminated, medium-bedded, light to medium gray; somewhat more thickly bedded toward the top.	3.5
15. Dolomite, calcitic, laminated; medium-bedded, argillaceous, laminae stand out upon weathering, contains scattered layers of intraformational conglomerate, and local microfolding.	4.6
14. Limestone, argillaceous, weathers to a shale; light gray, very thinly bedded.	1.2
Mottled Limestone Unit (80.2 feet)	

	Feet
13. Limestone, sublithographic, medium dark gray, unevenly bedded.	1.2
12. Limestone, mottled with dolomite, medium dark gray, argillaceous; one bed.	1.0
11. Limestone, poorly mottled, thickly to very thickly bedded, argillaceous, fine-grained to micritic texture.	11.0
10. Limestone, mottled with dolomite, largely covered.	7.0
9. Covered.	3.0
8. Limestone, mottled with dolomite, largely covered.	5.0
7. Limestone, mottled with dolomite, medium gray, thickly bedded.	5.0
6. Limestone, mottled with dolomite, as interval 7, partially covered.	6.8
5. Limestone, mottled with dolomite, medium gray, micritic texture, partially covered.	7.7
4. Largely covered, occasional outcroppings of mottled limestone, a few shale chips in residuum.	10.0
3. Limestone, mottled with dolomite, thickly bedded, medium dark gray, partially covered at base.	11.4
2. Limestone, mottled with dolomite, medium to thickly bedded, medium dark gray, generally micritic and dolomicritic textures.	11.1

Nolichucky Formation

- | | |
|--------------------------------------|--------------|
| 1. Covered, shale chips in residuum. | not measured |
|--------------------------------------|--------------|

Section 5

Section along Tennessee Route 33, 4.7 miles north of Halls Crossroads.
 36° 08' 27" north, 83° 54' 33" west, Knox County, Big Ridge Park
 quadrangle.

Maynardville Formation (upper units not exposed; 36.5 feet) Feet

Mottled Limestone Unit (top not exposed; 36.5 feet)

- | | |
|--|------|
| 12. Covered. | |
| 11. Limestone, mottled with dolomite, fine-grained to micritic, medium gray, with occasional calcite eyelets; generally medium-bedded; mottling less apparent on bedding surfaces. | 2.5 |
| 10. Covered. | 4.5 |
| 9. Limestone, mottled with dolomite, as in interval 11. | 2.0 |
| 8. Covered. | 4.0 |
| 7. Shale, olive green, slightly calcitic. | 1.0 |
| 6. Covered. | 3.8 |
| 5. Limestone, mottled with dolomite, medium to thickly bedded, otherwise as interval 11. | 11.2 |
| 4. Limestone, mottled with dolomite, as interval 5. | 4.5 |
| 3. Shale, slightly calcitic, as interval 7. | 0.2 |
| 2. Limestone, mottled with dolomite, as interval 11. | 2.8 |

Nolichucky Formation

- | | |
|---|------|
| 1. Shale, calcitic to non-calcitic, medium gray to olive green, in places sparingly fossiliferous, usually occurring as massive beds or interbedded with limestone, the latter occurring as discrete beds or more commonly as lenses, generally medium gray, micritic to coarsely crystalline, and argillaceous; in places oolitic, locally containing layers of intraformational conglomerate; minor amounts of siltstone are present, normally as thin beds interbedded with shale. | 200+ |
|---|------|

Section 6

Section along State Route 144, 1.6 miles northwest of junction with State Route 131. 36° 11' 17" north, 84° 11' 03" west, Union County, Gravelston quadrangle.

Feet

Maynardville Formation (upper unit not exposed; 140.3 feet)

Dolomicrite Unit (top not exposed; 14.6 feet)

41. Not exposed.	40
	(estimated)
40. Dolomicrite, occasionally banded, medium to thickly bedded, medium to light gray.	5.5
39. Dolomicrite, light gray, medium to thickly bedded, weathers pale yellowish orange to white.	7.3
38. Dolomite, saccaroidal, medium to very thinly bedded, argillaceous.	1.8

Banded Dolomite Unit (27.0 feet)

37. Dolomite, fine saccaroidal texture, light gray, medium-bedded, occasionally banded.	1.2
36. Dolomite, fine saccaroidal texture, medium gray, medium-bedded.	1.9
35. Covered.	1.0
34. Dolomicrite, medium gray, thickly bedded.	2.4
33. Chert, dark gray to black, lenticular.	0.3
32. Dolomite, fine saccaroidal texture, light gray, medium-bedded, vuggy.	2.3
31. Dolomicrite, banded, alternating more or less regularly with thinly bedded, argillaceous, shaly-weathering dolomite.	4.2
30. Dolomite, fine saccaroidal texture, light to medium gray, medium-bedded, pods of oolites in lower one foot.	2.8
29. Dolomite, fine saccaroidal texture, medium gray, medium-bedded.	2.2
28. Covered.	2.0
27. Dolomicrite, banded, medium gray, thickly bedded.	1.4
26. Limestone, light to medium gray, medium-bedded, very fine-grained; calcite veinlets present in interval.	1.0
25. Covered.	1.5
24. Dolomite, fine saccaroidal texture, vuggy, medium gray, appears deeply weathered.	1.2
23. Dolomite, fine saccaroidal, medium light gray, medium-bedded.	1.6

Feet

Laminated Unit (48.1 feet)

22.	Dolomite, very argillaceous, chippy-weathering, resembles shale when weathered, medium to very thinly bedded, yellowish gray when weathered; mud cracks on bedding surfaces.	7.0
21.	Covered, with chips of argillaceous dolomite as interval 22 in residuum.	7.0
20.	Dolomicrite, laminated to banded, medium to thickly bedded, slightly calcitic, argillaceous.	4.0
19.	Covered.	1.0
18.	Dolomite, laminated, medium to thickly bedded when fresh, medium to medium dark gray.	4.6
17.	Covered, chips of laminated dolomite in residuum.	17.0
16.	Dolomicrite, slightly calcitic, medium to medium dark gray, laminated.	1.8
15.	Dolomite, as interval 16.	1.9
14.	Covered.	0.8
13.	Dolomite, laminated, slightly calcitic.	0.5
12.	Covered.	0.3
11.	Dolomite, laminated, slightly calcitic, medium-bedded, medium gray.	2.2

Mottled Limestone Unit (50.3 feet)

10.	Limestone, mottled with dolomite, medium dark gray to medium gray, medium-bedded, micritic to very fine-grained.	4.1
9.	Dolomite, laminated, slightly calcitic.	1.6
8.	Limestone, mottled with dolomite, medium to very thickly bedded; mottling less distinct at top.	5.4
7.	Limestone, mottled with dolomite, as interval 8.	4.3
6.	Covered.	2.0
5.	Limestone, mottled with dolomite, as interval 8.	11.9
4.	Covered.	3.0
3.	Limestone, mottled with dolomite, as interval 8, partially covered.	7.3
2.	Limestone, mottled with dolomite, medium dark gray, dolomite weathers pale yellowish orange; limestone texture, coarse-grained to micritic, dolomite texture, micritic to fine-saccaroidal; medium to thickly bedded.	14.5

Nolichucky Formation

1.	Covered, few scattered shale chips in residuum.	not measured
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Section 7

Section along Southern Railroad cut through Copper Ridge, 1.2 miles northwest of the town of Washburn. $36^{\circ} 18' 37''$ north, $83^{\circ} 35' 54''$ west. Grainger County. Dutch Valley quadrangle.

Copper Ridge Dolomite

Feet

- | | |
|--|-----|
| 45. Dolomite, finely crystalline, generally thickly bedded, sparse white chert weathering out in rock. | 5.3 |
| 44. Covered, sparse chert in residuum. | 3.3 |

Maynardville Formation (approximately 184 feet)

Dolomicrite Unit (41.6 feet)

- | | |
|--|-----|
| 43. Dolomicrite, medium to thickly bedded, medium gray. | 2.2 |
| 42. Covered. | 3.8 |
| 41. Dolomicrite, medium-bedded, medium gray. | 0.9 |
| 40. Covered. | 2.0 |
| 39. Dolomicrite, medium to thickly bedded, medium gray. | 1.7 |
| 38. Covered. | 3.0 |
| 37. Dolomicrite, thickly bedded, medium light gray. | 2.8 |
| 36. Dolomite, coarsely crystalline to micritic, medium dark gray, medium to thickly bedded. | 3.3 |
| 35. Covered. | 2.0 |
| 34. Dolomicrite, medium-bedded, medium light gray. | 0.7 |
| 33. Dolomicrite, thickly bedded, medium dark gray. | 2.6 |
| 32. Dolomicrite, medium light gray, thinly bedded. | 1.9 |
| 31. Dolomicrite, light to medium gray, medium to thickly bedded. | 3.8 |
| 30. Dolomicrite, thickly bedded, medium to medium light gray. | 2.6 |
| 29. Dolomicrite, medium gray, medium-bedded, rarely banded with limonitic material. | 1.7 |
| 28. Dolomite, fine saccaroidal texture, medium to thickly bedded, medium to medium dark gray, vuggy. | 2.8 |
| 27. Dolomite, saccaroidal texture, medium to medium dark gray, thickly bedded, vuggy. | 3.8 |

Banded Dolomite Unit (26.0 feet)

- | | |
|--|-----|
| 26. Dolomicrite, medium to thickly bedded, occasionally banded, medium light gray, pale orange to yellowish gray weathering, contains one intraformational conglomerate bed. | 1.7 |
|--|-----|

	Feet
25. Dolomicrite, very thinly bedded, medium light gray.	0.8
24. Dolomicrite, occasionally banded, medium light gray, medium to thickly bedded, as interval 26.	2.6
23. Covered.	3.1
22. Dolomicrite, medium-bedded, medium gray, argillaceous.	3.4
21. Dolomite, medium to thickly bedded, bedding surfaces tend to be reddish brown, overall mottled appearance, intraformational conglomerate at base.	3.2
20. Dolomicrite, medium dark gray, medium-bedded.	1.6
19. Dolomite, calcitic, dark gray, medium to thickly bedded, upper portion saccaroidal, lower portion fine-grained.	2.6
18. Dolomicrite, banded, light yellowish gray to pale orange weathering.	2.6
17. Covered.	2.8
16. Dolomite, fine saccaroidal texture, medium light gray, thinly bedded, argillaceous.	0.5
15. Covered.	1.1
Laminated Unit (40.9 feet)	
14. Dolomite, laminated, very thinly bedded, weathers shaly, argillaceous, weathers very light gray to yellowish gray.	2.5
13. Covered interval, calculated.	37.8
12. Dolomite, very thinly bedded, argillaceous, medium light gray to light olive gray weathering.	0.6
Mottled Limestone Unit (75.6 feet)	
11. Limestone, micritic to fine-grained, medium to thickly bedded, medium dark gray.	4.5
10. Covered interval, calculated.	24.0
9. Limestone, mottled with dolomite, medium-bedded, micritic to finely crystalline, argillaceous, weathers medium dark gray to dark yellowish gray.	0.7
8. Covered, shale chips, yellowish gray to greenish gray, in residuum.	1.2
7. Limestone, mottled with dolomite, medium to thickly bedded.	2.8
6. Covered, a few shale chips as interval 8 in residuum.	3.0
5. Limestone, mottled with dolomite, thickly to very thickly bedded, otherwise as interval 9; the outcrop is one continuous bluff.	27.4
4. Limestone, mottled with dolomite, thinly bedded, argillaceous, weathers medium dark gray to yellowish gray.	2.0

Feet

- | | |
|--|-----|
| 3. Largely covered; a few outcrops of mottled limestone, as interval 4, mostly shale debris, as interval 8. | 7.0 |
| 2. Limestone, mottled with dolomite, interbedded with shale as interval 8; limestone medium to thinly bedded, finely crystalline, medium dark gray, weathers yellowish gray. | 3.0 |

Nolichucky Formation

- | | |
|--|-----------------|
| 1. Shale, yellowish gray to greenish gray, calcareous, associated with minor amounts of lenticular to thinly bedded, micritic to fine-grained limestone. | not
measured |
|--|-----------------|

Section 8

Section along U. S. 25-E, 1.8 miles northwest of village of Thorn Hill. 36° 22' 04" north, 83° 26' 22" west. Grainger County. Avondale quadrangle.

The Thorn Hill section has been previously measured by Hall and Amick (1934, pages 157-168).

Copper Ridge Dolomite

Feet

- | | |
|--|--------------|
| 63. Dolomite, traces of chert in residuum surrounding rock, and locally in rock. | not measured |
|--|--------------|

Maynardville Formation (179.5 feet)

Dolomicrite Unit (48.6 feet)

- | | |
|---|-----|
| 62. Dolomite, very argillaceous, weathers shaly. | 0.1 |
| 61. Dolomicrite, medium to thickly bedded, medium gray. | 5.1 |
| 60. Dolomite, very argillaceous, weathers shaly. | 1.5 |
| 59. Dolomicrite, medium to thickly bedded, medium gray, locally vuggy. | 9.9 |
| 58. Dolomicrite, medium to thickly bedded, medium gray. | 7.6 |
| 57. Dolomicrite, medium dark gray, medium-bedded, vuggy. | 1.0 |
| 56. Dolomicrite, medium-bedded, yellowish gray weathering, occasionally banded. | 3.3 |
| 55. Dolomicrite, thickly bedded, medium dark gray, vuggy in upper half. | 5.6 |
| 54. Covered. | 2.0 |
| 53. Dolomicrite, medium light gray, thickly to very thickly bedded. | 5.3 |
| 52. Dolomicrite, medium to light gray, medium to thinly bedded. | 2.0 |
| 51. Covered. | 1.0 |
| 50. Dolomicrite, banded, one bed. | 0.5 |
| 49. Dolomicrite, medium-bedded, medium gray, locally fine-grained; stylolitic. | 8.8 |

Banded Dolomite Unit (48.3 feet)

- | | |
|---|-----|
| 48. Dolomicrite, medium-bedded, occasionally banded. | 1.8 |
| 47. Dolomite, saccharoidal, medium dark gray, vuggy. | 0.3 |
| 46. Chert, oolitic, dark gray to black. | 0.2 |
| 45. Dolomicrite, medium gray, medium-bedded. | 1.2 |
| 44. Dolomite, argillaceous, yellowish gray; mud cracks on bedding surfaces. | 3.9 |

	Feet
43. Covered.	1.5
42. Dolomicrite, banded with limonitic material, weathers yellowish gray.	1.9
41. Dolomite, very argillaceous, weathers shaly.	1.5
40. Covered.	0.8
39. Dolomite, saccaroidal, medium dark gray, vuggy.	3.0
38. Covered.	1.0
37. Dolomicrite, banded, medium gray, medium-bedded, contains one 0.1 foot lenticular, discontinuous bed of non-silicified oolites, located 0.5 foot from the base of the unit.	2.6
36. Dolomicrite, medium gray, argillaceous, locally banded.	2.8
35. Dolomicrite, as interval 36.	2.4
34. Dolomicrite, medium gray, occasionally banded, one bed.	1.7
33. Dolomicrite, as interval 34.	2.5
32. Dolomicrite, as interval 34.	1.6
31. Dolomicrite, medium-bedded, medium gray.	2.1
30. Dolomicrite, occasionally banded, medium gray, thickly bedded.	5.1
29. Dolomicrite, medium to thinly bedded, partially covered.	1.0
28. Dolomicrite, occasionally banded, medium gray, medium to thickly bedded.	3.1
27. Dolomicrite, banded, medium light gray.	1.2
26. Dolomicrite, occasionally banded, medium light gray.	2.2
25. Dolomicrite, medium to medium dark gray, contains one 1-2 inch bed of flat-pebble conglomerate.	2.9
Laminated Unit (22.2 feet)	
24. Dolomite, medium gray, laminated.	1.6
23. Dolomite, banded, fine-saccaroidal texture, medium gray; one bed.	0.8
22. Dolomite, saccaroidal, medium dark gray, vuggy.	0.6
21. Dolomite, laminated, argillaceous.	0.7
20. Covered, chips of laminated dolomite in residuum.	1.0
19. Dolomicrite, laminated to finely banded, medium-bedded.	1.3
18. Limestone, dolomitc; laminated, argillaceous medium dark gray, partially covered.	2.2
17. Limestone, dolomitc, laminated, micritic texture, medium-bedded when fresh; laminae irregular and undulating.	11.1
16. Limestone, very thinly bedded when weathered, may suggest transition to laminated material.	2.9

Mottled Limestone Unit (60.4 feet)

Feet

15.	Limestone, thinly bedded, medium dark gray, bedding planes separated by thin shale seams.	3.0
14.	Covered, shale chips in residuum.	1.2
13.	Limestone, mottled with dolomite, medium to thickly bedded, medium to medium dark gray; bedding surfaces separated by one-fourth to one-half inch shale seams.	2.8
12.	Limestone, mottled with dolomite, medium to thinly bedded, medium to medium dark gray, micritic.	4.7
11.	Covered, shale chips in residuum.	1.2
10.	Limestone, mottled with dolomite, medium to thickly bedded, medium dark gray when fresh.	7.5
9.	Limestone, mottled with dolomite, as interval 10.	6.7
8.	Covered.	5.0
7.	Limestone, medium dark gray, thinly bedded, micritic texture, alternating with light olive gray weathering shale, the seams averaging three inches thick.	5.2
6.	Covered, shale chips in residuum.	2.7
5.	Limestone, mottled with dolomite, medium to thinly bedded, medium dark gray; bedding planes separated by shale seams averaging 0.3 foot thick.	4.5
4.	Shale, calcitic, light olive gray to yellowish gray, alternating with lenticular to thinly bedded micrite.	5.7
3.	Limestone, lenticular to thinly bedded, micritic, medium dark gray, alternating with calcitic light olive gray to yellowish gray weathering shale.	3.8
2.	Limestone, mottled with dolomite, argillaceous, medium-bedded, medium dark gray.	6.4

Nolichucky Formation

1. Shale, calcitic, medium dark gray to yellowish gray, occurring as massive beds or interbedded with argillaceous, lenticular to thinly bedded, medium to medium dark gray micrite.

not
measured

Section 9

Section along Tennessee Route 66, 1.2 miles northwest of the village of Lee Valley. $36^{\circ} 28' 27''$ north, $83^{\circ} 09'$ west. Hawkins County. Lee Valley quadrangle.

The Lee Valley section has been previously measured by Rodgers and Kent (1948, pages 12-14).

Maynardville Formation (185.7 feet)

Feet

Dolomicrite Unit (47.6 feet)

- | | |
|---|-----|
| 45. Dolomicrite, very thickly bedded, medium to light gray. | 3.2 |
| 44. Dolomicrite, thinly to very thinly bedded, medium to light gray, weathers shaly. | 0.4 |
| 43. Dolomicrite, medium to thickly bedded, light gray, intraformational conglomerate 1.2 feet below top. | 4.2 |
| 42. Dolomicrite, light gray, undulatory bedding. | 4.9 |
| 41. Dolomicrite, light gray, medium-bedded. | 4.9 |
| 40. Dolomicrite, medium gray, one bed. | 4.0 |
| 39. Dolomicrite, medium to thinly bedded, light to medium gray, with an occasional darker bed. | 3.4 |
| 38. Covered. | 2.0 |
| 37. Dolomicrite, medium to thickly bedded, light to medium gray. | 4.0 |
| 36. Dolomicrite, light to dark gray, medium to thickly bedded, weathers light gray; two vuggy zones averaging 1.8 feet thick occur near the middle. | 7.9 |
| 35. Dolomite, laminated. | 1.3 |
| 34. Dolomite, very argillaceous, very thinly bedded, calcitic; mud cracks are found on bedding surfaces; more thickly bedded toward the top. | 8.4 |

Banded Dolomite Unit (38.0 feet)

- | | |
|--|-----|
| 33. Dolomite, light gray, medium-bedded, finely crystalline, laminated to banded, with a few thin beds of medium gray dolomicrite. | 2.1 |
| 32. Dolomicrite, light gray, medium-bedded. | 1.3 |
| 31. Dolomicrite, medium gray, medium-bedded, crudely banded. | 1.1 |
| 30. Dolomicrite, medium to medium dark gray, medium to thinly bedded, crudely banded, in places calcitic. | 5.9 |
| 29. Dolomicrite, medium gray, vuggy, calcite crystals lining vugs. | 1.2 |
| 28. Dolomicrite, light to medium gray, banded, medium to thinly bedded. | 1.4 |

	Feet
27. Largely covered, a few outcrops of dolomicrite as interval 28.	5.2
26. Dolomicrite, medium gray, slightly calcitic.	2.5
25. Dolomicrite, banded, light to medium gray, medium to thinly bedded.	4.0
24. Dolomite, medium gray, calcitic, vuggy; suggestion of mottling near top and base.	2.2
23. Dolomicrite, banded, medium-bedded, medium gray.	3.5
22. Black, oolitic chert.	0.3
21. Dolomicrite, banded, medium gray, medium-bedded.	0.7
20. Dolomite, calcitic, fine-crystalline, crudely mottled, medium gray, weathers medium gray to light brown.	2.0
19. Limestone, dolomitic, medium dark gray, vuggy, weathers yellowish gray.	2.1
18. Dolomite, light gray, medium-bedded, fine-crystalline, upper 0.6 foot banded.	2.1
17. Silicified oolites, one bed.	0.4
Laminated Unit (22.0 feet)	
16. Limestone, dolomitic, laminated, light olive gray.	5.2
15. Limestone, laminated as interval 16, partially covered.	7.8
14. Limestone, laminated as interval 16, partially covered.	9.0
Mottled Limestone Unit (78.1 feet)	
13. Limestone, mottled with dolomite, faintly so at top.	1.5
12. Covered interval.	3.7
11. Limestone mottled with dolomite, medium to thickly bedded, medium dark gray, upper 3.0 feet covered.	27.9
10. Micrite, medium gray, thinly bedded (beds 1-1.5 inches thick) alternating with thin beds of slightly calcareous, olive green to medium gray chippy-weathering shale.	3.4
9. Limestone, mottled with dolomite, as in interval 11, containing a few thin shale seams; lower half partially covered.	19.2
8. Limestone, mottled with dolomite as interval 10.	3.0
7. Covered, shale chips in residuum.	2.0
6. Limestone, mottled with dolomite, as interval 10.	3.3
5. Shale, olive green to light brown, containing thin beds of micrite and siltstone.	2.0
4. Limestone, mottled with dolomite, as interval 10.	0.8

- | | Feet |
|---|------|
| 3. Shale, slightly calcitic, olive green to light brown, contains lenses and 1-2 inch beds of medium gray micrite. One bed of edgewise conglomerate is located two feet above the base. | 8.8 |
| 2. Limestone, mottled with dolomite, medium dark gray, medium to thinly bedded, weathers pale yellowish orange and medium gray. | 2.5 |

Nolichucky Formation

- | | |
|--|-----|
| 1. Shale, olive green to medium gray, silty at base, calcareous; alternating with medium gray, argillaceous, medium-bedded micrite, and noncalcareous chippy olive green to light brown shale.
Below covered. | 4.4 |
|--|-----|

APPENDIX C

MAYNARDVILLE FORMATION STANDARD SECTION

The standard section of the Maynardville Formation was measured by Josiah Bridge, probably around 1938 (Bridge called it the Maynardville Member of the Nolichucky Shale). It is located on the south side of Tennessee Route 33, between the bridge crossing Cox Branch and the Clinch River bridge spanning Norris Lake (Bridge, 1956, page 13). Bridge's descriptions are given below.

Copper Ridge Dolomite

Covered interval, concealing possibly 50 feet of beds. Hillside above road is strewn with chert float of Copper Ridge type, and there are scattered outcrops of coarse-grained dolomite. No outcrops in road ditch.

Nolichucky Shale:

Maynardville Limestone Member:

Feet Inches

- | | | | |
|-----|--|----|---|
| 47. | Limestone, blue, fine-grained, heavily bedded with gray, coarser grained mottlings. This limestone is similar to rocks in unit 32, and the gray mottlings are evidently a weathered phase of the buff and tan mottlings in the lower beds | 3 | 0 |
| 46. | Dolomite, dark-bluish-gray, finely crystalline; weathering moderately light, thick-bedded, laminated, the laminae standing in low relief on weathered surfaces. A few layers of irregular soft porous siliceous nodules along the bedding planes in the upper portions of the unit | 28 | 0 |
| 45. | Shale, olive-green, hard, well-bedded, with thin dolomite layers near top. Hand specimens would be indistinguishable from the mass of the Nolichucky Shale | 2 | 4 |
| 44. | Dolomite, similar to unit 46 but without the siliceous nodules | 2 | 6 |

	Feet	Inches
43. Limestone, light-blue, fine-grained, becoming dolomitic toward the top-----	3	4
42. Dolomite, similar to unit 46 but without the siliceous nodules, shaly at top and base-----	2	0
41. Limestone, dove-colored, sublithographic, massive-----	1	10
40. Shale, olive-green, hard, well-bedded, with thin, platy, fine-grained limestone layers averaging less than 1 inch thick-----	1	8
39. Dolomite, like unit 46-----		9
38. Shale, olive-green, hard, with thin platy layers of dolomitic limestone-----	1	0
37. Dolomite, dark bluish-gray; weathering light colored, finely crystalline, heavy-bedded, finely laminated-----	6	6
36. Limestone, dark-blue, finely crystalline-----	2	0
35. Dolomite, like unit 37-----	4	6
34. Limestone, like unit 36-----	2	10
33. Dolomite, similar to unit 37-----	2	4
32. Limestone, dark-blue, weathering to bluish gray, finely crystalline to sublithographic, with broad irregular tan and buff stripes and mottlings arranged roughly parallel to bedding surfaces---	11	0
31. Dolomite, similar to unit 37-----	11	4
30. Limestone, light-blue to dove-colored, fine-grained to sublithographic, mottled and striped---	3	10
29. Limestone, dark-blue, crystalline, oolitic and conglomeratic; pebbles of limestone, seemingly from the underlying beds, flat, as much as 6 to 8 in. long; most abundant in lower 10 in. of unit---	1	10
28. Shale, greenish-gray, hard; well-stratified with thin layers of dark-blue fine-crystalline laminated dolomite-----	2	6
27. Dolomite, finely crystalline, laminated, dark-blue-gray, weathering light; locally cross-bedded; one layer of stylolites-----	3	0
26. Limestone, dark-bluish-gray, with tan stripes and mottlings similar to unit 32; upper part badly shattered-----	28	6
25. Limestone, light-dove-gray, fine-grained to sublithographic; in some places showing mottlings as above, other places with no traces of bedding-----	6	0
24. Limestone, blue, crystalline, somewhat banded, massively bedded-----	3	6
23. Limestone, dark-blue, somewhat banded with irregular buff and tan stripings and mottlings similar to unit 32; rather poorly exposed-----	7	0

	Feet Inches	
22. Limestone, dark-blue, coarsely crystalline, magnesian, with few but broad bandings and mottlings-----	15	0
21. Limestone, dark-blue, finely crystalline to sublithographic, with buff and tan stripings and mottlings as in unit 32-----	12	0
20. Shale, olive-green, hard, well-stratified-----		6
19. Limestone, finely crystalline to aphanitic, massively bedded, with irregular tan stripes and mottlings similar to those in preceding units, a 2-ft. bed at top-----	13	0
18. Covered interval-----	10	0
17. Limestone, blue, nodular-----	8	0
16. Shale, olive-green, hard, well-stratified-----	3	0
15. Limestone, similar to unit 19-----	2	0
14. Covered interval-----	4	0
13. Limestone, similar to unit 19, largely covered-----	3	0
12. Shale, olive-green, hard, well-stratified-----	2	0
11. Limestone, dark-blue, finely crystalline, massive-----	12	0
10. Shale, olive-green hard-----	4	6
9. Limestone, similar to unit 11; exposed opposite south end of bridge-----	5	0
8. Shale, olive-green, hard, well-bedded-----	1	3
7. Limestone, like unit 11, with bed of edgewise conglomerate at base-----	2	0
6. Shale, like unit 8, typical Nolichucky-----		6
5. Limestone, similar to unit 19-----	1	0
4. Shale, typical Nolichucky, with thin platy beds of fine-grained limestone, averaging less than 1 inch thick-----	8	0
3. Limestone-----	1	6
2. Covered interval-----	10	0
1. An alternating series of limestones and shales like units just above, the individual units of shale and limestone varying from 2 to 8 ft. in thickness, but the relative amounts of shale and limestone about equal. Top of unit, a 4-ft. bed of blue coarsely crystalline fossiliferous limestone; the base, a 3½ ft. bed of light-blue to dove-colored aphanitic to finely-crystalline limestone, with narrow yellow irregularly clayey partings, exposed at maximum lake level, 1020 ft.-----	64	0
Total Maynardville limestone member-----	315	4