TR8-135-143

22. PETROLOGICAL NOTES ON SPECIMENS FROM THE MACKINTOSH QUADRANGLE, SOUTH EAST QUARTER

The following specimen was collected by Geologist K. L. Burns in a creek east of Lake Windermere.

62-431.

In handspecimen the rock is a pale grey, fine grained siliceous rock. It contains dark grey bands, and white, irregular shaped masses of clay minerals up to 1 mm across are associated with the dark bands. The dark colour is due to a concentration of biotite flakes, and biotite flakes 2-3 mm long are more sparsely scattered through the paler rock. These flakes are oriented parallel to the strike and at right angles to the dip of the banded rock and pyrrhotite in small granular masses is associated with them.

In thin section the rock is an aggregate of equidimensional quartz grains with muscovite and biotite. The quartz grains vary in size from an average of up to 0.02 mm in the darker bands down to a much smaller average in the more siliceous portions. The micas are oriented and show aggregate polarisation. Pyrrhotite tends to be associated with biotite, and there are granular patches of semi-opaque clay mineral.

The rock is schistose, micaceous quartzite.

The suite of rocks described below were collected by Geologist K. L. Burns from a creek south of Mt Remus in the Mackintosh Quadrangle.

63-14.

The specimen is a pale coloured fine grained quartzose rock.

In thin section the rock consists of recrystallized quartz grains 0.15-0.2 mm across. The intergranular material consists of fine grained yellowish sericite. There are also fine bands of sericite showing crenulation. Minute crystals of rutile are common and there are small opaque patches of clayey material.

The rock is a quartzite.

63-15.

In handspecimen the rock is very fine grained and shows irregular dark and light coloured bands associated with the bedding. Innumerable brownish lenticles about 1 mm long lie scattered through the rock approximately parallel to the bedding.

In thin section the rock has a mottled yellowish appearance, consisting of pale and deep greenish yellow, fine grained sericitic material, together with equally fine grained quartzose or quartzo-feldspathic matter, which sometimes is relatively free in patches from sericite. Irregular quartz grains averaging 0.1 mm in length are widely scattered, as are also minute prisms of rutile which may show geniculate twins.

The rock is probably an altered greywacke.

63-16.

The hand specimen is a fine grained medium grey rock with phenocrysts of quartz and feldspar.

In thin section the groundmass of the rock consists of very fine grained radiating and zoned quartzo-feldspathic material together with a little sericite. The quartz phenocrysts show crystalline outlines mainly of quartz forms, but some crystals are corroded and somewhat embayed. The feldspar phenocrysts are almost completely altered.

The rock is a quartz-feldspar porphyry.

63-17.

The specimen is a medium to fine grained pale grey granular rock, with grains and crystals of quartz and feldspar with very fine grained interstitial material.

In thin section the rock consists of angular fragments of quartz up to 2 mm across and fragments and crystals of altered feldspar. The feldspar is too much altered for identification but both orthoclase and plagioclase are present. The fragments are often deeply embayed and some are shattered. Rare chloritic fragments appear to have come from basic volcanic rock.

The matrix and interstitial material is of very fine grained quartzo-feldspathic mosaic.

63-18.

Pale grey granular rock, with visible grains and crystals of quartz and feldspar. The rock is very similar to the foregoing (63-17) from which it is distinguishable only by a somewhat paler grey colour.

In thin section it differs from 63-17 in texture and condition of the feldspars. There is no very fine grained interstitial material, its place having been taken by radiating granophyric aggregates. Quartz grains are fewer and these are corroded and embayed and surrounded by granophyric intergrowths. Feldspar crystals are altered to sericite and twinning is obliterated.

63-19.

The specimen is a fine grained, dark grey, schistose rock.

In thin section the foliation is marked and the rock consists of alternating layers predominantly of micaceous and quartzose composition. The quartz is in clear angular grains about 0.05 mm across, and builds up what are really elongated lenses with a little interstitial mica. The micaceous layers contain carbonaceous material, and some biotite and chlorite as well as sericite. White opaque crystals and irregular grains up to 0.5 mm long are common.

The rock is a carbonaceous mica schist.

63-20.

Fine grained, pale grey, schistose rock.

In thin section foliated texture is strongly shown by fine grained sericite and also by recrystallized quartz grains which tend to be elongated parallel to the sericite laminae. There is also an appreciable amount of chlorite in irregular elongated patches. Zircon occurs as minute scattered grains, generally rounded, but often showing worn crystalline outlines. White opaque grains of leucoxene are common, and there is some opaque clayey material, somewhat iron stained.

The rock is a quartz-sericite schist.

63-21.

Fine grained, greenish grey, somewhat sheared rock with phenocrysts of quartz and feldspar 2-4 mm long.

In thin section the groundmass of the rock consists of fine grained quartzo-feldspathic material containing much green chloritic material in irregular masses.

The phenocrysts of feldspar are almost completely sercitized, but there are suggestions of zoning and compound twinning. The phenocrysts of quartz have the crystalline form of β quartz, but some are rounded and embayed and surrounded by wide reaction rims of sericite material.

There is a little pyrite and opaque white leucoxene. The rock is a hybridized quartz feldspar porphyry.

63-22.

The specimen is a somewhat weathered mottled greenish rock with indefinite phenocrysts in a fine matrix. Some of the phenocrysts consist of glassy quartz with opaque white rims. They range up to 0.4 mm in length.

In thin section the matrix consists of fine grained quartzo-feldspathic material containing cloudy chloritic masses. However, some of these basic masses contain what seem to be minute crystals of feldspathoidal or zeolitic material together with fine talcose and serpentinous remnants.

The feldspar phenocrysts are euhedral but almost completely sericitized. The quartz phenocrysts are surrounded by reaction rims of feldspathic material.

The rock is a hybridized quartz-feldspar porphyry.

63-23.

The specimen is a greyish foliated rock with thin, dark, micaceous bands and elongated siliceous lenticles.

In thin section the folia of mica show crenulation and are coloured pale brown and green due to iron staining and the presence of chlorite. The lenticles consist of recrystallized quartz mosaic with a little interstitial sericite. There are white opaque pseudomorphs of leucoxene after ilmenite, and some white opaque clayey mineral.

The rock is a quartz-sericite schist.

SUMMARY

The rocks described above are from a porphyry dyke intruding Precambrian rocks. Both dyke rocks and country rock are represented. However, the name porphyry is given to the dyke rock for purely descriptive purposes. The dyke material is plainly of mixed origin, both acid and basic rock material being represented, and assimiliation being far from complete. The dyke rock also shows signs of shearing.

The following specimens were collected by Geologist B. Marshall in the Mackintosh Quadrangle.

63-53. *Small bluff SSE of Back Peak*

The specimen is a pale coloured, highly siliceous rock containing fine banding which is minutely folded and faulted.

In thin section the rock consists of a mass of angular interlocking quartz grains averaging about 0.05 mm across. Fine grained sericite is common as bands and patches and fills the minute interstices between the tightly packed quartz grains. Hematite, largely altered to limonite, occurs as disseminated minute euhedral crystals. The sericite is stained a yellowish brown, possibly by limonite, and is concentrated in bands, which are the fine bands seen in hand specimen. They represent pelitic bands in the original sediment.

63-54. *About* 500 *yards S of Back Peak*

The specimen is a pale coloured aphanitic siliceous rock.

In thin section the rock consists of irregular shard like shapes, with somewhat blurred or rounded outlines in a ground mass of much finer material. There are occasional larger fragments of quartz, about 0.1 mm across and rarer fragments of twinned and altered feldspar, together with irregular wisps of dark semi-opaque material, possibly limonitic.

With crossed nicols a felsitic texture appears, due to devitrification, and the presence of very fine grained clay minerals is indicated by vague lines and patches of material of higher birefringence than micro-crystalline quartz.

The rock is a devitrified welded acid tuff or ignimbrite.

63-55. *Top of Devils Ravine* 800 *yards SW of Back Peak*

The handspecimen is a siliceous, fine grained, grey rock with phenocrysts of glassy quartz averaging 2-3 mm and dark, less regular, inclusions of about the same size.

In thin section the rock consists of phenocrysts of quartz and saussuritized feldspar in a very fine grained quartzo-feldspathic matrix. Ragged crystals and remnants of chlorite and epidote are common. There are also reddish-brown, pleochroic broken crystals of sphene.

The quartz phenocrysts are deeply embayed and some show reaction rims.

The rock is a porphyry.

63-56. *Top of ravine* 500 *yards SW of Back Peak*

In handspecimen the rock is a porphyry with glassy phenocrysts of quartz and phenocrysts of altered feldspar.

In thin section the rock consists of phenocrysts of quartz and quartz and sericite. The quartz phenocrysts are somewhat rounded and embayed, the feldspar is partly altered to sericite but what remains is in the albite-oligoclase range.

63-57. *Locality as above*

In handspecimens the rock consists of glassy grains of quartz in a fine grained pale coloured matrix slightly stained by iron oxides.

In thin section the rock consists of euhedral quartz and feldspar in crystals up to 2-3 mm across in a recrystallized matrix of radiating intergrown quartz and feldspar. Sericite is plentiful in the matrix and there is a little chlorite in ill defined patches. The feldspar phenocrysts are partly sericitized and in the albite-oligoclase range. There are also a few disseminated crystals of the iron ore minerals.

63-58. *S side of creek* 500 *yards N of Mt Sumer*

The specimen is a pale grey medium grained rock with abundant fragments of quartz and feldspar.

In thin section the rock consists of irregularly shaped fragments of quartz and feldspar in a microcrystalline matrix. The quartz is rounded and sometimes embayed and seems to have been resorbed into the matrix. The feldspars are in addition somewhat sericitized. A little greenish isotropic material is present and scattered grains of iron ore minerals also occur.

63-59. *N side of creek about* 600 *yards N of Mt Sumer*

In handspecimen the rock is greyish and fine grained and shows many minute glassy fracture faces of quartz grains.

In thin section the rock is very similar to No. 63-58, except that in this instance the feldspars are completely sericitized and difficult to detect in the matrix and the quartz grains rarer and smaller.

63-60. *E Side of creek running S from Mt Sumer*

The handspecimen is a medium grained, greenish grey, granular rock, with grains of quartz and greenish irregular patches in a fine grained matrix.

In thin section the rock consists of irregular grains of quartz and fragments of euhedral crystals, together with irregular masses of sub-radiating chlorite flakes in a fine grained matrix of sericite and quartzo-feldspathic material. The sericite of the matrix may occur in dense patches having some shape, and these may represent former crystals of feldspar. The chlorite also, although usually in very irregular masses, may sometimes form rectilineal shapes reminiscent of hornblende or pyroxene.

63-61. *Small waterfall N of Mt Sumer*

In handspecimen the rock is a dark and light banded shale. Very fine veinlets of quartz penetrate the rock in various directions. Quartz grains appear as dark spots in the paler coloured layers.

In thin section the rock is a typical shale, consisting of very fine grained quartz and sericite. The darker bands owe their colour to a very fine included carbonaceous material. The paler bands are either predominantly sericite or minute chips and angular grains of quartz in a matrix of sericite. Some of the fine bands have a wavy form and this is reflected in the disturbed orientation of the constituents. The beds do not appear to be graded.

63-62. *Top of ravine ½ mile ENE of Mt Sumer*

The rock is a fine grained, grey, carbonaceous shale.

In thin section it consists of minute angular quartz grains in a matrix of sericite and dark carbonaceous material, with scattered opaque irregular grains of limonite.

63-63. *W side of Mt Sumer*

The handspecimen is a medium to fine grained, quartzose rock, with limonitic staining along cracks and in crevices.

In thin section the rock is seen to consist very largely of recrystallized quartz. Some large grains of quartz (up to 1 mm) remain, but the bulk of the rock has been recrystallized. Sericite is plentiful and occurs interstitial to the original grains and in small masses about 1 mm across which may represent original feldspar. In places there are indications of solid flow but without any particular orientation for the specimen as a whole.

The rock is a quartzite.

63-64. 300 *yards along Crisis Creek from where it enters the Devils Ravine*

In handspecimen the rock is greenish and porphyritic in texture with phenocrysts of quartz and irregular masses of chlorite in an aphanitic matrix.

In thin section phenocrysts of feldspar, completely sericitized, are common. Quartz appears as euhedral crystals, embayed and peripherally corroded. They are surrounded by rims of chlorite, and chlorite is closely associated with the feldspars, filling cleavage cracks. Smaller masses of chlorite are scattered throughout the quartzo-feldspathic matrix, and crystals of pyrite are associated with it.

The rock is a quartz-feldspar porphyry.

The following rocks were collected by Geologist R. D. Gee in the Mackintosh Quadrangle.

63-98. *NW cliffs on Lake McRae.*

The handspecimen is a fine grained quartzose rock mottled with limonite stains.

In thin section it consists of tightly packed grains of recrystallized quartz, together with a little hematite, largely altered to limonite, opaque white leucoxene and some micaceous material in vague patches, interstitial to the quartz grains.

The rock is a quartzite.

63-100. *Granite Tor*

The specimen is from a tourmaline vein in granite.

The feldspars of the granite are completely kaolinized. The vein contains only about 10% tourmaline the rest being quartz so that the vein might be better termed a quartz vein although it appears black in handspecimen. No other minerals are visible.

63-101. *Vein in granite from Granite Tor similar to* 63-100.

63-102. *Creek bed 2 miles NW of Mt Inglis*

In handspecimen the rock is a fine-grained, finely banded, light grey and dark grey bedded rock.

In thin section the rock consists of angular quartz grains up to 0.05 mm across in a matrix of very fine sericite with a little biotite. The dark bands are due to opaque carbonaceous material in thin anastomosing veinlets which also contain biotite and a little opaque white clayey material. Graded bedding does not appear and there are occasional irregular clots of chloritic material around which the dark laminae are curved. Scattered grains of zircon and crystals of tourmaline occur.

The rock is slaty siltstone.

63-103. *Creek bed 2 miles NW of Mt Inglis*

In hand specimen the rock is porphyritic, consisting of phenocrysts of pink and yellow-brown stained feldspar, irregular grains of colourless glassy quartz and transparent lustrous books of muscovite in a finer grained quartzo-feldspathic ground mass.

In thin section the rock consists of pinkish perthite which may be altered to a mass of fine grained sericite of a yellow colour. It appears both as phenocrysts and in the groundmass. Quartz is in irregular glassy grains of all sizes up to about 5 mm and muscovite is common as irregular colourless books. A little opaque iron ore occurs with irregular flakes of biotite which is closely associated with muscovite.

The rock is a granite porphyry which has undergone a little greisenization.

63-104. *Creek bed 2 miles NW of Mt Inglis*

In handspecimen the rock is fine to medium grained and dark grey in colour and strongly foliated. Innumerable small grains (up to 1 mm across) show flat crystalline faces. A little fine pyrite is visible.

In thin section the foliation is well shown by ragged plates of biotite. In between the foliae of biotite is a fine grained recrystallized quartzo-feldspathic mosaic. The biotite foliae curve round numerous micro-augen of feldspar, many of which show evidence of rotation. Occasional small prisms of tourmaline occur as inclusions in the micro-augen. Magnetite is disseminated as single grains and pyrite occurs as somewhat scattered groups of irregular grains.

The feldspar is a negative optical sign and the refractive indices are slightly higher than that of Canada balsam. Twinning is absent but the feldspar is probably oligoclase.

The rock is a pelitic schist.

63-105. *Lake Rodway.*

The specimen is a fine grained, schistose, grey rock consisting of quartzose layers about 1 mm thick separated by thinner sericitic partings. The layers are folded.

In thin section the rock consists of a fine mozaic of interlocking quartz grains and sericite, with a few small scattered grains of zircon. Anastomosing veinlets of opaque carbonaceous material and mica make up intervening layers which contain irregularly rounded and lenticular porphyroblasts of albite, dark with fine layers of carbonaceous inclusions, the mica and other material being absorbed into the porphyroblast while the carbon remains undissolved.

The rock is an albitized quartz-sericite schist.

63-106. *Devils Ravine*

The handspecimen is a grey schistose rock fairly heavily mineralized with pyrite. The schistosity is very irregular and the specimen has a knotlike character.

In thin section it is a confused, fine grained aggregate of quartz and sericite, with ragged wisps of opaque carbonaceous material and crystals and irregular aggregate of crystals of pyrite.

The rock is a quartz-sericite schist.

63-107. *Devils Ravine*

The rock in handspecimen is black and schistose with very fine bands of white quartz. A fine quartz stringer, here and there, crosses the schistosity.

In thin section the rock consists of a mosaic of recrystallized quartz with innumerable laminae of graphite. A little sericite also occurs between the very fine laminae.

The specimen consists of graphite-quartz-sericite schist.

63-108. *Devils Ravine*

In handspecimen the rock is fine grained and pale greenish-grey in colour with subhedral phenocrysts of quartz and irregular clots of dark green ferromagnesian material.

In thin section the rock consists of a very fine grained quartzo-feldspathic matrix containing also much sericite, carbonate and chlorite. Phenocrysts of feldspar, largely altered to sericite, carbonate and chlorite are common; they have sharp euhedral outlines whereas the phenocrysts of quartz are somewhat rounded and often deeply embayed and corroded.

63-109. *Mouth of Devils Ravine*

The handspecimen is a dark and light green mottled, sheared rock with numerous phenocrysts of glassy quartz and opaque white feldspar.

In thin section the rock has a finely granular feldspathic groundmass, partly sericitized and containing quartz and chlorite.

The phenocrysts are quartz, corroded and deeply embayed, feldspar, completely sericitized, and albite in fresh euhedral crystals. There are also irregular masses of chlorite enclosing crystals of quartz, albite and masses of sericite, and occasional patches of carbonate.

The rock is an albitized quartz-feldspar porphyry.

63-110. *Mouth of Devils Ravine*

The handspecimen consists of a medium grained quartzo-feldspathic rock weathered to a pinkish brown colour, and a fine grained green chloritic material which passes into the feldspathic rock as fine veinlets forming an irregular network.

In thin section the rock has a hypidiomorphic texture composed of quartz, orthoclase and oligoclase with occasional grains of ilmenite and zircon. Fine grained chlorite penetrates along grain boundaries and cleavages.

It is a contact rock.

63-111. *Mouth of Devils Ravine*

The handspecimen is a coarse grained granitic rock containing quartz, feldspar and a dark greenish ferromagnesian mineral.

In thin section the rock has a hypidiomorphic texture consisting of quartz, feldspar and ragged plates of chlorite with many inclusions. The feldspar is of different generations, some fresh untwinned feldspar being interstitial to quartz, some grains of which have a corroded appearance. This is probably albite from its low refractive index. Some of the earlier feldspar is too much altered for identification, and some of it shows compound twinning, and comes within the oligoclase range. The chlorite contains remnants of colourless pyroxene, white opaque leucoxene and occasional zircons with pleochroic haloes.

The rock is a granite.

63-112. *Fury River.*

The handspecimen is a fine grained greenish-grey rock with somewhat rounded phenocrysts of quartz 2 or 3 mm across, and dark green masses of ferromagnesian minerals of about the same size.

In thin section the rock consists of corroded and embayed phenocrysts of quartz and phenocrysts originally of feldspar, but altered to intergrown fine grained masses of chlorite and sericite. The groundmass is a mosaic of quartz, sericite and chlorite with a little ilmenite, largely altered to leucoxene, but this mosaic is not altogether uniform and may be a result of incomplete assimilation.

The rock is a porphyry.

63-113. *Fury River*

In handspecimen the rock is fine to medium grained and greenish in colour, with irregular creamy phenocrysts. It is mineralized with a little pyrite.

In thin section it consists of a little granular quartz, ragged patches of chlorite with inclusions of rutile and euhedral and subhedral crystals of plagioclase, now completely altered to sericite with a few wisps of chlorite. In some instances traces of zoning are preserved.

Skeletal crystals of fresh untwinned plagioclase are also present, this feldspar being in the oligoclase-andesine range. The texture of the section as a whole approaches hypidiomorphic

The rock is a porphyry.