

1985/50. A diamond drill hole at Porter Hill (Grange), Lower Sandy Bay

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Abstract

A fully cored drill hole at Porter Hill (Grange) has provided the critical details of that part of the Permian stratigraphic sequence between the Bundella and Malbina Formations. The sequence proved consists of (in downward order): Malbina Formation (in part) 53 m, Deep Bay Formation 49 m, Berriedale Limestone 47 m, Nassau Formation 17.30 m, Rayner Sandstone 0.95 m, Faulkner Group 14.75 m, and Bundella Formation (in part) 12 m. The fresh-water sequence (Faulkner Group) is much reduced in thickness compared with developments further north and contains no coal. As at Mt Nassau, the Cascades Group consists of two units, the Nassau Siltstone and the Berriedale Limestone. The rocks exposed in the Grange Quarry which have long been regarded as the lateral equivalent of the Berriedale Limestone, are wholly younger and belong with the Deep Bay Formation. This unit marks the base of the transgressive overstep of Lymingtonian rocks first recognised in the Cygnet area (Farmer, 1981; 1985).

INTRODUCTION

The designated type section of the Cascades Group (consisting of the Nassau, Berriedale and Grange Formations) is at Mt Nassau near Granton (Banks and Hale, 1957). At Mt Nassau the Berriedale Limestone is the predominant rock unit. To the south the carbonate facies is less in evidence and it was thought to pass laterally into a fine-grained clastic sequence (Grange Mudstone). The type section of the Grange Mudstone is at Porter Hill (Grange), Lower Sandy Bay where exposure is generally poor and unsatisfactory, and stratigraphic relationships are further complicated by two bodies of intrusive dolerite. Detailed mapping and a systematic drilling programme through the Kingborough Quadrangle (Farmer, 1981; 1985) revealed that the Cascades and Faulkner Groups are absent in the Cygnet area where they have been removed by the overstep of the younger Lymingtonian Deep Bay Formation. To the north in the Snug-Margate area thin age equivalents of the Faulkner and Cascades Group are present below the Lymingtonian. Drilling of the Mt Nassau section rather surprisingly revealed the absence of the Grange Mudstone in the type section of the Cascades Group (Clarke and Farmer, 1982). It thus became necessary to drill the Porter Hill section to establish the detailed character of the stratigraphic sequence through this critical interval.

The results of the borehole are significant. As expected the essentially freshwater Faulkner Group is much reduced in thickness and is almost entirely of marginal-marine aspect. A little to the south in the Margate-Snug area its age equivalent is wholly marine. Rather surprisingly the Porter Hill borehole proves the Cascades Group there to be bipartite as at Mt Nassau, although the Berriedale Limestone is significantly reduced in thickness (22% thinner). The so-called Grange Mudstone is clearly part of the transgressive clastic facies of the Lymingtonian Deep Bay Formation. The topmost few metres of the Berriedale Limestone are deeply weathered and it is tempting to regard this as resulting from pre-Lymingtonian erosion. Thus the Berriedale Limestone is now proved to consist of a continuous sheet of limestone from Granton in the north to Margate in the south, and wholly pre-dates the so-called Grange Mudstone (Deep Bay Formation).

The progressive southward thinning from Granton and the disappearance of the Berriedale Limestone south of Margate is due to removal by the later Lymingtonian overstep. This possibility was canvassed in the original study (Banks and Hale, 1957). However, in the then absence of any clear cut palaeontological evidence, those workers opted for a lateral facies change. In view of the excellent sections and proved stratigraphic and palaeontological details in the Cygnet area, it is recommended that the name Deep Bay Formation be retained and the term Grange Mudstone be allowed to lapse. Stratigraphic relationships are summarised in Figure 1.

The core in the Porter Hill Borehole is baked throughout, although metamorphism shows a gradual decrease with depth. This suggests that the eastern margin of the major dolerite body which forms the main axis of Mt Nelson-Porter Hill is steeply inclined and shelving to the west. The dolerite body to the east may be a down-faulted extension of the major intrusion.

GEOLOGICAL LOG OF THE PORTER HILL (GRANGE) DIAMOND DRILL HOLE

Collar height 155.2 m A.S.L. Located at Porter Hill (EN528877-5247467), Hobart Quadrangle. Hole drilled vertically and fully cored. Dips are negligible. All thicknesses are down-hole depths in metres.

Malbina Formation (in part) 53 m

0 - 11.0 Massive-bedded, fine-grained sandstone and siltstone with few clasts.

11.0 - 53.0 Coarse-grained sandstone with intervals of feldspathic granule conglomerate. Minor siltstone with some fenestellids. Clasts abundant throughout. Spiriferid and other shell debris common in lowest 20 metres but poorly preserved.

Deep Bay Formation 49 m

53.0 - 102.0 Brown and khaki, fine-grained sandstone and siltstone with pebbles and thin intervals of friable, decomposed feldspathic granule conglomerate. Siltstone becomes more prevalent downwards with some creamy-white horizons. Coarse-grained bands of feldspathic granule conglomerate persist to base. Fossils abundant throughout but preservation only moderate because of metamorphism. Fenestellids, *Wyndhamia dalwoodensis*, *Trigonotreta lethamensis*.

Cascades Group 64.3 m

Berriedale Limestone 47 m

102.0 - 109.60 Deeply weathered impure limestone and siltstone.

109.6 - 149.0 Massive-bedded, light grey bioclastic limestone and subordinate darker, richly fossiliferous, calcareous siltstone. Core in solid rods with no obvious shale or metabentonite layers. *Wyndhamia*, *Terrakea*, spiriferids, *Deltopecten*, *Etheripecten* and *Stenopora*.

Nassau Formation 17.3 m

149.0 - 166.3 Massive-bedded, dark grey, calcareous siltstone with abundant fenestellids and productids. Richly fossiliferous with *Stenopora*, *Deltopecten*, *Etheripecten*, *Cancrinella*, strophalosiids, *Ambikella*, *Trigonotreta hobartensis* and *Peruvispira*. A few irregular patches of bioturbated, poorly-sorted sandy material in lowest few metres.

Rayner Sandstone 0.95 m

166.3 - 167.25 Massive interval of coarse-grained, light grey, highly bioturbated sandstone and granule conglomerate. Top and bottom of bed with load and hydroplastic structures.

Faulkner Group 14.75 m

167.25 - 174.0 Massive-bedded, dark grey, micaceous siltstone with rare patches of dispersed granule-sized debris.

174.0 - 182.0 Light and dark grey, flaser-bedded siltstone and fine-grained micaceous and quartzose sandstone and siltstone. Small-scale cross-bedding in the more quartzose layers. Several irregular granule-sized intervals with abundant hydroplastic and load structures and some shell fragments.

Bundella Mudstone (in part) 12 m

182.0 - 185.0 Very poorly-sorted sandstone and granule conglomerate with shell fragments and much bioturbation.

185.0 - 194.0 Dark, richly fossiliferous siltstone with abundant clasts and irregular patches of lighter coloured, poorly-sorted, fine-grained quartzose sandstone. Bioturbation intense. Some articulated *Eurydesma*, but most shells broken or disarticulated; *Trigonotreta stokesi*, *Deltopecten*, *Keeneia*, *Stenopora*.

END OF HOLE

REFERENCES

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GRANTON

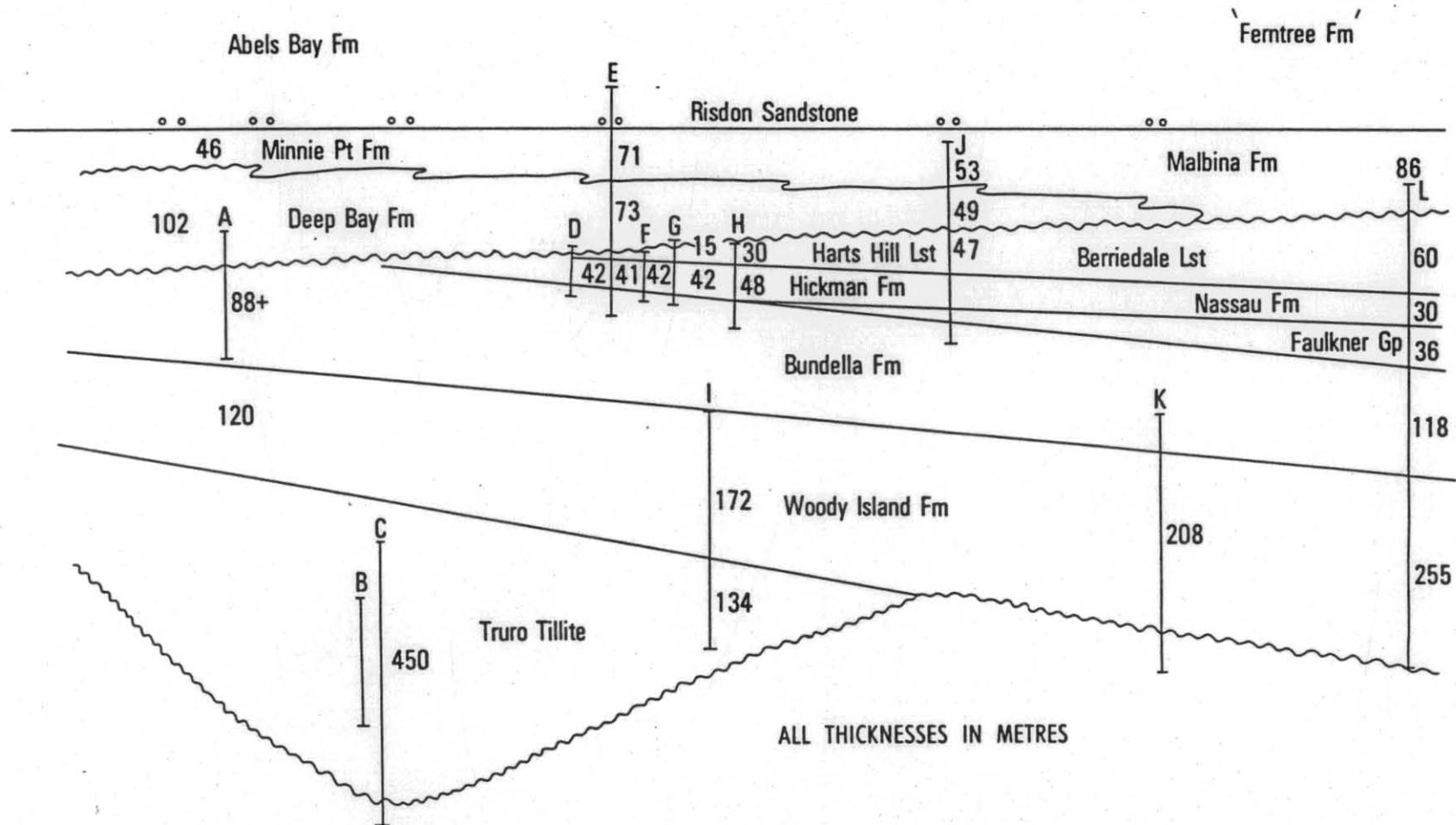
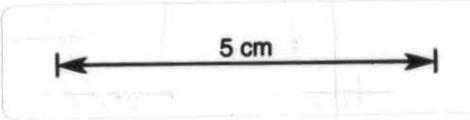


Figure 1. Stratigraphic relationships, Lower Parmeener Super-Group, Cygnet to Granton. Diamond drill holes - A: Deep Bay, B: Silver Hill, C: Woodbridge, D: Palmers Road, E: Snug Tiers, F: Snug, G: Harts Hill No. 2, H: Harts Hill No. 1, I: Margate, J: Porter Hill (described herein), K: Glenorchy, L: Mt Nassau.

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