

TR12-119-128

Section 3 — Petrology

NOTES ON SPECIMENS COLLECTED IN
VARIOUS LOCALITIES

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Petrological representatives of various rock specimens examined for departmental purposes during the year are given below:

APSLEY

*Specimen 67/5—Roadside Quarry, Lake Highway,
1 mile N of Apsley*

In the hand specimen the rock consists of dark greenish basaltic-looking rounded fragments in a yellowish-brown arenaceous matrix. Angular fragments of quartz ranging up to 3 or 4 mm but mainly <1 mm are common. There are also a few fragments of dolerite, including one 20 mm long.

In thin section the rock is seen to contain numerous rounded fragments of dark glassy vesicular lava showing flow texture; angular to sub-rounded fragments of quartz, feldspar and pyroxene; and a few fragments of dolerite and granophyre.

The basaltic lapilli are extremely vesicular and the vesicles are filled with pale yellowish-brown palagonite having a refractive index lower than that of Canada balsam and an extremely low birefringence. The basaltic material shows flow structure in pronounced alignment of microlites of feldspar and pyroxene. Black magnetite dust is plentiful and there is an occasional minute crystal of olivine.

The material between the basaltic fragments consists largely of cracked and angular quartz grains, averaging about .25 mm across and cemented together with palagonite. There are minute inclusions.

The rock is a sandy basaltic palagonite lapilli tuff.

WATERHOUSE POINT

67/71—Waterhouse Point

The hand specimen is a fine, even grained, pale yellow to buff coloured sandstone, tending to be massive but with definite indications of current bedding. The weathered specimen is brittle and friable.

In thin section the rock is a loose mosaic of angular and sub-angular grains of quartz, many of them cracked and sometimes shattered, cemented together by a yellowish, very fine grained, micaceous mineral, and white opaque clay material. Grains of feldspar are conspicuous because of alteration to white opaque kaolin, but compose only about 3% of the rock. Very minute grains of iron ore minerals are thinly but evenly disseminated through the rock. Rock fragments are uncommon.

The rock is a feldspathic sandstone or sub-arkose.

KINGSTON

67/88—D.D.H.C., Kingston, 82 R.M.

The hand specimen is a very fine grained dark greenish rock with minute, sparsely disseminated black and colourless crystals. A weathered specimen is of a much paler colour but contains small irregular grey patches and similar black and colourless crystals.

In thin section the rock is a mosaic of unsorted clastic grains of feldspar with some quartz and biotite measuring .002 mm or less across with sparser larger fragments up to .5 mm. Among the larger fragments are occasional pieces of rock consisting of trachyte, quartzofeldspathic granular types, and possibly very fine grained altered sediments.

Some fragments of feldspar showed lamellar twinning and observation of maximum extinction angles in sections normal to 010 showed the feldspar to be andesine. Larger untwinned fragments showed corrosion.

The biotite was in minute ragged patches. It was olive green in colour and strongly pleochroic and the laminae were bent and distorted.

The very fine grain size and freshness and angularity of the fragments suggests a sudden violent volcanic explosion followed by a settlement of fine ash.

The rock is an intermediate tuff.

ROY HILL AREA

D.D.H. core specimens from Roy Hill have been examined in thin section. Both holes have apparently been drilled into the metamorphic aureole of an intrusive granite. The first hole has penetrated to the granite at 147 feet. The second hole bottomed in a hornfels (granofels), but at 85 feet, cut a hybrid rock containing both albite and cordierite. Core specimens are described as follows:—

67/107A—Roy Hill D.D.H. No. 1, 10 feet

The hand specimen is a fine grained, pale brown and white mottled rock. It is slightly friable and contains much sericite.

In thin section the rock is a granoblastic aggregate of grains of quartz and cordierite up to about .5 mm across, set in a matrix of sericite, very fine quartz and opaque white material. The larger quartz grains show recrystallisation and the cordierite characteristic twinning.

The rock is a hornfels (granofels).

67/107B—*Roy Hill D.D.H. No. 1, 55 feet*

The hand specimen is similar to the preceding one but is finer grained and less oxidised. It is pale grey instead of pale brown.

The thin section also, is in every way similar to that of 107A, except for a finer granularity.

67/107C—*Roy Hill D.D.H. No. 1, 130 feet*

The hand specimen is a very pale yellowish grey rock. It is fine grained but shows innumerable sparkling grains below .5 mm across.

In thin section the texture is granoblastic, the rock consisting of closely spaced, irregular grains of quartz and cordierite, up to .5 mm across showing recrystallisation and characteristic twinning respectively. Rarer opaque white patches represent grains of feldspar completely sericitised. Very fine grained white mica is interstitial, and there are occasional ragged plates of the same. Irregular aggregates of carbonate are common.

The rock is a hornfels (granofels).

67/107D—*Roy Hill D.D.H. No. 1, 147 feet*

This specimen shows a sharp contact between hornfels and a medium to fine grained granite. At the immediate contact there is a band about $\frac{1}{2}$ inch wide of dark brown biotite hornfels, then, further away from the contact, the rock closely resembles that at 130 feet previously described.

The granite is a rather fine grain leucocratic rock with a band about $\frac{1}{4}$ inch wide, near the contact, finer grained than the rest.

In thin section it shows typical hypidiomorphic texture with euhedral oligoclase in crystals averaging .3 mm and showing fine lamellar twinning, sub-hedral orthoclase cloudy with alteration and clear anhedral quartz. A little biotite is present in irregular books and plates; it is strongly pleochroic from colourless to a light reddish brown and is obviously a less basic variety. A brownish tourmaline very similar in colour to the biotite is also present in a similar amount. Black opaque iron ore minerals are sparsely disseminated. Near the contact cordierite it is very prominent but almost disappears about $\frac{1}{4}$ inch away. Ignoring the cordierite, the approximate proportions are quartz 45%, orthoclase 33%, oligoclase 15%, biotite 5%, tourmaline 2%.

67/106A—*Roy Hill D.D.H. No. 2, 20 feet*

The hand specimen is a brownish oxidised rock but in thin section it is a quartz cordierite, sericite hornfels indistinguishable from 107C.

67/106B—*Roy Hill D.D.H. No. 2, 50 feet*

The hand specimen is a pale greenish grey rather crumbly rock and slightly porous.

In thin section it is a quartz, cordierite sericite hornfels, in texture and mineralogy very like the preceding except for the development of a yellowish-green pinite.

67/106C—*Roy Hill D.D.H. No. 2, 85 feet*

The hand specimen is a white slightly friable rock with colourless equi-dimensional porphyroblasts 1-2 mm across set in a white matrix containing small glittering platelets of white mica.

In thin section the porphyroblasts appear as irregular crystals, and groups of crystals, of cordierite which enclose fresh and altered crystals of feldspar. The matrix is a mass of altered crystals of feldspar and plates and masses of sericite. Orthoclase shows almost complete alteration to white opaque clay minerals, but the smaller crystals of plagioclase are still relatively fresh.

The rock is a hybridised altered granite.

67/106D—*Roy Hill D.D.H. No. 2, 102 feet*

In hand specimen the rock is a very fine grained grey mass of minute plates of mica.

In thin section the rock is a structureless mosaic of plates of white mica, with occasional grains of quartz and tourmaline and rounded zircons.

LAKE RIVER AREA—CONNORVILLE

Mr P. B. Nye described rocks similar to those described subsequently, and collected from the same area, as 'Gabbro porphyrite'. This description is in conformity with an origin of igneous intrusion and autobrecciation. However, although the rocks are composed mainly of sheared basic igneous fragments, the occasional preservation of rounded pebbles, particularly of quartzite, indicates that they are of clastic origin.

At the petrologists' conference held early in 1967 it was decided to reserve the term breccia for rocks which had undergone brecciation. Although the Connorville rocks consist of sheared fragments they are polymictic epiclastic conglomerates composed mainly of angular clasts. The term 'tuff' has been applied to these rocks as the clasts are small and are associated with finer material.

67/97—*Connorville*

The hand specimen is a fine grained, greyish-green, sheared rock with dark, sub-phacoidal porphyroblasts up to 2-3 mm across.

In thin section the texture is sub-trachytic consisting of a felted mass of microlites of plagioclase, grains and prisms of pyroxene and minute opaque white composite granules and sparse small crystals of iron ore minerals.

Thickly scattered through this matrix are small laths, broken crystals and aggregates of plagioclase in the sanidine-oligoclase range up to .2 mm long and averaging .1 mm long. Pyroxene, in the form of a pale brown augite, forms single crystals and aggregates about 3 mm long with much peripheral alteration to chlorite and a brownish intermediate product, possibly hornblende. These aggregates show peripheral granulation and drawing out which can also be seen in the hand specimen. In places some of the augite has recrystallised as clinozoisite which forms small prismatic crystals in the chlorite. Plagioclase has also in places recrystallised to give sub-phacoidal shapes.

The rock is a sheared basic tuff.

67/98—*Connorville*

The hand specimen is a medium grained greenish-grey rock made up of crystalline and composite fragments and pale green amorphous material.

In thin section the rock consists of a mass of crystalline fragments, generally from 1-2 mm in length, of pale brown augite and smoky plagioclase. These fragments are in a variegated matrix of clear green glass, faintly devitrified, opaque greenish white material and minute granules of plagioclase, augite and very fine grained iron ore mineral. There are also a few patches of pumiceous material consisting of opaque substances and microlites with fine grained feldspars and glass, filling the vesicles.

The rock is a crystal tuff.

67/99—*Connorville*

The hand specimen is a fine grained greenish-grey, roughly bedded rock with a few white crystals of feldspar and a few dark crystals, both kinds about 1 mm across; and some larger dark irregular patches.

In thin section the rock consists of aggregates of feldspar and augite, andesitic rock fragments, glass, granules of feldspar and ferromagnesium minerals, and a little magnetite. The feldspar crystals are smoky but those of augite are quite fresh. Many of the crystals and aggregates are phacoidal in shape. The andesitic rock fragments are fine grained and, with the glass, occur in a sheared matrix of opaque white material.

The rock is a sheared lithic crystal tuff.

67/100—*Connorville*

The hand specimen is a greyish-green fine grained, sheared rock, containing white rectangular crystals of feldspar up to about 1 mm long and larger dark lenticular masses.

In thin section the rock consists of rectangular and phacoidal crystals of lamellar-twinning oligoclase-andesine feldspar and larger elongated lenticles of pale coloured augite which are partly altered to chlorite. Clinzoisite is common in grains and crystals of smaller size. The matrix is a felted mass of brownish-green hornblende and pale tremolite, together with chlorite, granular feldspar, clinzoisite, iron ores, and opaque white material. The feldspars show incipient saussuritisation and some of them are strongly strained.

The rock is a sheared tuff or semischist.

67/101A—*Connorville*

The hand specimen is a greyish-green sheared rock composed of lithic fragments of differing types which are up to about 2 cm long.

In thin section lithic fragments similar to the rock types already described can be identified together with fragments of fine grained feldspathic rock, basic lava and shale.

The fragments are distorted and generally show fairly strong shearing.

The rock is a sheared coarse grained lithic tuff.

67/101B—*Connorville*

The rock in the hand specimen is fresher and somewhat less sheared than 101A, but differs in that it contains numerous phenocrysts of augite up to 1.0 cm long.

In addition, in thin section, crystals and aggregates of carbonate up to 1 mm across are common. The pyroxenes show signs of a previous zoning, but are now homogeneous crystals. Intermediate range feldspars sometimes show radiating structures.

The rock is a coarse grained crystal, lithic tuff, showing shearing and incipient recrystallisation.

67/102A—*Connorville*

The hand specimen is a fine grained pale green weathered rock showing flow structure and containing similarly oriented, dark green, lenticular inclusions.

In thin section the rock contains distorted lithic fragments, which appear to be composite. However, the bulk of the rock seems to be composed of a fine grained felted mass of acicular pyroxene and minute laths of feldspar, together with much opaque white or pale green clay material, containing lenticles of green glass averaging .5 mm long although some are much larger.

The glass is crammed with sheaf-like aggregates of pyroxene needles and minute crystals of feldspar.

The rock is a flow-sheared lithic vitric tuff.

67/102B—*Connorville*

The hand specimen is a fresher rock than 102A and is a coarse grained welded mass of lithic fragments containing interstitial opaque grass green material.

In thin section the lithic fragments are seen as different rock types. One type consists of feldspar laths averaging .3 mm long in the oligoclase-andesine range and recrystallised euhedral phenocrysts of augite in a matrix of opaque white material and felted microlites of feldspar, augite and magnetite. Another type consists of rounded fragments, about .5 mm across, of cloudy feldspar, and similar fragments of green glass with microlites—all in a fine grained feldspar-glass matrix. There are patches and wisps of semi-opaque yellowish-green material consisting of very fine grained pyroxene and clay mineral.

The rock is a coarse grained lithic tuff.

67/103—*Connorville*

The hand specimen is a grey massive rock consisting of a welded mass of rock fragments of various types. White crystals of feldspar, black crystals of pyroxene and some indeterminate reddish patches are visible.

The rock types were similar, in thin section, to those already described.

The rock is a coarse grained lithic tuff.

67/104—Connorville

The hand specimen is a dark greenish, fine grained strongly sheared rock. White crystals of feldspar and dark crystals of pyroxene up to nearly 1 mm long are common and there are several cloudy, irregular reddish and greenish patches ranging up to 1 cm or more in length.

In thin section the texture is almost schistose, consisting of needles of fibrous hornblende and drawn-out wisps of white opaque material in a matrix of recrystallised fine granular feldspar.

Phenocrysts of plagioclase and hornblende are common. Of the plagioclase crystals, some are idiomorphic, others which are allotriomorphic show curved and deformed faces. The augite phenocrysts are euhedral or subhedral, and show considerable peripheral alteration to a deep green strongly pleochroic uraltic hornblende formed generally in parallel position. The patches of opaque material show a peculiar cellular texture or network, the interstices being filled with granular feldspar or small crystals of feldspar or hornblende.

67/105A—Connorville

The hand specimen is a rather fine grained pale grey schistose rock with numerous fine grained, dark green and other inclusions, such as lenticles of quartzite. In the centre of a cut face is a knot of pale green silicate minerals about 2 cm across which transects other inclusions and is therefore due to recrystallisation.

In thin section the rock consists of a mass of lenticular and elongated rock fragments which may have lost identity by alteration and recrystallisation. The original outlines have been obliterated by strong directed pressure. Several fragments of quartzose rocks have been most resistant, but even these have been rounded, drawn-out and recrystallised into a fine mosaic of very irregularly shaped, interlocking grains with undulose extinction. These fragments also include a little intergranular white mica and opaque white material.

The knot of silicate mineral seen in the hand specimen consists of a mosaic of tremolite crystals with some talcose and isotropic material.

The rest of the section is a felted mass of tremolite altered in part to talc and with granular quartz and plagioclase.

The rock is a tremolite schist.

67/105B—Connorville

The hand specimen is a schistose rock somewhat similar to 105A in appearance, but more quartzose. It contains a rounded pebble of silicate material which is about 2 cm in diameter.

In thin section the rock is a sheared aggregate of various original fragments which have not altogether lost their identity although they have been deformed and recrystallised and the original outlines have been obliterated. Thus part of the section consists of sub-phacoidal saussuritised feldspar crystals in an opaque white matrix stained reddish-brown in places by iron oxides. Another part consists of a hypidiomorphic mass of hornblende,

tremolite actinolite, plagioclase feldspar and a little quartz. Yet another part consists of an irregularly banded shredded aggregate of talcose tremolite saussuritised feldspar and recrystallised quartz grains.

The rounded pebble seen in the hand specimen consists of pale olive green, strongly pleochroic hornblende in a mosaic of anhedral averaging .5 mm across, together with irregular masses, about 1 mm across, of fine grained sericite, and opaque white clots that may consist largely of perovskite.

The rock is a schistose breccia.

RUBICON QUARTER SHEET—FRANKFORD QUADRANGLE

67/200—*Field Description—Basalt Flow (Porphyritic)*

The hand specimen is a fine grained brownish grey, weathered rock containing phenocrysts up to about 4 mm long of feldspar, olivine and pyroxene.

In thin section the texture is porphyritic, intergranular and intersertal and consists of phenocrysts of rounded and corroded and partially iddingsitised olivine, prisms of augite and laths of labradorite, in a matrix of reticulate andesine needles with granular augite, olivine and brown glass filling the interstices. Augite phenocrysts often occur in clumps, and some augite crystals partly enclose slightly deformed laths of labradorite so that there is a development of glomeroporphyritic and ophitic textures as well. Magnetite is common, and occurs in rods and irregular aggregates.

A vesicle about 5 mm across filled with zeolite occurs in the section.

The rock is an andesine, olivine basalt hybridised by dolerite.

67/201—*Field Description—Igneous Intrusion*

The hand specimen is a massive medium even grained, greenish-grey, granular rock.

In thin section it consists of a network of saussuritised semi-opaque plagioclase laths, with glomeroporphyritic tendencies, in a mosaic of hypidiomorphic hornblende with some alteration to chlorite. Skeletal crystals of magnetite-ilmenite partly altered to leucoxene are common. Ragged plates of brownish biotite also occur.

The rock is a diabase.

NATIVE HUT RIVULET

66/207—*Native Hut Rivulet, Campania*

In thin section the specimen is a medium grained rock consisting of completely sericitised, lath-like crystals of feldspar in a finer grained matrix which displays two different but intermingled textures.

One texture consists of a mosaic of allotriomorphic crystals of quartz and feldspar. The feldspar grains show differing degree of alteration, but many grains are almost entirely clear. These are optically negative with a wide axial angle and have a higher refractive index and birefringence than contiguous quartz grains. They consist therefore of bytownite.

The other texture consists of needles of quartz up to 2 or 3 mm long, usually in bundles or brushes, with interstitial feldspathic material which does not give a clear interference figure, but which has a refractive index lower than that of balsam. Needles and interstitial material are frequently intermingled in micrographic intergrowth.

There are also frequent skeletal crystals and irregular aggregates of ilmenite which have been almost entirely altered to white opaque leucoxene and stained pale brown with iron oxides. These seem to be specially associated with the larger, euhedral sericitised feldspar crystals which may also contain a little acicular quartz.

The rock is granophyre.

WHITEWATER CREEK DAM SITE, KINGSTON

67/197—D.D.H. No. 7, 107 feet—*Whitewater Creek*

The hand specimen is a dark yellowish green, fine grained rock with a specific gravity of about 2. It is moderately hard and somewhat brittle with a greasy to vitreous lustre and sub-conchoidal fracture. The rock is not entirely homogenous but contains small yellowish earthy patches and minute voids, lined with white glassy material, that are just visible to the eye.

In thin section the rock consists of a matrix of colourless isotropic opal, covered by a network of fine cracks and showing colloform structure. The opal has a fairly high relief and an index of refraction lower than that of balsam. Voids in the colloform structure are lined, and sometimes almost filled, by radiating needles of chalcedony.

In the opal is much greenish-yellow nontronite, which makes up about one-third of the rock. It is in irregularly shaped, rounded masses also showing colloform structure. It shows relatively high birefringence colours for such fine grained material and has a refractive index higher than that of balsam. It is partly altered to brown opaque limonite.

ROYAL GEORGE

67/6—D.D.H. C.C.C.9, 317 feet—*Royal George*

The specimen is a small piece of core consisting of medium to coarse grained quartz carbonate material mineralised with a light metallic looking sulphide and also containing a black silicate.

Under the microscope the thin polished section is divided by a single crystal of carbonate 3.5 mm across, running right through the section from side to side. The carbonate contains inclusions of idiomorphic sulphide, quartz, feldspar, and tourmaline, and very fine granular aggregates of these minerals.

On one side of the large calcite crystal, sulphide is the principal mineral. The sulphide is isotropic and cannot be scratched by a steel needle. It is strongly pleochroic from yellow to white and is identified with pyrite. In general the pyrite is idiomorphic, but it is traversed by fine irregular veinlets of calcite, and sometimes of fluorite, which have penetrated along the cleavages. Besides calcite and fluorite there is some euhedral quartz and feldspar and interstitial microcrystalline siliceous material.

On the other side of the calcite crystal are irregular granular masses of calcite, quartz, feldspar, fluorite and tourmaline both mixed and in monomineralic aggregates, with microcrystalline siliceous matrix. Cassiterite was not positively identified, but very minute crystals with properties which are difficult to ascertain are plentiful.

The specimen is a Lodestuff.

SINGLE HILL, LAUDERDALE

67/4—Contact Specimen—Single Hill, Lauderdale

The hand specimen consists of a medium grained leucocratic doleritic rock in contact with a dark grey aphanitic rock. The contact is quite sharp and marked by a linear concentration of small crystals of magnetite. In one part of the contact a small section of rock of intermediate grain size and colour is interposed. However, the contacts of this intermediate rock with the fine and medium grained rocks are still very sharp.

In thin section the fine grained rock has an intergranular texture and contains masses of minute granules of pale brownish augite. Each granule averages about .02 mm across and is in a network of labradorite laths averaging .05 mm long. Octahedra of magnetite from .01 mm across down to the finest dust are evenly disseminated through the rock. There are rare platelets of brown biotite.

The mode is approximately labradorite 55%, augite 42½%, magnetite 2½%.

The intermediate rock is of slightly coarser grain with labradorite laths up to .2 mm long. The texture is also different being in part sub-ophitic, but most of the feldspars, being more equidimensional, form a mosaic with patches of micrographic intergrowths and ragged crystals of augite. Magnetite occurs as larger crystals and in irregular aggregates. Minute needles of apatite are common and there is a little epidote. Flakes of sericite appear in the feldspar crystals.

The mode is approximately plagioclase 60%, augite 25%, magnetite 3%, micrographic intergrowth and mesostasis 12%.

In the medium grained leucocratic rock the texture is granophyric. The rock consists of semi-opaque irregular altered crystals of feldspar alternating with patches of micrographic intergrowth and shears of acicular quartz. A few laths and irregular crystals of feldspar remain relatively fresh but the ferromagnesium mineral has been reduced to dark, irregular patches associated with magnetite, or may be replaced by carbonate.

The rock consists of approximately plagioclase 50%, mesostasis and graphyric intergrowth 39½%, pyroxene 7½%, magnetite 2½%, carbonate 2½%.

The rock is a granophyre.