CARBONATE PETROGRAPHY OF MIDDLE AND UPPER ORDOVICIAN ROCKS IN THE CENTRAL BASIN OF TENNESSEE

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ABSTRACT

The purpose of this paper is to characterize the carbonate petrography of various Middle and Upper Ordovician formations in the Central Basin of Tennessee.

About 250 hand samples from three formations at three different locations were collected for the study. Examination by optical methods was found to be satisfactory except to determine optical properties. It was necessary to use X-ray methods to obtain optical data. By these means sets of characteristics for the Bighy-Cannon Limestone, the Catheys Formation, and the Leipers Formation were established. Certain rock types common to all three formations are recognized, described, and photographed for future reference. Some minor reinterpretations of the geologic history of these three formations are proposed for consideration.

INTRODUCTION

The results of the carbonate petrography of the Bighy-Cannon Limestone, the Catheys Formation, and the Leipers Formation are presented here. These formations present many lithostratigraphic problems because they are so similar in appearance on outcrop. Three outcrop sections were studied, two (D1 and D4) in Davidson County 5.5 miles apart and one (P1) in Putnam County 65 miles to the east. The Bighy-Cannon Limestone crops out at sections D1 and P1, the Catheys at D1 and P1, and the Leipers at D4 and P1. Section D1 is 88.23 feet thick and is represented by 78 hand samples. Section D4 is 41.11 feet thick and is represented by 31 hand samples. Section P1 is 319.28 feet thick and is represented by 126 hand samples. Due to time limitations, only these three sections were sampled, but the work is being continued by N. K. Moore and Dr. L. P. Alberstadt of Vanderbilt University.

Outcrop sections were selected based upon completeness of formational exposure and carefully measured. Second, an oriented hand sample was taken on the average of every 12 to 18 inches of outcrop or wherever a change in lithology occurred. Third, each hand sample was slabbcd, polished, varnished, etched, and an acetate peel taken of the etched surface. The lithostratigraphy was described from the nearly 250 acetate peels. Acetate peels are ideal for the study of carbonate rocks in that a perfect imprint of the etched surface is made, and in that their transparency permits microscopic and photographic examination. They cannot be used for optical mineralogy however, and must be supplemented by spot chemical tests and X-ray determinations. They are easy to prepare—a real advantage. For each peel the size and character of fossil material, calcite, dolomite, and non-carbonate detritus were described. Photographs were made of many of the peels to show characteristic rock types.

In addition each sample was fitted into a simple classification of carbonate rocks derived from the classification of Folk (1959). This classification was designed to be used both in the field and in laboratory examinations to simplify description of measured sections for litho- and biostratigraphic work.

Bighy-Cannon Limestone

The Bighy-Cannon Limestone was defined by Wilson (1949) as two intertonguing facies, one the Bighy-Cannon Limestone facies and the other the Cannon Limestone facies. The Bighy is the western facies and the Cannon the eastern. In addition there is a third facies, the Dove-colored facies, that occurs as discontinuous lenses throughout the eastern half of the formation. “The Bighy-facies is blue-gray in color when fresh, usually weathering to a brownish-gray . . . . This facies is commonly massive bedded, but the horizontal bedding planes are often difficult to distinguish because of prevalence of irregular oblique planes and more regular cross-bedding planes. The horizontal bedding planes separate strata that average between 1 and 3 feet in thickness. The texture is coarse granular, being composed of ground fragments of bryozoa, brachiopods, etc., and crystalline grains of calcite that are about the same size as the organic fragments.” (Wilson, 1949, p. 115.)

“The typical Cannon facies is a uniformly bedded fine- to medium-grained blue limestone occurring in strata that range up to several feet in thickness but averaging about one foot . . . . The Cannon facies is moderately free from silt. The silt that is present occurs as thin partings. Chert may be a common feature in the upper 20 to 30 feet of the Cannon facies, as it was on both the Bighy and Dove-colored facies.” (Wilson, 1949, pp. 126-127.)

The Dove-colored facies is light gray weathering to white. It is usually a very pure limestone, but where clayey impurities are disseminated weathering results in yellow to buff discoloration. . . . Bedding varies from an inch to several feet, but averages about one foot. Bedding is uniform, and although the limestone is usually pure, thin partings of silt and clay are often interbedded. The limestone is very fine-grained, dense, and brittle, breaking with a characteristic conchoidal fracture. . . . A common feature is the occurrence of specks and vertical stringers of clear calcite resembling the “birdsye” limestone as described in New York . . . .” (Wilson, 1949, p. 122.)
Three main rock types were found in the Bigby-Covey-Lime Creek sequence. The Bigby is a coarsely crystalline, brownish-gray (7YR 4/1) limestone, unevenly bedded (some beds ranging over 2 to 3 inches in thickness). Many fossils are well calcified with the exception of the moderately abundant nodules.

The Covey is a more proportionately abundant type of fossiliferous limestone. It is light gray with a thin, well-bedded, and fairly uniform thickness. The fossils are generally well calcified and are predominantly echinoderms, brachiopods, bryozoans, and other less common forms.

The Lime Creek formation is the most fossiliferous of the three. It is a fine-grained, dark-gray (7.5Y 1/2) limestone, and the fossils are most abundant in the middle and lower parts of the formation. The fossils are generally well calcified and include brachiopods, bryozoans, echinoderms, and other marine invertebrates.

Cathyes Formation

The Cathyes Formation is divided by Wilson (1949) into two sections. The lower section is the Cathyes Bed, Laminated Limestone, and the upper section is the Cathyes Bed, Pale-colored Limestone. The Cathyes Bed contains some of the most abundant fossils in the sequence. The fossils are generally well calcified and include brachiopods, bryozoans, echinoderms, and other marine invertebrates.

The Cathyes Bed is the most fossiliferous of the three sections. It is a fine-grained, dark-gray (7.5Y 1/2) limestone, and the fossils are most abundant in the middle and lower parts of the formation. The fossils are generally well calcified and include brachiopods, bryozoans, echinoderms, and other marine invertebrates.

The Cathyes Formation has an overall thickness of approximately 100 feet, with the majority of the fossiliferous material occurring in the middle and lower parts of the formation.

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In contrast, the rocks in the Leipers have many algae and brachiopod-echinoderm association. The rocks are more carbonate than the Bigby. The algae are green and the brachiopods are more abundant. The brachiopods are generally well calcified and are predominantly echinoderms, brachiopods, bryozoans, and other less common forms.

The Leipers Formation is 0 to 175 feet thick and is not known to be completely exposed at any location according to Wilson. Wilson's description of the lithology is as follows:

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LITERATURE CITED


ABSTRACTS OF PAPERS PRESENTED AT THE SPRING COLLEGIATE MEETINGS

EASTERN REGION

TRENCH PRIMROSE (Asclepias Asperula) in Ohio

LOIS ROBERTS

The selection of trench prairie (Asclepias Asperula) in Ohio is a significant contribution to the study of plant distribution and ecology. This species is found in wet meadows and marshes, and is adapted to conditions of high water table and rich soil. The study of this species in Ohio provides valuable information for the conservation of wetland habitats.

The Effects of Soil Reclamation Upon Popsicle Inactivation

Robert Wilson, Traceson Westby College.

The effects of soil reclamation upon the inactivation of Popsicle was studied during the spring of 1971. The results indicated that reclamation significantly increased the rate of inactivation of Popsicle. The effectiveness of reclamation was attributed to the improved soil texture and water holding capacity.

The use of methods to improve the rate of inactivation of Popsicle is important for the control of this disease. The findings of this study suggest that reclamation is an effective method for increasing the rate of inactivation of Popsicle.
Since groupings, quasi-groups and loops are relatively new and not yet widely used, they have been chosen as the topic for this exposition. The language and notation will be given in the Appendix.

The method will be applied to the following problem: Given a set of data points, find a curve that best fits the data. The curve will be a polynomial of degree three.

The model is expressed in terms of a system of linear equations. The solution is obtained by applying the method of least squares. The resulting polynomial is then used to predict the values of the dependent variable for new data points.

Mechanism of Proteinase Resistance in Cryptococcus neoformans: The basic principle of proteinase resistance involves the inhibition of the proteolytic activity of the enzyme. This is achieved by the formation of a complex between the enzyme and an inhibitor.

Conclusion: The results of this study indicate that the inhibition of proteinase activity by the inhibitor is due to the complex formation. Further studies are required to investigate the mechanism of this inhibition.

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