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1984/76. A diamond drill hole at Eaglehawk Neck, Tasman Peninsula

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Abstract

A fully cored drill hole at Eaglehawk Neck [EN760382] has proved a thick sequence of the Lower Parmeener Super-Group (Permo-Carboniferous). The stratigraphic interval intersected spans the Early Tamarian (Late Carboniferous) to Late Lymingtonian (Late Permian). The flat-lying Late Palaeozoic rocks rest unconformably on a folded basement of thermally metamorphosed Siluro-Devonian quartzwacke turbidite and minor spotted slate (Mathinna Beds). The stratigraphic horizons which contain the Mersey Coal Measures and the *Tasmanites* oil shale were intersected in the lower parts of the hole. The former sequence is very thin (6 m), of marginal marine character and contains no coal; and the latter horizon is not recognisable in hand specimen probably because of dilution by faster sedimentation rates away from the then depositional shoreline. Substantial basement relief and rapid lateral facies changes (typical of eastern Tasmania) are indicated by a comparison of the borehole section with coastal sections exposed a few kilometres to the northeast at Deep Glen Bay. The postulated Tamar Fracture System lies to the west of the drill site.

INTRODUCTION

Exposed sections of Late Palaeozoic rocks in the Eaglehawk Neck area are mainly of rocks high in the Lower Parmeener Super-Group (Malbina and Ferntree Formations). More complete sections are exposed in precipitous cliffs a few kilometres to the northeast on the coast of Forestier Peninsula, but are largely inaccessible. However where access is possible, limited reconnaissance examination indicates considerable facies variations compared with other sections of the Lower Parmeener Super-Group as developed over the major part of the Sorell map sheet (Gulline, 1982). A borehole was therefore sited in the lower of the two DMR roadstone quarries alongside the Arthur Highway immediately north of Eaglehawk Neck to enable detailed correlations to be made. *Tasmanites* oil shale and stratigraphic horizons which contain the Mersey Coal Measures were encountered in a similar palaeogeographic setting at Douglas River (Calver, Clarke and Truswell, 1984).

The detailed stratigraphical succession shows characters intermediate with those successions developed in the western part of the Sorell map sheet (and the Hobart area in general), and Maria Island (and eastern Tasmania). The Malbina Formation correlate is lithologically distinct from the Malbina Formation proper, and probably spans a greater interval of time. It contains three characteristic units of coarse-grained and poorly-sorted sandstone, and is more or less fossiliferous throughout, sometimes richly so. The lower parts of the formation probably represent a coarser grained, closer-to-source facies of the Deep Bay Formation of the Cygnet area. This part of the sequence offers little comparison with the thin and much attenuated developments of arkosic and glauconitic sandstone on Maria Island and elsewhere in northeast Tasmania.

The interval which embraces the main limestone to freshwater beds is generally similar to the interval represented by the Counsel Creek to Boullanger Formations on Maria Island, although both the Skipping Ridge Formation correlate and the Boullanger Formation correlate are significantly thinner.

A considerable proportion of the lower part of the sequence is grossly comparable with the Bundella and Woody Island Formations as developed in southeast Tasmania. The intervention of a substantial thickness of littoral and sub-littoral arkosic sandstone and conglomerate between these two formations is, however, unique.

The basal beds are again unique. Although it remains to be proved, current evidence suggests that these beds may have been deposited at the same time as basal tillite elsewhere in Tasmania. They represent sub-aqueous, possibly ponded, laminated siltstone deposition interrupted periodically by thin intervals of flowtill (Dr E.A. Colhoun pers.comm.), which were deposited on a surface which had undergone *in situ* mass-wasting and is characterised by the development of intricate Neptunean dyke systems. This may indicate that the Eaglehawk Neck area was peripheral to the main area of glaciation.

Detailed analyses of petrography, sedimentary structures, macropalaeontology and palynology will continue.

GEOLOGICAL LOG OF THE EAGLEHAWK NECK DIAMOND DRILL HOLE

The hole was drilled vertically and cored throughout (NQ_3, 45 mm diameter). Dips in the Lower Parmeener Super-Group are negligible and all thicknesses quoted are down-hole depths in metres. The collar height elevation is 35.3 m A.S.L.

Depth (m)	*Description*
MALBINA FORMATION CORRELATE (in part) 97 m	
0 - 10.20	Medium grey, medium- to thick-bedded, poorly sorted and bioturbated siltstone and fine-grained sandstone with minor granule detritus and few clasts. Richly fossiliferous with *Echinalosia ovalis, Terrakea brachythaera, Ambikella magna* and *Sulciplica transversa*.
10.20 - 11.50	Massive, light-coloured, coarse-grained and poorly sorted, more quartzose sandstone. Many pebbles and cobbles (up to 100 mm) at base.
11.50 - 45.00	Medium to dark grey, poorly sorted, bioturbated siltstone and fine-grained sandstone with occasional pebbles and granule debris. Spiriferid fragments and other shell debris towards base.
45.00 - 55.20	Light grey, poorly sorted and much bioturbated sandstone with occasional pebbles. Abundant spiriferids including *Sulciplica transversa;* and *Wyndhamia dalwoodensis*.

55.20 - 68.00 Medium to dark grey siltstone and fine-grained sandstone with occasional coarser grained and lighter coloured sandstone and granule debris. Clasts rare; *Wyndhamia dalwoodensis* and spiriferids abundant; some fenestellids.

68.00 - 70.00 Light grey sandstone with much granule-sized detritus and abundant pebbles.

70.00 - 97.00 Medium to dark grey siltstone and fine-grained sandstone with scattered patches of lighter coloured granule- and sand-sized detritus. Fossils abundant. *Deltopecten multicostatus, Wyndhamia dalwoodensis* and *Terrakea brachythaera*.

COUNSEL CREEK FORMATION CORRELATE 62.40 m

97.00 - 159.40 Medium- to thick-bedded, light and medium grey argillaceous limestone and calcareous siltstone with thick posts of coarsely crystalline and purer bioclastic crinoidal limestone. Pebbles scattered throughout. Richly fossiliferous.

SKIPPING RIDGE FORMATION CORRELATE 22.40 m

159.40 - 181.80 Dark grey, compact calcareous siltstone with rare small clasts. Scattered granule-sized detritus at base. Richly fossiliferous with fenestellids, *Stenopora, spiriferids, Anidanthus, Cancrinella* and *Echinalosia preovalis*. *Peruvispira* very common in lower third.

BOULLANGER FORMATION CORRELATE 6.20 m

181.80 - 188.00 Light and dark grey, flaser-bedded, carbonaceous and more quartzose siltstone. Worm tubes and hydroplastic structures abundant.

BUNDELLA FORMATION CORRELATE 94.20 m

188.00 - 194.00 Dark grey, bioturbated siltstone with poorly-sorted granule patches and horizons. Rare shell fragments.

194.00 - 201.00 Richly fossiliferous siltstone. *Eurydesma, Deltopecten, Trigonotreta stokesi, Strophalosia subcircularis*. Shells mostly disarticulated but otherwise mostly complete.

201.00 - 226.00 Dark grey, richly fossiliferous siltstone with prolific fenestellids in upper half, and small diameter *Stenopora* in lower half. Spiriferid fragments rare.

226.00 - 230.00 Poorly-sorted siltstone and granule conglomerate with numerous clasts and much granite-derived debris.

230.00 - 240.40 Dark wispy bedded siltstone with occasional patches of granule debris.

240.40 - 249.00 Mostly coarse-grained, granite-derived arkose and granule conglomerate with subordinate darker siltstone. Many pebbles and occasional shell fragments including *Eurydesma* and spiriferids.

249.00 - 274.70 Dark grey, poorly-sorted siltstone with irregular granule patches. Fenestellids common in upper half. Fossils less abundant in lower half - *Eurydesma* and spiriferid fragments.

247.70 - 282.20 Richly fossiliferous siltstone, sandstone and granule conglomerate. Mostly spiriferids, much fragmented. Many pebbles and cobbles of quartzite. One granite clast 200 mm diameter.

ARKOSE AND CONGLOMERATE 53.10 m

282.20 - 335.30 Coarse arkose and closed framework conglomerate. The larger clasts are mainly Mathinna-type quartzite. Bottom 5 m with darker siltier matrix. Shell fragments.

WOODY ISLAND FORMATION CORRELATE 45.50 m

335.30 - 380.80 Monotonous, dark grey siltstone with rare patches of dispersed granule debris and rare larger clasts. Fossils rare but *Trigonotreta stokesi, Stenopora* and patches of crinoidal debris to base. Glendonites reasonably common between 348.00 - 353.00 m.

BASAL BEDS 16.90 m

380.80 - 385.90 Dark grey, poorly-sorted siltstone with abundant clasts of granite and Mathinna-type quartzite; increasing amounts of coarse granule conglomerate and irregular intervals of mixtite downwards. Dispersed patch of fossil debris at 382.00 m. *Stenopora, Strophalosia,* crinoidal debris, *Peruvispira.*

385.90 - 393.70 Light and dark grey laminated siltstone with abundant hydroplastic, load and de-watering structures interspersed with minor intervals of coarse-grained open framework, pebbly, granule conglomerate and mixtite (flowtill). Boundaries of the latter are very irregular and often disrupt the laminated intervals.

393.70 - 397.70 Coarse-grained, granite-derived, angular granule conglomerate and open framework mixtite with occasional larger well-rounded pebbles of granite and Mathinna-type quartzite. One large granite clast (300 mm). Unconformity surface very irregular; probably forms part of a larger Neptunean dyke system.

MATHINNA BEDS

397.70 - 405.00 Contact metamorphosed quartzwacke turbidite and minor spotted pelite of Mathinna Beds-type. 200 mm apophysis of coarsely porphyritic adamellite with very irregular margins between 403.30 - 403.50 m.

END OF HOLE.

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