

UR1987-24

1987/24. Middle Palaeozoic rock sequences in Tasmania

P.W. Baillie

Abstract

A summary is presented of the stratigraphy of Middle Palaeozoic rock sequences, dominantly of Silurian and Early Devonian age, occurring to the west and east of the Tamar Fracture System.

INTRODUCTION

The Owen Conglomerate and younger strata of western Tasmania differ, for the most part, from the folded Mathinna Beds of northeastern Tasmania (Williams, 1976). This report briefly contrasts the stratigraphy of the Siluro-Devonian rocks of the Western Tasmanian Terrane with rocks of similar age east of the Tamar.

THE WESTERN TASMANIAN TERRANE

Peritidal carbonate sequences of the Ordovician Gordon Group are overlain conformably by interbedded shallow-marine quartz sandstone, mudstone, and minor limestone sequences. These deposits range in age from Late Ordovician to Early Devonian (Baillie *et al.*, 1978; Baillie, 1979; Banks, 1962; Clarke, in Gee *et al.*, 1969; Flood, 1974) and occupy the axial regions of synclinoria in the Western Tasmanian Terrane. The sequence attains its greatest thickness in the Strahan-Queenstown area, where it is at least 2.3 km thick (Baillie and Corbett, 1985).

Clastic carbonates of Early Devonian age are best developed in the lower reaches of the lower Gordon River, but extensive leaching has removed carbonate from the sequence at many other localities.

In all areas of the Western Tasmanian Terrane there is abundant evidence that the siliciclastic sequences were deposited under marine conditions that included tidal flats through barrier bar systems to deeper, below wave-base environments. In broad terms, the sequence can be considered to consist of two fining-upwards or transgressive cycles; a lower essentially Llandovery to Early Wenlock cycle, and an upper Latest Silurian to Early Devonian cycle.

The oldest formation, the Arndell Sandstone of south-central Tasmania, contains trinucleid trilobites near its base, and Early Llandovery graptolites (*Glyptograptus persculptus* Zone or low *Parakidograptus acuminatus* Zone) at a higher horizon (Baillie *et al.*, 1978). At this horizon the formation contains the earliest known strophic brachiopods (Sheehan and Baillie, 1981). Graptolites from a higher formation indicate a latest Llandovery age in either the *Monoclimacis crenulata* or *M. griestoniensis* Zones (Baillie, 1979).

In western Tasmania the contact between carbonates of the Gordon Group and the overlying siliciclastics is, at least in part, a disconformity (Blissett, 1962). Biostratigraphic correlation between the various sequences is difficult because of the lack of reliable index fossils, in particular of graptolites.

A little over one kilometre of Devonian rocks is exposed in the lower reaches of the Gordon River, including a 24 m interval of massive

44

bioclastic limestone, and limestone development at other horizons (Gee *et al.*, 1969). Faunal criteria indicate that the uppermost formation is in part younger than the Bell Shale of the Zeehan area (Clarke, in Gee *et al.*, 1969), and the same age as the Point Hibbs Limestone of southwestern Tasmania. The Point Hibbs Limestone contains corals (Hill, 1942), brachiopods (Flood, 1974), and conodonts (Phillip and Pedder, 1968). In terms of Australian biostratigraphy, the Point Hibbs fauna belongs to the lower part of conodont-coral fauna "B" of Phillip and Pedder (1968), that is, very low in the Siegenian.

THE EASTERN TASMANIAN TERRANE

The term Mathinna Beds is applied to all pre-Late Carboniferous folded rocks in northeastern and eastern Tasmania (Williams *et al.*, 1975). Graptolites of Early Ordovician age have been found within the tract of Mathinna Beds running through the Lefroy area (Banks and Smith, 1968). In eastern areas the Mathinna Beds contain fossils of Early Devonian age (Banks, 1962; Rickards and Banks, 1979). A western outlier of Mathinna Beds correlate near Beaconsfield also contains Early Devonian graptolites (P.B. Hills and M.R. Banks, pers. comm., 1986).

Ordovician sequences

An argillaceous sequence, consisting dominantly of lutite, with a subordinate arenite content, was recognised from immediately east of the River Tamar (Banks, 1962). Although the grainsize is often fine, and individual bed thicknesses can exceed two metres, it can generally be shown that grading is present and that the sandier beds are of turbiditic origin.

The only fossil known from this sequence is *Loganograptus logani*, suggestive of a Castlemanian age (Banks and Smith, 1968).

Silurian - Devonian clastic sequences

There are no known contacts exposed between the dominantly pelitic Ordovician rocks, and the more arenaceous Siluro-Devonian rocks to the east (Marshall, 1970). On the basis of structural trends and apparent lithological change, Turner (1980) postulated the existence of a fault between the two sequences.

Williams (1959, 1976) recognised that sandstones in the Scamander area had been deposited from turbidity currents from the southwest, and deduced that, in general, the Mathinna Beds had been deposited by currents originating from the western margin of a northwesterly-trending basin. This basin was along strike from the Melbourne Trough.

The unit contains fossils at a number of localities. Devonian graptolites are known from near Scamander (Rickards and Banks, 1979) and Beaconsfield (P.B. Hills and M.R. Banks, pers. comm., 1986); vascular plant remains, including *Hostimella*, are known from many localities (Banks, 1962).

Devonian volcanic sequences

Walker (1957) used the term St Marys Porphyrite for an igneous body which occurs in the St Marys area, and which he considered was either an extrusive or a high-level intrusive. Recent work (Higgins *et al.*, 1986; Turner *et al.*, 1986; Turner and Calver, 1987) has shown that the southwest

contact is intrusive and that the northern and eastern parts of the body are extrusive, and consist of a pile of recrystallised ash-flow tuff units. These rocks are the only known Tasmanian Devonian volcanic rocks, and are of the order of 1.4 km thick. The age of emplacement of the body is dated at 388±1 Ma (Turner et al., 1986).

REFERENCES

BAILLIE, P. W. 1979. Stratigraphic relationships of Late Ordovician to Early Devonian rocks in the Huntley Quadrangle, south-western Tasmania. *Pap. Proc. R. Soc. Tasm.* 113:5-13.

BAILLIE, P. W.; CORBETT, K. D. 1985. Geological atlas 1:50 000 series. Sheet 57 (7913N). Strahan. *Explan. Rep. geol. Surv. Tasm.*

BAILLIE, P. W.; BANKS, M. R.; RICKARDS, R. B. 1978. Early Silurian graptolites from Tasmania and their significance. *Search.* 9:46-47.

BANKS, M. R. 1962. Silurian and Devonian Systems, in: SPRY, A. H.; BANKS, M. R. (ed.). The geology of Tasmania. *J. geol. Soc. Aust.* 9(2):177-187.

BANKS, M. R.; SMITH, E. A. 1968. A graptolite from the Mathinna Beds, north-eastern Tasmania. *Aust. J. Sci.* 31:118-119.

BLISSETT, A. H. 1962. Geological atlas 1 mile series. Sheet 57 (7914S). Zeehan. *Explan. Rep. geol. Surv. Tasm.*

FLOOD, P. G. 1974. Lower Devonian brachiopods from the Point Hibbs Limestone of western Tasmania. *Pap. Proc. R. Soc. Tasm.* 108:113-136.

GEE, R. D.; MOORE, W. R.; PIKE, G. P. 1969. The geology of the Lower Gordon River - particularly the Devonian sequence. *Rec. geol. Surv. Tasm.* 8.

HIGGINS, N. C.; TURNER, N. J.; BLACK, L. P. 1986. Petrogenesis of an I-type volcanic-plutonic suite: The St Marys Porphyrite, Tasmania. *Contrib. Mineral. Petrol.* 92:248-259.

HILL, D. 1942. Some Tasmanian Palaeozoic corals. *Pap. Proc. R. Soc. Tasm.* 1941:3-12.

MARSHALL, B. 1970. Geological atlas 1 mile series. Zone 7 sheet 31 (8315N). Pipers River. *Explan. Rep. geol. Surv. Tasm.*

PHILLIP, G. M.; PEDDER, A. E. H. 1968. Stratigraphical correlation of the principal Devonian limestone sequences of eastern Australia. *Int. Symp. Devonian System, Calgary. Alberta Soc. Petrol. Geol.* 2:1025-1041.

RICKARDS, R. B.; BANKS, M. R. 1979. An Early Devonian monograptid from the Mathinna Beds, Tasmania. *Alcheringa* 3:307-311.

SHEEHAN, P. M.; BAILLIE, P. W. 1981. A new species of Eospirifer from Tasmania. *J. Paleont.* 55:248-256.

TURNER, N. J. 1980. Composite geological profile across Tasmania. *Unpubl. Rep. Dep. Mines Tasm.* 1980/38.

44

TURNER, N. J.; CALVER, C. R. 1987. Geological atlas 1:50 000 series.
Sheet 49 (8514N). St Marys. *Explan. Rep. geol. Surv. Tasm.*

TURNER, N. J.; BLACK, L. P.; HIGGINS, N. C. 1986. The St Marys
Porphyrite - A Devonian ash-flow tuff and its feeder. *Aust. J. Earth
Sci.* 33:201-218.

WALKER, K. R. 1957. Geology of the St Helens-Scamander area. *Pap.
Proc. R. Soc. Tasm.* 91:23-40.

WILLIAMS, E. 1959. The sedimentary structures of the Upper Scamander
sequence and their significance. *Pap. Proc. R. Soc. Tasm.* 93:29-32.

WILLIAMS, E. 1976. *Tasman Fold Belt System in Tasmania*. Department of
Mines, Tasmania.

WILLIAMS, E.; SOLOMON, M.; GREEN, G. R. 1975. The geological setting of
metalliferous ore deposits in Tasmania. *Monogr. Ser. Australas. Inst.
Min. Metall.* 5:567-581.

[29 April 1987]