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## LIMESTONE AT REDPA

by M. J. Longman and W. L. Matthews.

## INTRODUCTION

A limestone had been reported on the property of Edwards Bros. about  $2\frac{1}{2}$  miles south-east of Redpa, by Mr. S. R. Adams, who held a permit to enter this area. An investigation was made on 15th December, 1960 to determine the age and extent of the limestone.

## GEOLOGY

This area is on the western edge of Welcome Swamp which consists of recent alluvium overlying dolomite. Isolated outcrops of basalt and limestone form small mounds on the swamp surface and are up to 5 acres in area.

The geological succession in the area is:—

Recent—alluvium.

Tertiary { basalt.  
          { limestone.

— unconformity —

## Precambrian—Limestone and Dolomite

*Recent alluvium* is widespread in this locality and occurs to a depth of 33 feet in water bores. It conceals most of the older rocks and only small outcrops of these are visible.

*Tertiary basalt* occurs to the west and north-west of the area and small patches occur overlying the Tertiary limestone. It is typical of the basalt in other parts of the Redpa District.

*Tertiary limestone* is pale pink in colour and composed largely of fragments of fossils and calcite cemented by pure white calcite. Small vughs containing crystallized calcite are common. It is horizontally bedded and forms the hill tops in the swamp area. Immediately underlying the limestone is a conglomerate composed of rounded to subrounded pebbles of grey limestone, dolomite, sandstone and quartzite cemented by fine grained pink calcite. Numerous fossils, mainly pelecypods, and crystalline calcite in vughs occur in the calcite groundmass.

*Precambrian (?) limestone*, dipping towards the north-east at  $61^\circ$  and striking at  $320^\circ$ , unconformably underlies the conglomerate. It is pale grey to blue grey in colour and massive in appearance. No fossils were found but numerous caves occur which contain deposits of Recent or Tertiary origin.

The largest cave visited was over 200 yards in length and the height varied from six to ten feet. Numerous small caves up to 15 feet in height contain excellent stalactites, stalagmites, shawls and flow stone. A band of massive white crystalline calcite, containing numerous fragments of cave pearl and over three feet in height outcrops on one hillside.

## Comparison with limestones in adjoining districts

## Chemical Analyses

Location	CaO %	MgO %	CaCO <sub>3</sub> * %	MgCO <sub>3</sub> * %
Redpa (1) .....	47.1	7.5	84.1	15.7
Redpa (2) .....	48.3	6.5	86.2	13.6
Lower Scotchtown .....	54.23	0.50	96.9	1.05
Duck River Nr. Smith- ton .....	46.40	7.53	83.9	15.8

\* Calculated.

From the chemical analyses this limestone is actually a dolomitic limestone (Pettijohn), containing only 0.2% non-carbonate material, and closely resembling the limestone on the Duck River in chemical composition. Limestones of this composition are rare. The majority of limestones contain less than 4% or greater than 40% dolomite (Pettijohn).

## PETROLOGY

## Limestone at Redpa

In thin section this limestone shows recrystallized oolites up to 0.3 mm in diameter, recognized by their rounded outlines and fine calcite crystal aggregates set in a mosaic of anhedral calcite crystals.

A few oolites show radial and concentric structures but most of the internal features have been destroyed. The average diameter of the oolites is 0.2 mm.

The calcite crystals, which form the major proportion of the rock, vary in grain size between 0.05 mm and 0.3 mm and show mosaic texture. Some crystals have overgrowths in optical continuity, while other crystals completely enclose smaller oolites.

Dolomite occurs as subhedral to anhedral crystals scattered in the calcite matrix, which has been cut by later calcite veins.

## Duck River, near Smithton

This limestone is similar in all respects to that at Redpa.

## Limestone at Scotchtown

The rock in thin section is composed dominantly of brown calcite oolites, ranging in size from 0.5 mm to 1.0 mm with some individuals as small as 0.2 mm and the largest over 5.0 mm in diameter. Clear calcite and rare dolomite form the matrix.

Spherical oolites are most common, but a few are ovate or irregular due to the shape of the nucleus.

The rims of the oolites are composed of up to ten thin concentric shells of fine brown calcite aggregates, but no radial textures were noted. More commonly there are two or three distinct shells surrounding recrystallized nuclei. Rarely only one fine rim is developed, but this may be due to complete recrystallization of the oolite, the impurities accumulating on the oolite surface, emphasizing

its shape. In some cases the concentric texture has been destroyed and replaced by a fine calcite aggregate. Small siderite crystals emphasize the outer rim of many oolites.

The nuclei are composed generally of recrystallized calcite, with individual crystals up to 0.5 mm in length. The average crystal size is 0.2 mm. Many of the oolites have no apparent nucleus, the whole being composed of an aggregate of fine brown calcite crystals, with a massive or concentric structure. In the larger oolites the nucleus is composed of aggregates of smaller oolites.

Calcite, which ranges in grain size from 0.01 mm to over 0.2 mm, forms the matrix, together with fine grained dolomite. Numerous veins of fine grained white calcite cross both oolites and matrix and show no preferred orientation.

Another feature of the rock is the development of stylolites which are emphasized by iron staining.

From the petrology these limestones appear to be similar, but the limestone at Redpa and Duck River is more dolomitized. All limestones would have been formed under conditions of local agitation, which would favour the formation of oolites. The structure of the oolite would tend to retard dolomitization, so normal crystalline limestone formed at the same time would now be completely dolomitized while the oolitic limestone would be only partially dolomitized.

#### CONCLUSION

The limestone at Redpa appears to be an oolitic phase of the dolomite, which has resisted dolomitization. It would thus be Precambrian in age.

#### REFERENCES.

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