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The boundary relationship of the Concert Schist and the Oonah Quartzite and Slate correlate at Dundas.

Abstract *N.J. Turner*

The boundary between the metasedimentary Concert Schist and the adjacent correlate of the Oonah Quartzite and Slate at the western edge of the Concert Schist near its type section on Concert Creek is regarded as marking a transition in degree of deformation and metamorphic recrystallisation. Three cleavages, mineral segregation and quartz recrystallisation were found in the Concert Schist whereas two cleavages and only minor mineral segregation and quartz recrystallisation were found in the Oonah Formation correlate.

Quartz optic axes fabrics obtained from a Concert Schist quartzite and from a sandstone in the Oonah Formation correlate show that substantial deformation and recrystallisation can occur without significant increase in the preferred orientation of quartz optic axes. Although Precambrian metasedimentary rocks having quartz optic axes fabrics showing relatively strong preferred orientation occur in Tasmania, the fabric of the Concert Schist quartzite demonstrates that such relatively strong preferred orientation is not a characteristic of all Tasmanian Precambrian metasediments.

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Blissett (1962) named the Concert Schist and defined it as 'that group of metasediments which appear to form the basement of the sedimentary succession in the Dundas district. The type section is on Concert Creek between co-ordinates 350500E 844900N and 351700E 845150N'*. He correlated the adjacent rocks with the Oonah Quartzite and Slate of Spry (1958). He regarded the metasediments as basement because they occur in what he regarded as a structural high. Because of poor outcrop Blissett could not determine whether the unfaulted parts of the boundary marked an unconformity or a change in degree of metamorphism. Blissett found an apparent transition between a similar group of metasediments (the Whyte Schist) to the north-west and the Oonah Quartzite and Slate. Current interpretation (Williams, 1976) of the Arthur Lineament of which the Whyte Schist is part is that it is transitional with the adjacent rocks.

The work reported here was undertaken in order to establish the character of the boundary between the Concert Schist and the Oonah Quartzite and Slate correlate. Good exposure has been provided in recent years by the construction of a vehicular track along the spur immediately south of Concert Creek.

OONAH QUARTZITE AND SLATE CORRELATE

Near the Concert Schist this unit consists mainly of grey and green, thinly-bedded mudstone and fine siltstone in which the argillaceous material has recrystallised to fine-grained muscovite showing strong alignment defining the first of two tectonic surfaces. Small amounts of granular opaque minerals may be present and very fine-grained, dusty, opaque material is commonly intermixed with the muscovite. The latter is probably carbonaceous. Where the second tectonic surface, which is a crenulation cleavage, is developed the carbonaceous material commonly is segregated in the limbs of the crenulations.

A few thin beds of medium-grained sandstone were observed in the sequence. They contain about 30% matrix consisting of fine-grained, tectonically aligned muscovite plus very fine-grained, equidimensional quartz and, in one sample, abundant green chlorite. Accessory zircon and subhedral opaque minerals may be present. No development of the crenulation cleavage observed in the pelitic rocks was found. Clasts in the sandstone consist predominantly of undulose quartz with minor micaceous quartzite and fine-grained muscovite schist. The foliation in the matrix wraps around the clasts and beards are developed. Incipient recrystallisation to finer grained quartz is evident along quartz grain margins abutting against beards and the entire margins of most grains are pitted indicating some attrition. Despite the evidence of tectonic and metamorphic modification it is considered probable that the clast grain-size distribution and percentage of matrix reflect those of the original sediment, and, therefore, that the sandstone was originally a quartzwacke.

The part of the Oonah Formation correlate adjacent to the Concert Schist differs from that which is exposed in the road cuttings west of Maestries Siding where fine- to medium-grained, white weathering, micaceous sandstone units are interbedded with dark grey, lustrous slate. The sandstone contains about 20% matrix consisting of fine-grained, tectonically

*Co-ordinates in yards. The equivalent AMG references are CP717639 and CP728641 respectively.

aligned muscovite and very fine-grained quartz. Although some quartz-rich patches in the matrix have a fine-grained, polygonal character similar to recrystallised material there is little deflection of the foliation about the clasts, development of beards or sign of incipient recrystallisation at grain margins. The clasts consist predominantly of undulose quartz with minor micaceous quartzite and muscovite schist. Sparse, relatively coarse, detrital grains of muscovite may be present. Several examples of quartz grains containing well rounded sedimentary margins preserved as trains of fine opaque minerals within authigenic overgrowths were observed. Because they are relatively few in number and because there is little evidence of tectonic and metamorphic modification of the gross texture and the texture indicates that the rock is a wacke it is considered likely that such grains are wholly clastic.

CONCERT SCHIST

Material in the portion of the Concert Schist examined is dominantly pelitic and semipelitic. Quartz and muscovite are the principal minerals. Dusty, very fine-grained, probably carbonaceous material and disseminated, euhedral pyrite are abundant in some rocks. Secondary quartz, pyrite and green chlorite occur in small patches and veinlets in many rocks. Three tectonic surfaces are developed, the second of which is dominant. In pelitic material the second surface is very closely spaced and difficult to distinguish as a crenulation cleavage in hand specimen, whereas in semi-pelitic rocks it has thin (0.5-1 mm) quartz-rich and mica-rich segregation laminae associated with it. The carbonaceous material segregates with the muscovite. Such rocks have a glossy, dark grey, phyllitic character. The first tectonic surface may be preserved in the quartz-rich laminae as obliquely oriented fine-grained muscovite flakes and elongate quartz grains. The third surface is a weakly developed crenulation cleavage which in hand specimen is more commonly evident as a lineation on the second surface than as a cleavage. Segregation of carbonaceous material can be associated with it but no segregation of quartz or muscovite was observed.

A number of beds, several metres in thickness, of white or greenish white, foliated, micaceous quartzite occur within the pelitic sequence. They contain 5-10% muscovite plus accessory subhedral opaque mineral and green tourmaline. Two surfaces are defined by the preferred orientation of muscovite flakes. An older, poorly preserved, crenulated surface, defined by individual flakes, is transected by the dominant surface which is defined by stringers of muscovite. Two populations of quartz grains are present. Most grains are fine (0.04 mm), undulose, polygonal quartz, which in places show dimensional orientation parallel to the older muscovite surface. A small proportion (10-15%) of grains are coarser (0.2 mm), strongly undulose and have pitted margins along which incipient development of finer grained material may be apparent. This latter relationship indicates that the finer grained population is derived from the coarser material by recrystallisation. Because the finer population shows dimensional orientation parallel to the older mica surface the coarser grains must be older than that surface. It is likely that they are modified clasts. However, no substantiating evidence, such as preserved sedimentary margins, was established. The third surface of the pelitic rocks was not observed in the quartzite units. The strong tectonic and metamorphic modification of the quartzite within the Concert Schist is in contrast with the sandstone of the Oonah correlate, particularly those west of Maestries Siding. Because of this modification the type of sediment from which the quartzite was derived cannot be inferred.

STRATIGRAPHIC RELATIONSHIP

There is good exposure over the interval in which the boundary between

BOUNDARY RELATIONSHIP OF THE CONCERT SCHIST AND THE OONAH QUARTZITE AND SLATE CORRELATE AT DUNDAS

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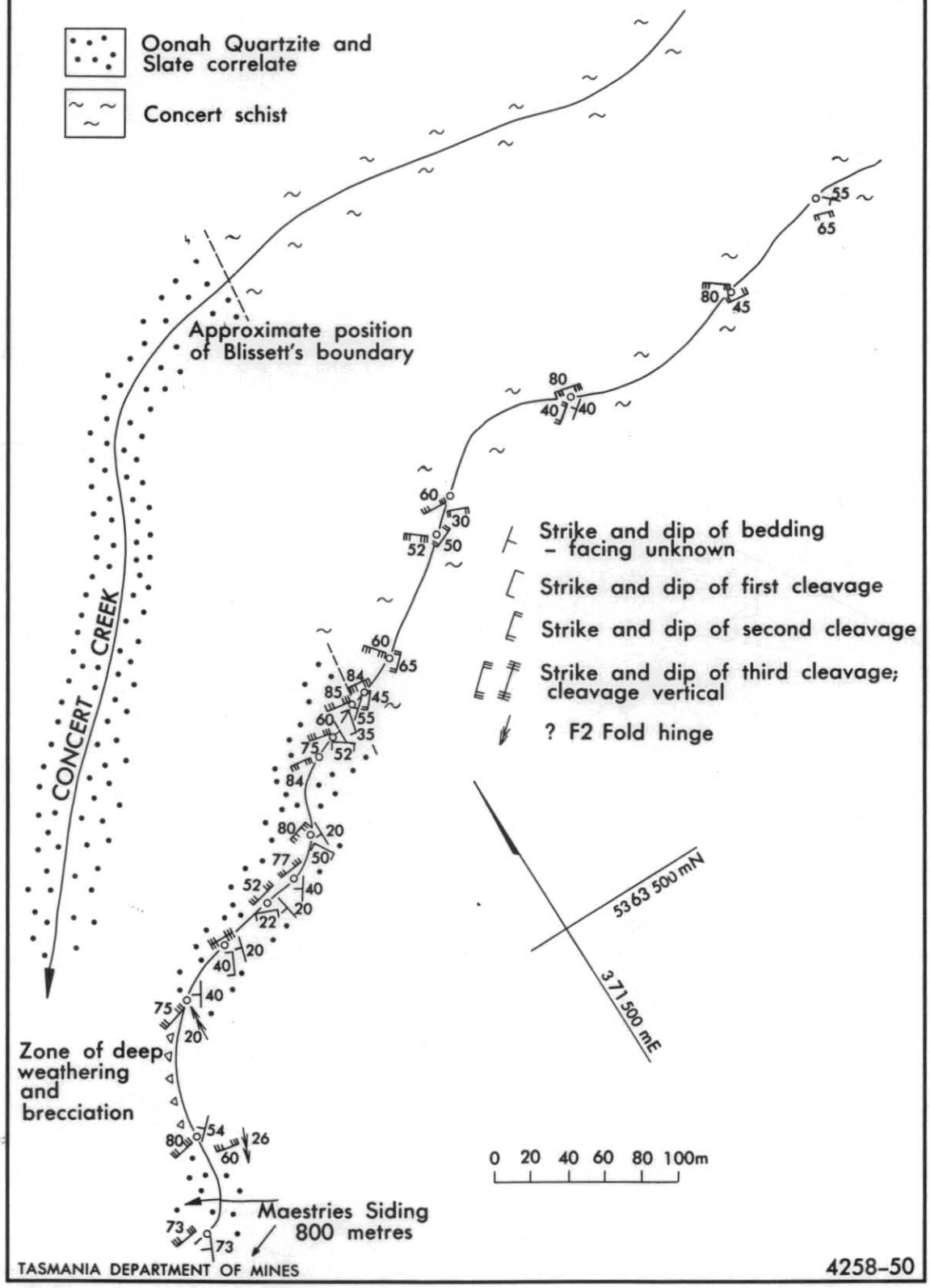

Figure 1

5 cm

the Concert Schist and the Oonah Quartzite and Slate correlate occurs (fig. 1). The following observations were made:

(1) No substantial change in lithology occurs although the pelitic and semipelitic rocks in the Concert Schist are richer in carbonaceous material than those adjacent to it.

(2) No erosional interface was detected.

(3) No fracturing or displacement indicative of substantial faulting was detected.

(4) There is a marginal increase in the lustre of some rocks in the Oonah correlate as the boundary is approached.

(5) Bedding in the Concert Schist near the boundary is of similar attitude to bedding in the Oonah Formation correlate. Although bedding was not confidently identified in the Concert Schist at the boundary the second foliation, to which bedding is commonly sub-parallel, is of similar attitude to bedding in the Oonah Formation correlate.

The absence of any indication of an erosional surface or of substantial faulting, combined with transition in lustre of the rocks and similar attitude of bedding indicates that there is no stratigraphic break between the Concert Schist and the Oonah Quartzite and Slate.

The third tectonic surface of the Concert Schist has continuity across the boundary with the second surface in the Oonah Formation correlate and they are regarded as being the same. It has not been demonstrated which of the earlier surfaces in the Concert Schist is equivalent to the first surface in the Oonah Formation correlate. A few minor, open folds of short wave length and low amplitude occur in the Oonah Formation correlate. They post-date the earlier surface and pre-date the later. They have a crenulation lineation parallel to their hinges. The crenulation might be equivalent to the second surface in the Concert Schist and thus indicate that the first cleavages in the Concert Schist and the Oonah correlate are equivalent.

In view of the textural differences between the quartzite of the Concert Schist and the sandstone of the Oonah Formation correlate it was anticipated that their quartz optic axes fabrics would be substantially different. This is not the case. Both fabrics are diffuse, have very low intensity maxima and show triclinic symmetry (fig. 2). There is no increase in preferred orientation in the Concert Schist quartzite although a large proportion of the quartz grains are of metamorphic origin. Comparable fabrics were found by Spry (1964) in Donaldson Group quartzite (relatively unmetamorphosed Precambrian) and by Spry (1963) in Fisher Group quartzite (metamorphosed Precambrian). Although it is well established (*e.g.* Spry, 1963) that metasedimentary rocks in the Tyennan Precambrian terrane may have quartz optic axes fabrics showing a relatively strong preferred orientation, the results given here show that Precambrian metasedimentary rocks in Tasmania are not characterised as a class by the presence of such fabrics. Spry's result for the Fisher Group quartzite shows that even within the Tyennan terrain there are rocks having fabrics showing relatively weak preferred orientation (*cf.* Williams, 1976).

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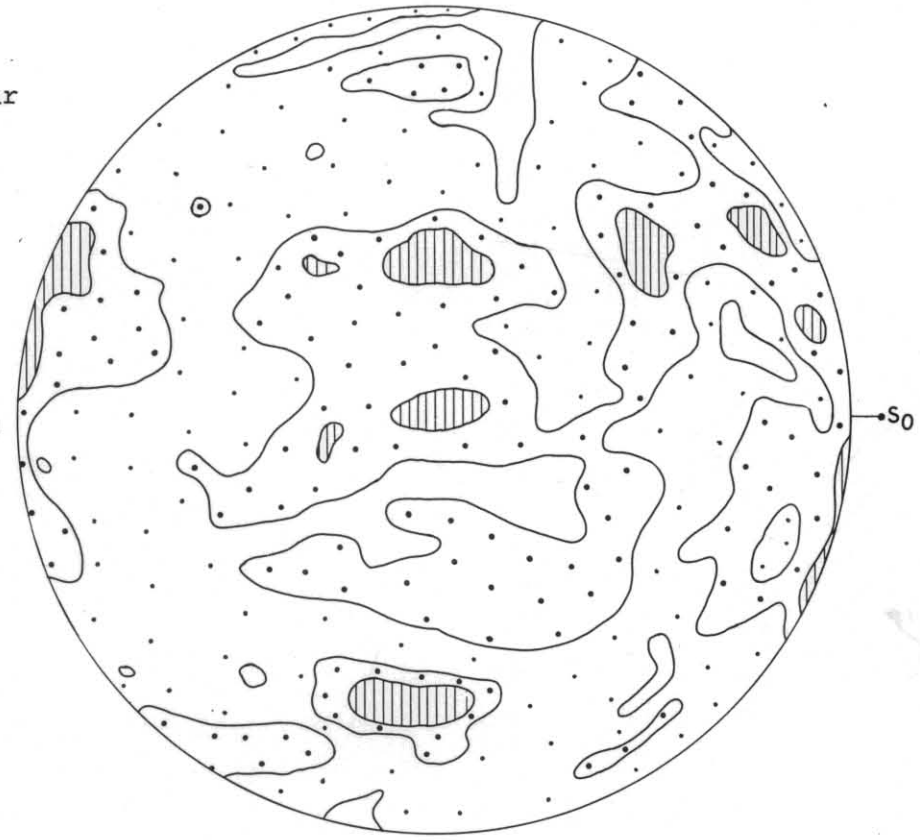
[5 January 1977]

Oonah Quartzite and State correlate, near Maestries Siding, Dundas [CP70756330] Cat. No. 76/744.



Concert Schist, spur south of Concert Creek, Dundas [CP78506385] Cat. No. 73/238.

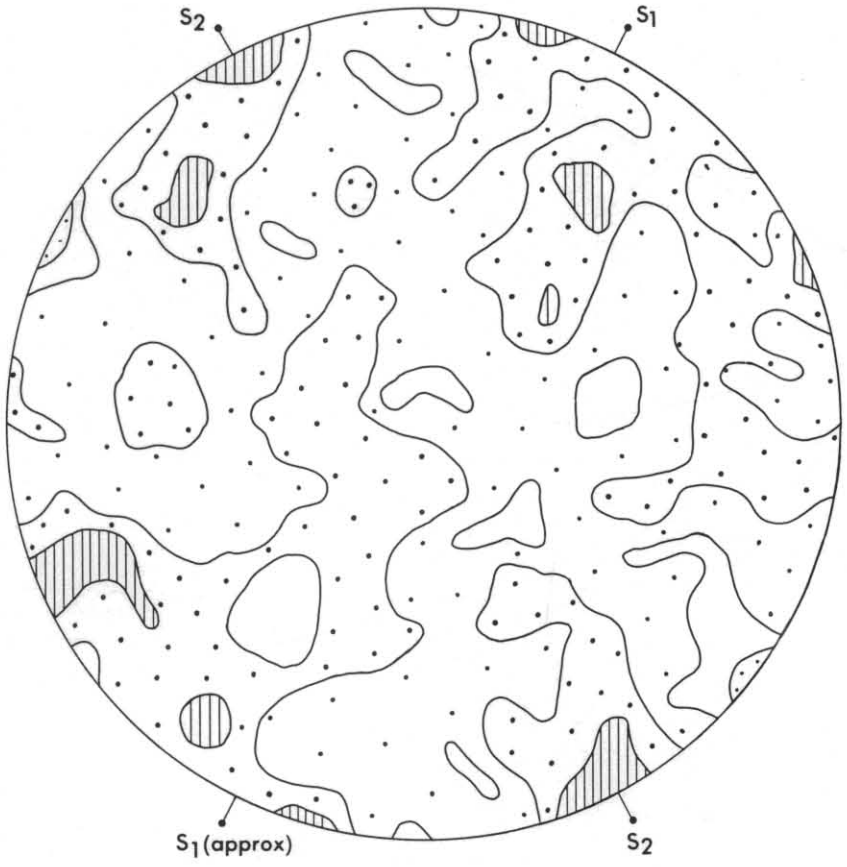


Figure 2. *Quartz optic axes plots, 275 counts, contours at 2, 1 and 0%. Sections perpendicular to the dominant lineation.*

5 cm