# 1983/18. A diamond drill hole at The Quoin, south-east of Ross.

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*Abstract*

A fully cored drill hole at The Quoin [EP55473312], about 15 km south-east of Ross, has proved a thickness of 186.30 m of the Lower Parmeener Super-Group (Liffey Sandstone, Golden Valley Group, Quamby Formation and Stockers Tillite) which rests unconformably on folded and cleaved Mathinna Beds. The Mathinna Beds are intruded by what is interpreted as a thick, subhorizontal sheet of Jurassic dolerite. The drilled section of the Lower Parmeener Super-Group closely resembles the pre-Liffey Sandstone sequence at Poatina.

## INTRODUCTION

Much of central Tasmania is underlain by thick sequences of Upper Parmeener Super-Group rocks which are intruded by substantial sheets of Jurassic dolerite. The Quoin represents one of the few known sites where folded, pre-Parmeener Super-Group rocks could be expected at a reasonably shallow depth. The site is located at the centre of a more or less equilateral triangle, the apices of which mark the well-known but widely disparate Lower Parmeener Super-Group (pre-Liffey Sandstone) successions at Poatina, Granton and Douglas River. The site is of additional interest in that it is within the eastern and western limits of the placement of the Tamar Fracture.

The borehole proved a pre-Liffey Sandstone sequence of the Lower Parmeener Super-Group essentially similar to that at Poatina and the Central Plateau area in general. A substantial development of basal tillite is the most easterly known.

The intersection of the Mathinna Beds indicates that the Tamar Fracture occurs to the west of the drill site.

The presence of a major sheet-like body of Jurassic dolerite in the folded basement is unusual.

*GEOLOGICAL LOG OF THE ROSS No. 1 (QUOIN) DIAMOND DRILL HOLE*

The hole was drilled vertically and cored throughout. Dips in the Lower Parmeener Super-Group are negligible and all thicknesses quoted are down-hole depths in metres. The collar height elevation is 344 m.

| Depth (m) | Description |
|---|---|
| LIFFEY SANDSTONE CORRELATE (in part) 21.10 m | |
| 0 - 4.00 | Massive- and cross-bedded, coarse-grained quartz sandstone. |
| 4.00- 8.50 | Striped, dark siltstone and coarser-grained, light-coloured, micaceous sandstone with starved ripple structures. |
| 8.50-13.21 | More uniform and essentially dark-coloured, laminated siltstone with minor bioturbation. Minor hydroplastic structures, and abundant fish scales present. |
| 13.21-15.85 | Massive-bedded, irregular mixture of sandstone and siltstone with all original bedding structures destroyed by intense bioturbation. Mottled in appearance. |
| 15.85-20.31 | Alternations of laminated siltstone and sandstone. Bioturbated in places, with some thin pebble bands and comminuted shell debris in siltier portions. Becomes lighter-coloured and more sandy downwards. |
| 20.31-21.10 | Coarse-grained, light-coloured sandstone with pronounced band of pebbles at base which is very sharp. Irregular thin lenses of fine-grained siltstone present. Bedding irregular. Possible plant fragments in places. Some disseminated pyrite. |
| GOLDEN VALLEY GROUP 48.20 m | |
| 21.10-54.20 | Dark-coloured, massive-bedded siltstone with bioturbation and rare comminuted shell debris. Thin pebble bands (5 mm thick) present. Becomes more heavily bioturbated below 31.78. Sandier and lighter-coloured, and very heavily bioturbated between 40.0-43.0. Occasional dropped pebbles. Speckled with granule debris. [This interval occupies the stratigraphic position of the Macrae Formation at Poatina and Golden Valley, but the lithological similarity is not very marked.] |
| BILLOP SANDSTONE CORRELATE 4.20 m | |
| 54.20-58.40 | Massive-bedded, sandy siltstone and sandstone with many pebble-sized clasts. Heavily bioturbated throughout. Granule patches and much broken shell debris - mainly spiriferids and *Peruvispira*. Robust, bilaminar *Stenopora* colonies near top of unit. |

| Depth (m) | Description |
|---|---|
| GLENCOE FORMATION CORRELATE 10.80 m | |
| 58.40-69.30 | Dark grey, calcareous siltstone and fine sandstone rich in fossils particularly *Strophalosia, Stenopora* and fenestellids. Micaceous in places; erratics abundant. |
| QUAMBY FORMATION 57.70 m | |
| 69.30-127.00 | Dark grey, massive-bedded siltstone full of fine wispy laminations. Rare shell debris and small clasts. Conglomerate band at 86.20 with one very large clast (500 mm). Massive rods of core from 94.00 downwards; fossils absent and rare small clasts. Darkens towards base with rare shell fragments at 124.00. |
| STOCKERS (WYNYARD) TILLITE CORRELATE 59.30 m | |
| 127.00-145.70 | Coarse-grained tillite; sandy and reworked with granule matrix for first 1.5 m, but then true tillite with disrupted framework and fine-grained matrix. Clasts mainly granite and quartzite up to 100 mm. |
| 145.70-164.60 | Dark grey, massive-bedded mudstone with a few, small, scattered clasts. |
| 164.60-186.30 | Coarse-grained, massive-bedded tillite. One large microgranite clast at 167.00-168.40. Unconformity very sharp and irregular. |
| MATHINNA BEDS 26.70 m | |
| 186.30-213.00 | Folded, steeply-dipping and cleaved quartzwacke turbidite and minor pelite, with some quartz veins sub-parallel to bedding (See Appendix 1). |
| JURASSIC DOLERITE 470.81 m | |
| 213.00-683.81 | Contact flat. Chilled margin and fine-grained to 221.00 m. Medium-grained to 230.00 m. Very coarse-grained and horizontally layered to 320.00 m. Coarse-grained to 350.00 m. Medium-grained and horizontally layered to 460.00 m. Medium- to fine-grained to end of hole. Horizontal layering ends at 560.00 m (See Appendix 2). |
| END OF HOLE | |

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# APPENDIX 1

Examination of core and two thin sections from sandstone/mudstone contact at 199.60 m.

*E. Williams*

*Sandstone:* The texture indicates sediment of originally disrupted framework. Framework grains: Coarse sandstone grade of median size 0.4 mm. Grains angular to sub-rounded and dominantly of quartz with inherited characteristics; most are of single crystal vein quartz, some with inclusion trails in a number of directions occupying previously formed extension strain cracks, many exhibit undulose extinction and rare examples show polygonisation. Occasional grains of plagioclase feldspar and microcline occur. Grains show stylolitic margins and beard intergrowths of quartz and micaceous material in a cleavage direction.
Matrix: Angular to sub-rounded grains of quartz of average size 0.04 mm with some micaceous material. Quartz grain margins are stylolitic.
Origin: Quartzwacke with poor sorting strongly suggests turbidite.

*Mudstone:* Silt laminae of dominantly angular grains of quartz of average size 0.04 mm with some micaceous material. In laminae composed predominantly of micaceous material, the grains show optical continuity due to regrowth during cleavage formation.
Origin: The immature physical nature of the siltstone grains suggests their transportation by density current before coming under the influence of traction prior to deposition in laminae. The micaceous laminae may represent deposits from normal dilute solution (*i.e.* normal to site of deposition).

*Nature of lithological contacts:* The original planar depositional contacts are modified by load adjustments with the development of typical mudstone flames in sandstone.

*Structural modifications:* Incipient beard formation around sandstone grains and alignment of recrystallised micaceous material in the mudstone occur in an early cleavage direction approximately 10° from bedding. Later cleavage has resulted from crenulation (0.08 mm spacing) of the earlier cleavage defined by aligned micaceous material in the mudstone. Veins of quartz up to 2 mm thick formed sub-parallel to the bedding and distort the previously formed cleavages.

*Conclusions:* The nature, composition and structural modifications of the sandstone grains are typical of those found in the turbidite quartzwacke of the Mathinna Beds. Bedding and early cleavage relationships indicate that the bore core penetrated the steep limb of a fold with probably a nearly horizontal hinge (assuming hole to be vertical).

# APPENDIX 2

Density determinations of the dolerite.

*R.N. Woolley*

The results listed below are the average of five measurements per sample.

| *Depth (m)* | *Density (kg/m²)* |
|---|---|
| 224 | 2920 |
| 229 | 2900 |
| 239 | 2910 |
| 249 | 2850 |
| 259 | 2870 |
| 284 | 2920 |
| 304 | 2960 |
| 324 | 2990 |
| 354 | 2980 |
| 364 | 2910 |
| 394 | 2960 |
| 424 | 3000 |
| 449 | 3010 |
| 454 | 3000 |
| 484 | 2970 |
| 529 | 2970 |
| 534 | 2970 |
| 594 | 2970 |
| 599 | 2960 |
| 604 | 2990 |
| 639 | 2990 |
| 649 | 2960 |
| 654 | 2980 |
| 659 | 2980 |
| 669 | 2970 |
| 674 | 2980 |
| 684 | 2980 |