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FIRST OCCURRENCE OF *LITHOSTROTION (DIPHYPHYLLUM)* FROM THE MISSISSIPPIAN REDWALL LIMESTONE IN THE BEAVER DAM MOUNTAINS, WASHINGTON COUNTY, UTAH

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ABSTRACT

The Paleozoic stratigraphy of the Beaver Dam Mountains of southwestern Utah correlates well with the better known deposits of the Grand Canyon, Arizona. However, a detailed list of the fossil fauna from the Beaver Dam Mountains is lacking. Here we describe a rugose coral from the Mississippian Redwall Limestone from Washington Country, Utah. The rugose coral is highly recrystallized, but identified as *Lithostrotion (Diphyphyllum)* based on morphology and geographic extent. An analysis was conducted to determine conodont zonation, but proved inconclusive. This is the first documented case of *Lithostrotion (Diphyphyllum)* from the Beaver Dam Mountains.

KEY WORDS: rugose coral, Jarvis Peak Quadrangle, Basin and Range Province, Colorado Plateau, Beaver Dam Anticline

INTRODUCTION

The Beaver Dam Mountains are located in the southwest corner of Utah, approximately fourteen miles west of St. George, Utah (fig. 1). Southwestern Utah marks the transition of the Basin and Range Province to the west and the Colorado Plateau to the east. The Beaver Dam Mountains expose Phanerozoic stratigraphic sequences that are approximately 9.6 km thick. Much of the Paleozoic formations feature marine conditions of the cratonic sequences (Sloss, 1963). The Beaver Dam Mountains are structurally complex, composed of the Beaver Dam Anticline, as well as major folds and faults produced by Sevier orogenic forces (Hintze, 1986). Basin and Range extensional faulting began about 13 million years ago (Hintze, 1986). The resulting sequence is broken up into approximately 4 km of Paleozoic strata, 3.5 km of Mesozoic strata, and 2 km of Cenozoic sediments (Hintze, 1986).

The study area is located in the Jarvis Peak quadrangle of the Beaver Dam Mountains. The area is mapped as the Mississippian Redwall Limestone (fig. 1) at N37°02’08.5” by W113°50’05.4” (Utah Geological Survey, 1983). The approximate

elevation where we found this specimen was 1726m above sea level. Surrounding formations include the Devonian Muddy Peak Dolomite below and the Pennsylvanian Callville Formation above, which are both locally fossiliferous, including scattered stromatoporoids, horn and hair corals, fusulinids, bryozoans, gastropods, brachiopods, and crinoids (Hintze, 1986). These species suggest that the environment during this time was likely a shallow sea with a tropical climate.

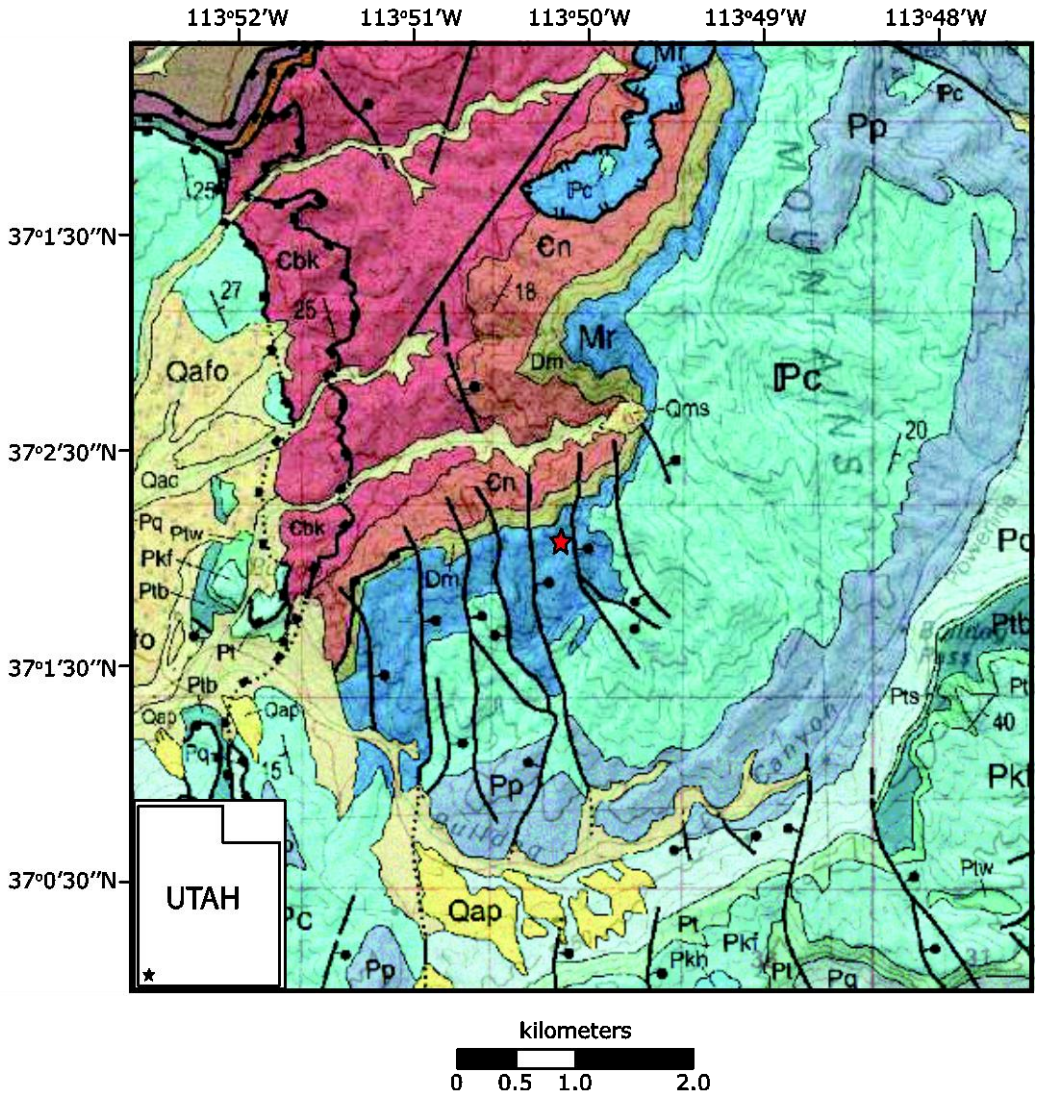
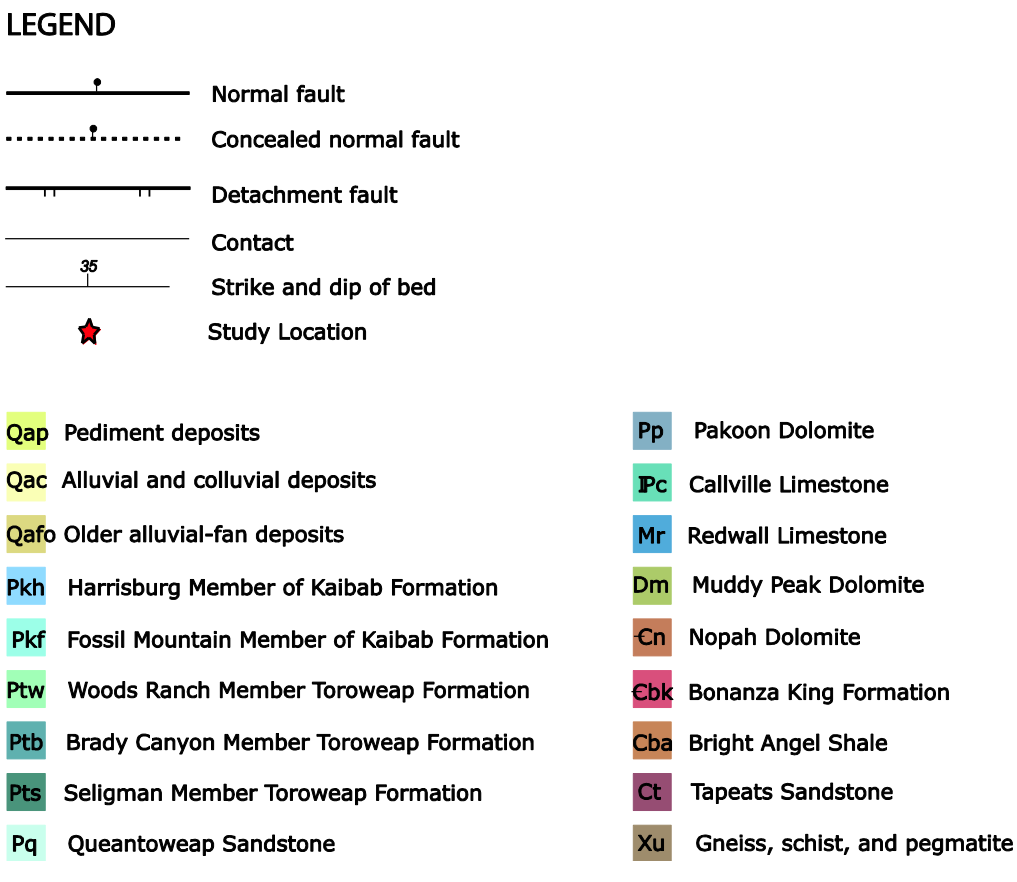


Figure 1. The Beaver Dam Mountains are located in the southwest corner of Utah, approximately 14 miles west of St. George, Utah. The black star within the outline of the state of Utah designates the study area, as shown in the geologic map. The red star designates the study area. Modified from Utah Geological Survey map, Jarvis Peak Quadrangle (1983). See map legend on page 3.



METHODS

Fieldwork was completed to determine our stratigraphic location using published maps and lithologic descriptions. Thin sections of the coral specimens were made using standard methods. Additional samples were treated for conodont analysis. Crushed samples were placed in a container filled with 10% acetic acid and allowed to dissolve for several weeks. The dissolved material was then treated to heavy liquids separation using standard methods (Collinson, 1963) and the liquid LST, which has a density 2.85 +/- 0.02 g/mL. The separated material was examined under a dissecting microscope using a size 0 paintbrush. The conodonts were glued to microscope slides for further analysis and identification.

RESULTS

Stratigraphy

The geologic map of the study area indicates the fossil coral was found in the Mississippian Redwall Limestone, but very close to the contact with the Pennsylvanian Callville Formation (Utah Geological Survey, 1983). Due to the fact that the area has been heavily faulted, a field analysis was conducted and confirmed the stratigraphic position. The corals were found *in situ* in a massive, dark gray limestone (fig. 2A). The base of the unit is marked by the presence of black chert nodules of the Thunder Springs Member (Hintze, 1986; Moore, 1972) and was easily located in the study area. The Redwall Limestone has been described as fossiliferous (Hintze, 1986), but only down to common names. The Callville Formation

overlies the Redwall Formation, and is easily recognizable by "stair-step" weathering pattern and abundant fossils (Hintze, 1986). Micro-faulting with small areas of displacement were also noted.

Fossils

The study unit yielded the corals studied herein. Fossil coral were found sporadically in patches within the study area. The corallites were in close proximity to each other. The remainder of the unit included isolated crinoid fragments, hair corals, and gastropods.

Systematic Description

Phylum CNIDARIA, Hatschek, 1888
Class RUGOSA, Milne-Edwards and Haime, 1850
Order STAURIIDA, Verril, 1865
Family LITHOSTROTIONIDAE, d'Orbigny 1851
Genus LITHOSTROTION (Diphyphyllum), Easton, 1960

Diagnosis: The specimens collected from the Beaver Dam Mountains are closely-spaced fasiculate corallites, with cross-sectional diameters averaging approximately 10 mm (figs. 2 B-C). Diameters of *Lithostrotion (Diphyphyllum)* range from 8.5-10 mm (Armstrong, 1970). In cross-section analysis, we observed distinct dissepimentarium with lonsdaleoid dissepiments (figs. 3A-B), slightly shortened, concentric septa (figs. 4A-B) with some of them reaching the tabulae, as well as complete, domed tabulae (figs. 5A-B). However, much of the specimen has been recrystallized making species-level identification difficult.

DISCUSSION

To further confirm the Mississippian-age to the coral and stratigraphic unit, a conodont analysis was completed from the limestone samples. We were able to extract and examine blades, bars, and single cone type conodonts (Fig. 6), but most were broken. No pallet types were found, which are used for diagnostic purposes. Some of the blades are tentatively assigned to c.f. *Roundya*. The sparse and broken conodont specimens proved inconclusive for zonation analysis.

SUMMARY

Occurrences of the family Lithostrotionidae are reported from North America, and the Cordilleran region (Kelly, 1942), but none have been described from southern Utah. A sample containing *Lithostrotion (Diphyphyllum)* has been described from northern Utah in the Wasatch Mountains in a similar dark gray limestone (Parks, Jr., 1951). The presence of this genus in southern Utah is not surprising, given its documented geographic range (Kelly, 1942). However, this specimen adds to the known extent of the genus.

Figure 2. *In situ* and hand samples of *Lithostrotionidae (Diphyphyllum*) from the study location. A. The massive bedding of medium-gray limestone is a characteristic of the Redwall Limestone. B. Longitudinal section of a sample, showing the tabularia and dissepimentarium. C. Transverse section showing the septa and dissepiments. Scale bars are 1 cm.

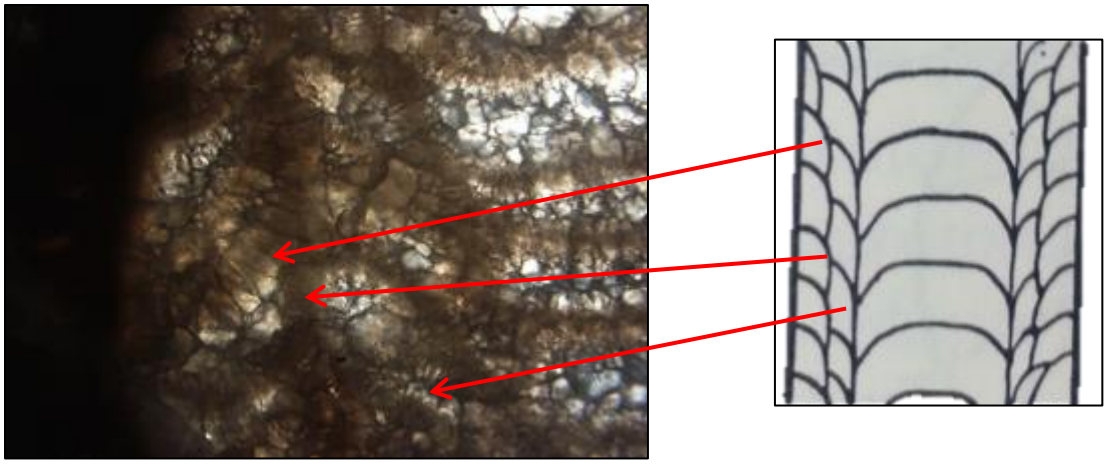


Figure 3. Coral dissepiments. 3A (left) shows a longitudinal section of the study specimen. 3B (right) demonstrates the complete tabulae and lonsdaleoid dissepiments (Shrock and Twenhofel, 1953), typical of Lithostrotionidae (Diphyphyllum). The red arrows compare the dissepiments of our sample to the standard. Image taken at 10X magnification.

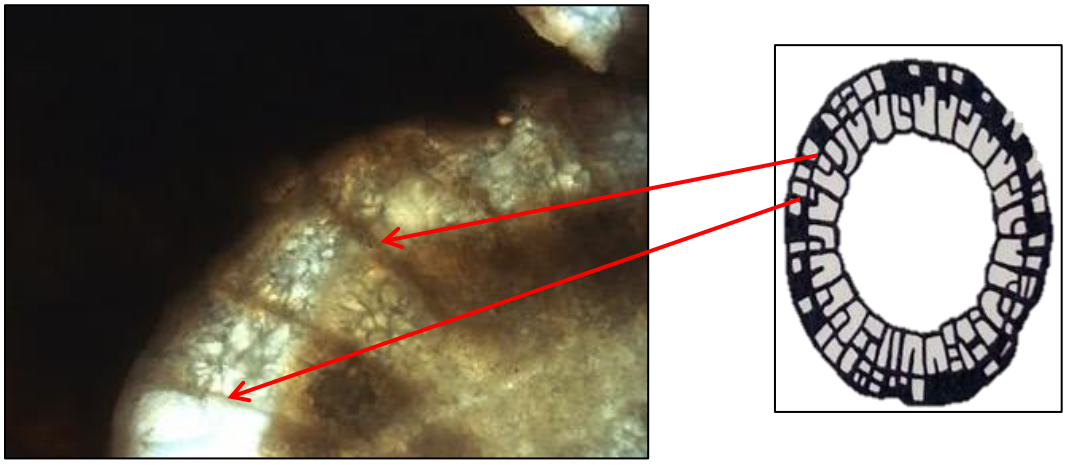


Figure 4. Coral septa. 4A (left) shows the septa in transverse section of the study specimen. 4B (right) shows similar short and domed septa, characteristic of Lithostronidae (Bayer *et al*., 1956). The red arrows show the similarities of the septa between the two figures. Image taken at 10X magnification.

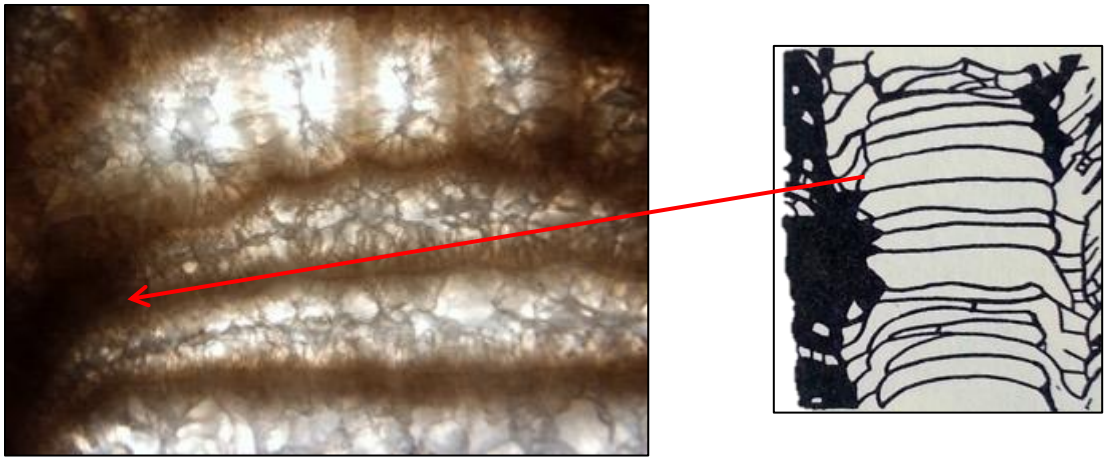


Figure 5. Coral tabulae. 5A (left) is a longitudinal section of the study coral. Notice the domed and complete tabulae. 5B (right) demonstrates the characteristic tabulae shape of Lithostrotionidae (Bayer *et al.*, 1956). The red arrow correlates the tabulae between the two. Image taken at 10X magnification.

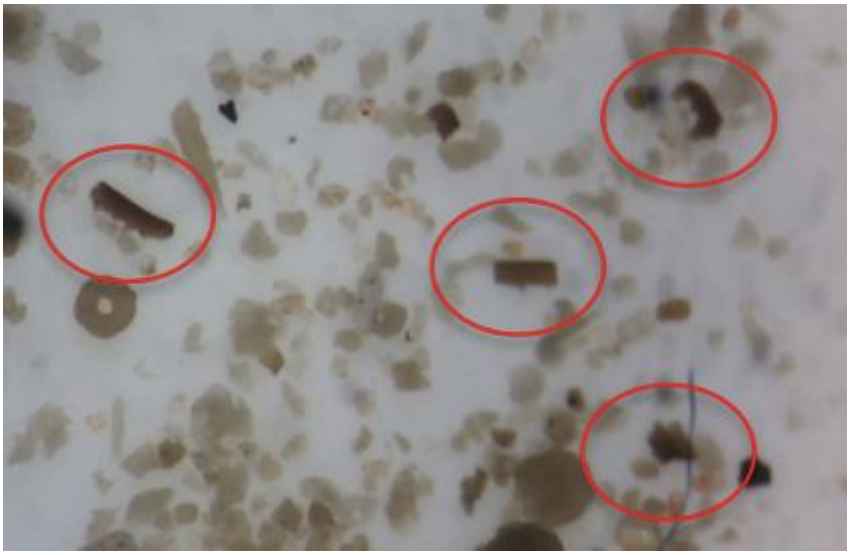


Figure 6. Conodonts recovered from the limestone matrix. Blades, bars, and cones were recovered, but due to their fragmentary nature were not identify. Blade in lower right was tentatively identified as c.f. *Roundya*). The red circles mark the location of conodont elements. Scale bar is 10 mm. Image taken at 10X magnification.

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