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PETROLOGICAL REPORT NO. M.19/64.SPECIMENS FROM BALFOUR, TASMANIAS. Whitehead

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M. ApthorpeMelbourneJune, 1964.

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SPECIMEN NO. M.812:

Core from DDB.4 at 524.8 feet.

Pale grey rock with darker fine banding (carbonaceous) in places. Irregular grains of pyrrhotite sufficient to render the specimen weakly magnetic are scattered throughout the rock. Narrow occasionally intersecting quartz veins cut the rock independently of sulphide grains.

Thin & Polished Sections (M.812):

A fine grained rock composed of quartz, chlorite and sericite with scattered irregular patches of very fine grained iron rich carbonate, scattered crystals of tourmaline, irregular very fine grained aggregates of recrystallised leucoxene or rutile, and irregular grains and patches of sulphide. Very rare grains of feldspar (albite) of metamorphic origin are intergrown with quartz and very rare, very small, well rounded zircons are sparsely scattered through the rock.

Much of the sulphide occurs as irregular and porous aggregates associated with carbonate. Pyrrhotite predominates. There are also a few grains and rare cubic crystals of pyrite, very minor sphalerite most of which is associated with pyrrhotite, and traces of chalcopryrite.

The carbonate and sulphides are secondary having partly replaced parts of the rock, but their relationship to each other is obscure. They are unrelated to the small quartz veins which appear to have formed later possibly by lateral secretion into small joints. The presence of elongated "pressure shadow" quartz against one sulphide aggregate also suggests movement and recrystallisation of silica after introduction of the sulphide.

Conclusion: Sericitic quartzite with secondary carbonate and sulphides mainly pyrrhotite but with traces also of sphalerite and chalcopryrite.

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SPECIMEN NO. M.813:

A very fine grained dark grey schist with fine colour banding. The rock has been folded and fractured and invaded by quartz-chlorite-sericite veins. Movement of the order of 1 mm has occurred along some fractures and brecciated zones contain angular fragments of schist cemented by quartz and sericite or chlorite. Cavities in some veins suggest leaching of a former mineral (sulphide or carbonate?).

Very small elongated aggregates of leucoxene fleck the rock.

Thin Section (M.813):

A very fine grained rock composed of biotite, chlorite, sericite and minor quartz with small lenses and elongated aggregates of leucoxenic material and scattered grains of yellow to green tourmaline.

Veins contain quartz, muscovite and chlorite partly altered to a clay mineral (?).

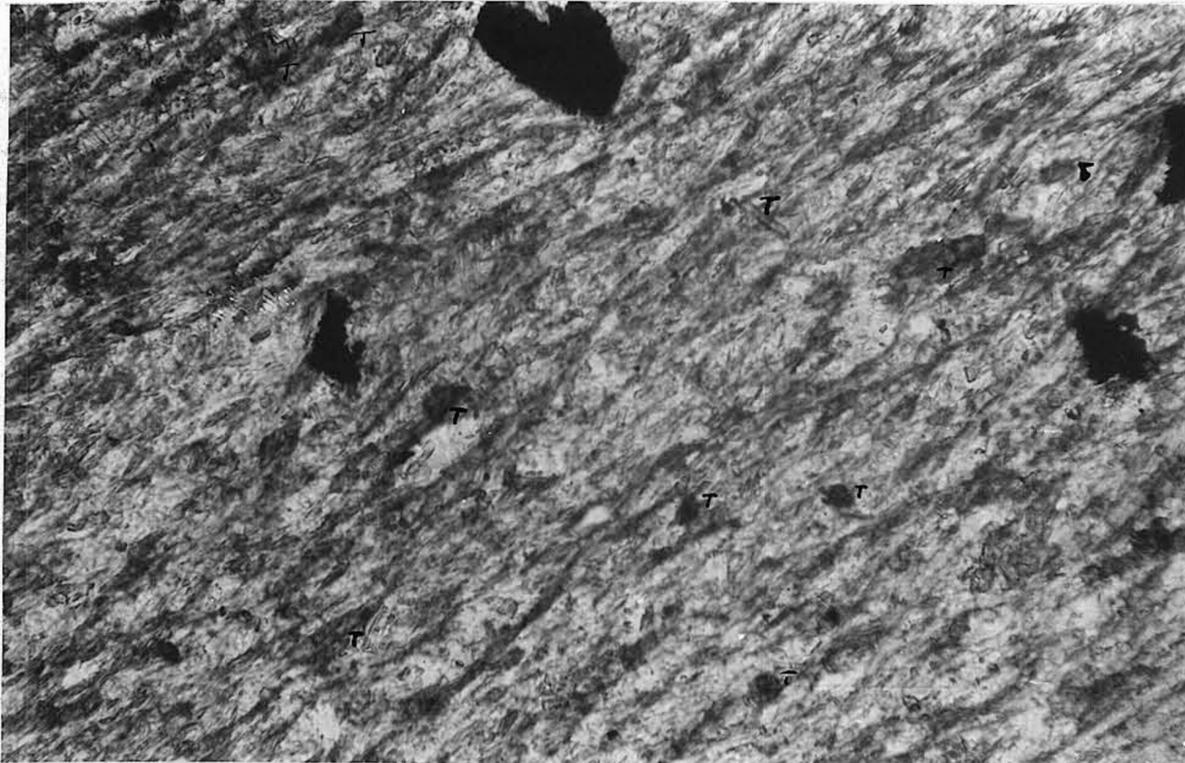
Dark carbonaceous material is unevenly distributed but there is no evidence of fossil remains.

Carbonaceous mica-chlorite schist contorted, fractured and invaded by quartz veins.

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THIN SECTION M. 814A (X.140)

Fine grained quartz-mica schist with scattered grains of authigenic tourmaline (T). Dark grains are leucoxene.

SPECIMEN NO. M.814:

Field Description: Two specimens of pale grey carbonaceous shale. Both specimens show fine colour banding.

Thin Sections (M.814A & B):

Very fine grained schistose rock composed of sericite, biotite, chlorite and quartz with minor scattered aggregates of leucoxene partly recrystallised to rutile or anatase, and scattered prismatic crystals of authigenic tourmaline.

Small paler lenticular patches scattered through the rock are composed mainly of sericite and chlorite.

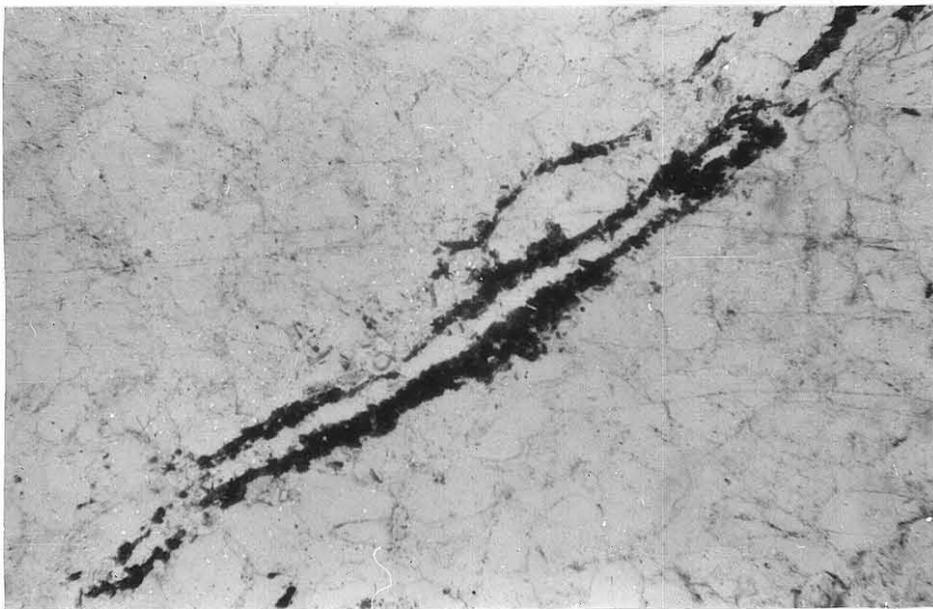
Dark carbonaceous staining varies with the banding.

Conclusion:

Very fine grained quartz-mica schist derived from slightly carbonaceous shale.

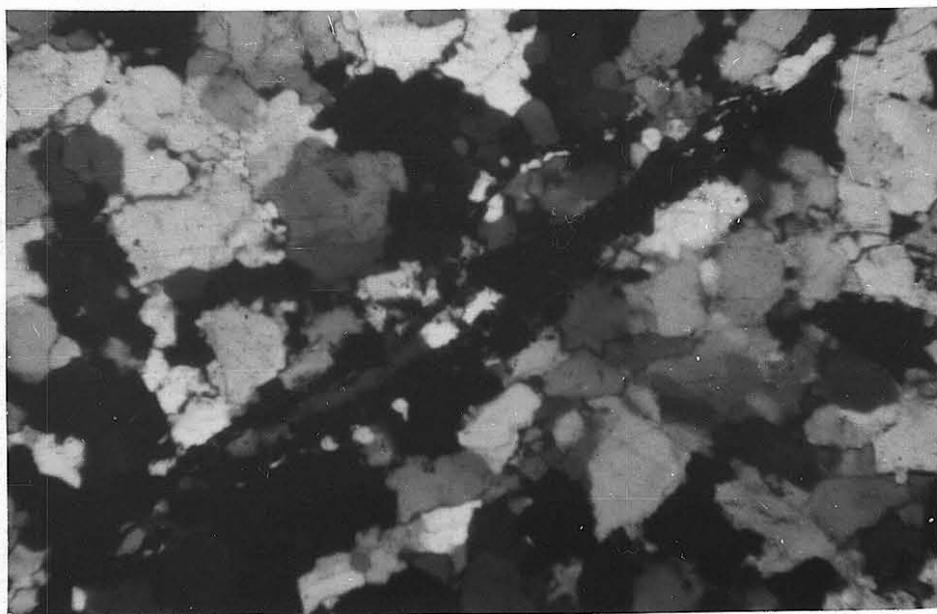
The rock contains rather more authigenic tourmaline (0.5 - 1% estimate) than is usual. This is evenly distributed with no positive evidence suggesting introduction of boron after diagenesis. It may have formed from boron adsorbed by the marine muds forming the original sediments, or from introduced or migratory boron uniformly permeating the rock.

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THIN SECTION M.815 (X.50)

Shreds of tourmalinized material (grey) in quartzite. Lines of minute bubbles through quartz intersect direction of shreds at a moderate angle.



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SPECIMEN NO. M.815:

White to pale grey quartzite with elongated cavities and darker grey shreds orientated more or less parallel to indistinct banding.

Thin Section (M.815):

Recrystallised sandstone or quartzite in which the grain boundaries of former clastic quartz grains has been almost obliterated. Irregular, interlocking and sutured grain boundaries are common suggesting pressure solution and recrystallisation of quartz. Most of the grains show undulatory extinction indicating strain.

Elongated shreds and cavities (visible in hand specimen) are outlined by fine grained yellow to brown tourmaline with random orientation of prismatic crystals. In one of these the former cavity has been filled by secondary quartz.

There is no evidence to suggest what the tourmaline has replaced. One possibility is that it formed by the action of boron on some aluminous silicate.

The only other minerals present are traces of fine grained muscovite and sericite, very rare zircons, and minor very fine grained iron oxide and opaque material. A little fine grained tourmaline is also scattered through the rock.

Conclusion:

Quartzite formed from sandstone recrystallised under stress. Secondary tourmaline has replaced elongated fragments of unidentified origin.

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SPECIMEN NO. M.816:

Pale banded "sandstone" with rare dark carbonaceous shale bands.

Thin Section (M.816):

A medium grained rock composed mainly of quartz and sericite with occasional flakes of muscovite, grains of opaque iron oxide and leucoxene, and rare zircon, tourmaline and apatite.

Rounded clastic quartz grains 0.05 - 0.1 mm grain size have optically continuous overgrowths of secondary quartz. In places where this fills interstices an irregular quartz mosaic is formed.

In general, however, sericite occurs along all grain boundaries and was almost certainly formed from primary clay.

Larger muscovite flakes, opaque grains, zircon, tourmaline and apatite were probably all of clastic origin. The tourmaline grains show evidence of alteration and corrosion. Some fibrous grains may be secondary.

Conclusion:

Sericitic quartzite formed from argillaceous siltstone.

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SPECIMEN NO. M.817:

Faintly banded pale greenish grey quartzitic rock.

Thin Section (M.817):

Composed of quartz, chlorite and minor sericite with sparsely scattered heavy mineral grains.

Quartz occurs as a mosaic of 0.1 mm grain size with irregular grain boundaries and very little evidence of the outline of former clastic quartz grains which have been obscured by regrowth and recrystallisation.

Chlorite forms up to 50% of the rock in some bands and sericite 5 - 10%. They occur along grain boundaries but both chlorite and sericite also tend to occur as rounded grains of about the same order of size as and slightly larger than former clastic quartz grains. This suggests the presence of grains or pellets of clay in the original sediment. Some chlorite aggregates may have formed from weathered and altered ferromagnesian minerals but there is no definite relict textural evidence to indicate this.

Heavy mineral grains include zircon, opaque iron oxide and leucoxene, and very rare tourmaline. A few zircons are cloudy and partly altered and some have caused dark pleochroic haloes in adjacent chlorite.

Rare cubic cavities also visible in hand specimen indicate former pyrite.

Conclusion:

Partly weathered chloritic quartzite formed from impure fine grained sandstone or siltstone.

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