

TR6-85-92  
**PETROLOGICAL NOTES ON SPECIMENS  
 FROM VARIOUS LOCALITIES**

by G. Everard.

- (a) Trowutta Area.
- (b) Blythe River.
- (c) Mt Barrow.
- (d) Bond Plains.
- (e) Beaconsfield.
- (f) Flagstaff Hill, Lindisfarne.
- (g) Savage River.

**TROWUTTA AREA**

The following are brief descriptions of rocks collected by Geologist W. L. Matthews in the Trowutta area.

**Rapid River, Trowutta—61/13**

Dark greenish grey medium to fine grained rock with white feldspar crystals 1-2 mm long and dark ferromagnesian crystals.

In thin section the feldspars are completely saussuritized, but there is a little fresh secondary albite and a minute amount of interstitial quartz. Subhedral and anhedral pyroxene is common; it shows simple twinning with extinction angle of about  $45^\circ$ ,  $2V = 40^\circ$  and has been diagnosed as pigeonite. This pigeonite shows partial alteration to hornblende and further to chlorite. Ilmenite-magnetite showing partial alteration to leucoxene is common in crystals up to 0.2 mm, and may partly enclose both feldspar and pigeonite.

The rock is a diabase.

**Rapid River, Trowutta—61/14**

Fine grained, greyish, bedded rock stained with iron oxides. There are thin bands of hard limonitic material.

In thin section numerous pores averaging about 0.2 mm appear. The specimen shows a suggestion of breccia structure which has been almost obliterated by diagenetic changes. Some undoubted rock fragments consisting of fine grained micaceous rock are present, but generally the rock consists of a fine granular mosaic of quartz and a little fresh feldspar with much sericite.

The rock is a sub-greywacke.

**Trowutta—61/15**

Fine grained, pale grey, siliceous rock stained by iron oxides. The rock shows evidence of shearing in hand specimen.

In thin section the specimen consists of angular, irregular grains of quartz averaging about 0.02 mm across, minute plates of white mica, and possibly some altered feldspar, in a finer matrix of similar composition. However, the texture is not entirely uniform and there are suggestions of an original breccia structure, obliterated by subsequent alterations.

The rock is a siltstone or sub-greywacke.

**Rapid River, Trowutta—61/16**

Very fine grained siliceous rock having a general reddish tinge due to small clots, about 1 mm across, of iron oxides.

In thin section the specimen is a mass of very minute plates of sericite. Occasional larger fragments of quartz are visible. The rock is replete with minute wisps of hydrated iron oxide, disseminated, or massed together with cores of haematite which may show cubic outlines.

The rock is a mudstone.

**Rapid River, Trowutta—61/17**

Fine grained, dark grey, carbonate rock with irregular white angular fragments up to half an inch long.

In thin section the rock is a mass of interlocking carbonate crystals. The white fragments are semi-opaque finer grained carbonate crystals.

The specimen is a dolomite breccia.

**Trowutta—61/18**

Fine grained grey rock with pink mottlings. It is white on weathered surfaces.

In thin section the specimen is an interlocking mosaic of carbonate crystals. Some of these are clear, others contain opaque white material which may be impurities or simply a recrystallization of the larger crystals. The opaque spots have a sub-radiating texture. The pink mottlings shown in hand specimen are due to limonitic inclusions which mark the outlines and crustification of original pores in the rock, which are now filled in and continuous with the rock texture as a whole.

The rock is a dolomite.

**Arthur River, Trowutta—61/19**

Fine grained, dark chocolate coloured, massive rock with phenocrysts up to 1 or 2 mm long.

In thin section the texture is intergranular, consisting of minute grains of brownish augite and opaque magnetite in the interstices of fine grained lath-like feldspar which is much altered.

Phenocrysts are olivine and a calcic plagioclase, both somewhat altered to greenish chloritic material.

The rock is a basalt.

**Near Caves, Little River, Trowutta—61/20**

Dark brownish, fine grained, massive rock with phenocrysts about 1 mm across.

In thin section the texture is intergranular to sub-ophitic with brownish violet titan-augite between laths and needles of labradorite, but the titan-augite is sometimes of larger grain size than the feldspar.

Fine grained disseminated magnetite is common and there are occasional vesicles filled with carbonate and zeolite.

The phenocrysts are merely some of the larger labradorite crystals.

The rock is a basalt.

**Duck River, Trowutta—61/21**

Fine grained grey rock with fine bands of white carbonate up to 2 mm thick.

In thin section the rock is a mass of equidimensional grains of calcite from sub-microscopic dimensions up to 2 mm long. There are a few small patches composed entirely of argillaceous material, but the clay minerals occur interstitially for the most part.

The rock is an argillaceous limestone.

**Trowutta—61/22**

Irregularly banded black carbonaceous rock with white and greyish bands and lenses of calcareous material.

In thin section the specimen consists of black opaque laminae or argillaceous and carbonaceous material with irregular bands and lenses of impure calcite mosaic, the growth of which has contorted the black laminae. These laminae also may contain fine grained calcite. Rare grains of quartz are also present.

The rock is calcareous carbonaceous shale.

**Arthur River—61/23**

Fine grained grey rock containing innumerable black brecciated fragments up to 1 cm long.

In thin section the specimen consists of a mass of subangular particles of fine grained dark dolomite in a darker matrix. Some of the breccia particles have been partly silicified and there are veins and infillings of very fine grained quartz.

The rock is a dolomite breccia.

**First Bridge, Duck River, Trowutta—61/24**

Fine grained dark grey rock studded with black fragments up to 1 mm across.

In thin section the rock is a mass of angular and subangular fragments of basalt and tachylite together with broken crystals of plagioclase and pyroxene and interstitial chlorite and carbonates.

The rock is a tuff.

**Trowutta Hill, Trowutta—61/25**

Fine grained porous grey rock studded with black and white fragments less than 1 mm across.

In thin section the specimen is an even grained aggregate of fragments of basalt, tachylite, granular calcite and feldspar crystals.

The rock is a tuff.

#### **Trowutta—61/26**

Dark greenish grey rock made up of fragments of rocks and minerals in a very fine dark matrix.

In thin section the fragments are from sub-rounded to angular and vary in size over a very considerable range down to microscopic particles. They consist of very fine grained basaltic rocks, quartz, feldspar and calcite.

The rock is a volcanic breccia.

#### **Arthur River—61/27**

Fine grained, deep violet coloured, siliceous rock.

In thin section the specimen consists of angular grains of quartz and sericite together with opaque red limonitic material.

The rock is a ferruginous siltstone.

### **BLYTHE RIVER**

The following descriptions apply to samples of limonite collected at Blythe River and received from the Acting Chief Chemist and Metallurgist.

#### **Blythe River**

In hand specimen the sample consists of massive haematite with irregular broken veins of quartz, in places coloured red by contained haematite and limonite.

In thin section the specimen consists of fine grained white quartz mosaic and black opaque haematite. In places the haematite is covered with a red coating of limonite and limonite also colours the quartz in small irregular spots. Minute granules of limonite occasionally build up small banded and pisolitic structures in the quartz. The haematite and the quartz mosaic are finely intergrown and it would be difficult to find an area of more than 0.2 mm squared which did not contain both. The haematite exerts its crystal form against the quartz mosaic which consists of interlocking anhedral crystals from 0.1 mm across down to the limits of visibility with the microscope.

#### **Blythe River North**

In both hand specimen and thin section this sample is similar to the foregoing, but in addition shows microstructures consisting of radiating needles of red opaque limonite, growing out from the haematite.

### **MT BARROW**

The following is a rescription of a rock specimen collected by Geologist M. J. Longman on Mt Barrow.

The specimen is a granitic rock of medium to coarse grain. Visible in hand specimen are colourless transparent crystals of feldspar with pearly lustre on the cleavages, irregular grains of

milky quartz, black prisms of hornblende, and lustrous black books of biotite with slightly crumpled laminae. There are some dark oval patches of much finer granularity, about an inch in length.

In thin section the texture is hypidiomorphic. Plagioclase, quartz, orthoclase, hornblende and biotite occur in that order of abundance, with magnetite, apatite and zircon as accessories, and as secondary minerals, chlorite, sericite and calcite. A little augite is present with the hornblende.

Plagioclase occurs in subhedral crystals averaging 2-3 mm in length. Carlsbad, Mannebach and very fine lamellar twinning occur, and extinction angles and refractive indices place this feldspar within the andesine range. Zoning is very common but extinction angles show that the composition varies within the andesine range. Andesine may be partly enclosed by orthoclase, but the relative amounts of the species prevents this relationship from being common. Hornblende, too, tends to wrap around the ends of andesine crystals; quartz is interstitial, so that the order of crystallization is normal. Although the feldspars appear very fresh in hand specimens, some alteration to sericite can be seen in thin sections of both orthoclase and plagioclase and there is also some alteration to calcite.

Hornblende occurs in ragged prisms with pleochroic scheme  $x = \text{yellow}$ ,  $y = \text{olive green}$ ,  $z = \text{green}$  and absorption  $z > y > x$ . The extinction angle  $z^{\wedge}c = 20^{\circ}$ . It has a little colourless augite developed in parallel position usually well inside the crystal boundaries. The augite has a larger extinction angle and higher refractive indices than the hornblende.

Biotite is common and occurs with the hornblende. It is brown and highly pleochroic and shows alteration to a green biotite and to chlorite. It has inclusions of magnetite, and zircon with pleochroic haloes.

Apatite is a common accessory, occurring in numerous small needles with hexagonal section that penetrate other minerals.

There are also a few ragged patches of calcite.

The rock is therefore a normal granodiorite.

### BOND PLAINS

The following is a description of a specimen collected on Bond Plains south of Bond Peak, Mackintosh Quadrangle.

In thin section this rock is porphyritic in texture, containing phenocrysts of quartz, feldspar and chlorite in a groundmass of quartz and feldspar. The phenocrysts average 1 or 2 mm across and the grains of the groundmass about 0.03 mm, with practically no material of intermediate size.

The groundmass is holocrystalline and allotriomorphic granular in texture, being very even grained. It consists of clear quartz and feldspar cloudy with alteration products, mainly sericitic.

In the same way the phenocrysts of feldspar are considerably altered. They are idiomorphic crystals showing simple and sometimes lamellar twinning, but the alteration has gone too far for closer identification.

Quartz is present in badly corroded crystals presenting rounded outlines with deep embayments.

Chlorite shows regular books of incomplete hexagonal crystals, but it is largely replaced by rosettes of colourless needles of epidote with parallel extinction. The rosettes are parallel to the mica cleavage and therefore show only in basal sections.

The rock is a porphyry. It shows two distinct phases of crystallization and is therefore probably of hypabyssal origin.

### BEACONSFIELD

Two samples of nickeliferous D.D.H. core taken at 65 feet and 70 feet, from Beaconsfield, were examined in thin section.

The core is an opaque light green and is brittle due to alteration in the zone of weathering. It contains numerous fine dark veinlets and deposits of fine grained magnetite on shear surfaces.

In thin section the rock consists of lenticles of fibrolamellar antigorite and intergranular isotropic serpophite. The fine dark veinlets consist of almost structureless serpophite with refractive index less than that of Canada balsam. Islands of antigorite occur in the veinlets which send off numerous finer branches. The veinlets and branches carry idiomorphic crystals of magnetite, coated with brown limonite, and limonite stains some of the antigorite.

No garnierite was observed or any nickel sulphide. Possibly the serpentine is itself nickeliferous with the nickel being present in insufficient amount to form the mineral garnierite.

### FLAGSTAFF HILL, LINDISFARNE

The following descriptions apply to rocks collected by Senior Geologist W. MacLeod at the Clarence Commission quarry site on Flagstaff Hill, Lindisfarne.

The first specimen is from the contact zone between dolerite and the Permian mudstone. It is a fine grained black rock, weathered pale grey on the exterior. In thin section the texture is intergranular with occasional phenocrysts of pyroxene and irregular grains of quartz. Labradorite feldspar is present in small laths about 0.2 mm long, with ragged ends and a few phenocrysts.

Small granules of colourless pyroxene fill in the interstices and there are some larger lath-like pyroxene crystals about 0.3 mm long. Together with the pyroxene are innumerable tiny crystals of magnetite. Occasional phenocrysts of magnetite occur up to 0.5 mm long.

The rock is, except for the quartz grains, a typical dolerite in mineral composition. The texture is due to rapid cooling and the quartz to a slight contamination with country rocks.

The second specimen is a very fine grained, pale coloured rock. It has a sub conchoidal fracture and is stained in small cracks and on weathered surfaces by iron oxides.

In thin section the rock consists of quartz grains fused together and showing undulose extinction. The grain size ranges from about 0.1 mm to 0.01 mm. A little sericite is present in minute scales and dark opaque fragments possibly of organic origin. The whole rock is stained in indefinite patches by pale brown limonite.

The rock is a contact metamorphosed siltstone and consists of about 95% quartz.



## SAVAGE RIVER

The following specimen were collected by Chief Geologist T. D. Hughes at Savage River, Collar of No. 7 Bore.

In hand specimen the rock is greyish green in colour and of medium to coarse grain, consisting of feldspar crystals in a ferromagnesian matrix with disseminated crystals of magnetite and a little pyrite.

In thin section the specimen consists of crystals of albite with indefinite, irregular outlines, and showing simple and compound twinning, although most crystals are not twinned. Albite also occurs in masses of much smaller crystals indicating recrystallization of the larger crystals. Most of the albite is quite fresh, but the larger crystals show numerous inclusions of epidote and chlorite, and the peripheries especially are crowded with small needles of actinolite. Actinolite also occurs in larger microcrystalline aggregates representing altered pyroxene.

Octahedra of magnetite up to 0.5 mm across are plentiful, and pyrite occurs also in small crystals and aggregates.

The specimen is a gabbro which has been altered to an albite-actinolite rock.

The following are descriptions of amphibolite core from No. 12 D.D.H. Savage River.

Four hundred and seventy-eight feet: Fine grained, schistose rock made up of white, pink and dark green bands.

In thin section the white bands may be transparent and consist of a mosaic of anhedral albite crystals averaging 0.05 mm across. Sometimes the white bands are translucent or opaque owing to alteration of the albite. The green bands consist of chlorite with sometimes a very little amphibole remaining. The pink bands consist of albite stained by hydrated iron oxides, derived from minute disseminated grains of magnetite. Scattered opaque white grains are of ilmenite altered to leucoxene. Larger crystals of iron pyrites are fairly frequent. Irregular small patches of carbonate are common.

Five hundred and six feet: Fine grained, banded, green and pink rock with intersecting veins of white carbonate and quartz.

In thin section the rock shows a strong schistose structure with alternating bands within which albite or hornblende predominates. Carbonate is frequent in small interstitial crystals, larger irregular patches and as intersecting veinlets. Disseminated pyrite, magnetite and leucoxene are common together with small patches of red iron oxide.

Five hundred and sixteen feet: Fine grained, dark green rock with pink mottlings and many fine veins of white carbonate. Some pyrite.

In thin section the rock is a mass of green hornblende in felted needles without apparent orientation, but many phenocrysts about 1 mm in cross section are also present. Twinned albite occurs interstitially and as masses of anhedral crystals. There is extensive carbonization and veinlets of carbonate occur. Magnetite and ilmenite altered to white opaque leucoxene occur in small irregular masses and scattered grains, some of which have haloes of red iron oxide.

Five hundred and twenty-four feet: Fine grained, greenish, mottled rock with vague banding and intersecting veinlets of white carbonate. There is a little pyrite in scattered grains and clumps of grains.

In thin section the rock consists of rather indefinite layers of green pleochroic hornblende with a little albite and of a mosaic of anhedral albite crystals about 0.02 mm across with a few interspersed crystals of hornblende. The albite is often cloudy with alteration. Magnetite and ilmenite altered to white opaque leucoxene are present in small scattered grains.