Section 3: Petrology

TR14-135-144

29-38. Notes on specimens collected at various localities

G. EVERARD

29. Hellyer Gorge

62-242. *Hellyer Gorge*

The hand specimen is a fine-grained, greyish black rock with closely-spaced bedding planes along which it cleaves readily. On the cleaved faces are small protuberances and their corresponding depressions due to fragments of rock from a previous cycle buried in the sediment. A drop of acid effervesces only when placed on a surface at right angles to the bedding.

In thin section laminations of about 1 mm can be seen and each lamination shows graded bedding, the average maximum grain size is about 0.004 mm. The minerals in this very fine material are quartz in clear angular grains, wispy platelets of sericite, a little carbonate and much dark carbonaceous material. Grains of iron ore minerals and a few grains of pyrite are also present.

The fragmental material is in rounded lenticular grains of quartzite and greywacke up to 2 or 3 mm across. These fragments include pieces of yet another earlier cycle and contain greywacke, schist, altered basic igneous material and fragmental limestone with organic structure.

The rock is a carbonaceous, calcareous shale.

66-243. *Hellyer Gorge*

The hand specimen is a smooth lenticular structure with a thin shaly surface over a calcareous interior. The smooth surface is interrupted with small protuberances caused by included fragments as in the previous specimen.

In thin section the rock shows fine current bedding in sedimentary material with a grain size of 0.01 mm, consisting of quartz, sericite, calcite, black carbonaceous material and a little disseminated pyrite. The current bedding is outlined by the black opaque carbonaceous material. Lithic fragments are confined to the shaly outer crust of the structure the centre of which is a calcareous carbonaceous mudstone.

30. Lorinna area

Oliver Hill

The hand specimen is a fine-grained, pale-coloured weathered rock, sheared and stained red in part by iron oxides. Small brownish patches of limonitic material from 1 mm to 1 cm are common.

In thin section the rock consists of angular quartz grains from 0.05 mm to 1 mm across, in a matrix of fine quartz and sericite. There are also occasional minute crystals of magnetite altered in part to limonite. The interstitial material is spotted with limonite which is sometimes in sufficient amount to form a secondary cement.

The quartz grains have undergone strain and show undulatory extinction, but the rock was originally of a rather dirty immature type.

The specimen is a sheared quartz-sandstone.

31. Frankford area

68-165A. *Rudge's Barite Prospect*

The hand specimen is a dark, greenish, glassy looking rock with a conchoidal fracture. A polished surface shows a streaked and mottled texture with elongate paler grains and patches up to 3 x 0.5 mm and dark wispy markings. Barite is present in irregular small veins.

In thin section the streaked and mottled, sheared texture can be seen in plane polarised light as dark cloudy patches and a brownish mottling due to iron oxide. This, however, is mainly a palimpsest texture because, on inserting the upper nicol, the section appears as a mosaic of interlocking grains of feldspar and quartz, showing extensive recrystallisation and little relation to the texture shown in plane polarised light.

There are two distinct grain sizes averaging 0.1 and 0.01 mm in diameter. Some of the larger quartz grains are euhedral and some show crystalline outlines marked by lines of inclusions.

Some of the feldspar grains retain an elongate outline, but they are also recrystallised. Twinning is very irregular and the refractive index is greater than that of balsam.

The rock is a hornfels.

68-165B. *Rudge's Barite Prospect*

This rock is weathered variety of 165A. It is lighter in colour and weight, due to the weathering out of the feldspar grains, which also brings out the original sheared texture of the rock.

32. Quamby area

68-34. *Pumicestone Ridge* [58758300]*

The hand specimen is a fine-grained red rock with numerous phenocrysts up to 5 mm long of pink feldspar and occasional phenocrysts of colourless quartz.

Black patches of magnetite are common but much of the iron has been further oxidised.

In thin section the quartz phenocrysts appear as broken fragments of crystals, corroded and embayed. Oligoclase is present as single euhedral crystals and groups of unzoned crystals with well marked twinning.

The matrix seems to have had an original intergranular and intersertal texture consisting of microlites of feldspar having maximum extinction angles of about 30°, indicating a labradorite, with interstitial magnetite, glass and possibly pyroxene. On inserting the upper nicol the matric appears to have a different texture due to devitrification and recrystallisation, but the microlites of feldspar are still prominent.

If this interpretation of the petrography is correct, the original rock has undergone a considerable amount of chemical alteration.

The rock is a quartz-feldspar porphyry.

63-37. *Pumicestone Ridge* [58758300]

The hand specimen is a very fine-grained massive pink quartzose rock with barely visible fine colour banding.

In thin section the rock consists of an interlocking mosaic of quartz grains averaging 0.07 mm across. The grains are angular and show some strain but only traces of incipient recrystallisation here and there. There is little interstitial material, which consists of thin wisps of sericite with occasional small interstitial patches of pink microcrystalline quartz; the interstitial material usually has a pinkish tinge.

68-67. *Lobster Creek* [466888]

The hand specimen is a fine-grained, pale grey, massive rock with a conchoidal fracture. Angular grains of quartz and feldspar, up to nearly 1 mm across, are visible here and there.

In thin section the rock consists of angular fragments and crystals of quartz, orthoclase and oligoclase-andesine and greenish yellow patches of opaline material in a very fine-grained groundmass. Some quartz crystals show embayment and corrosion, and the fragments of quartz, which are much the commoner, sometimes have concave edges. Fragments and crystals of orthoclase show simple twinning and have a lower refringence than the matrix.

* Kiloyard grid, Quamby 1-inch sheet.

Plagioclase shows multiple twinning and a higher refringence than the matrix which in turn is higher than that of balsam. The matrix is partly glassy and partly microcrystalline. It contains confused outlines of minute splinters and shard-like shapes and appears to have been largely recrystallised.

68-68. *Gog Range, between Lobster Rivulet and Mersey River*

The hand specimen is a fine-grained, massive crystalline rock.

In thin section it shows a marked ophitic texture with acicular to lath-like crystals of completely sericitised feldspar penetrating larger prismatic crystals of green pleochroic tremolite-actinolite or uralite. Minute black crystals, aggregates and skeletal masses of magnetite-ilmenite sometimes altered to white opaque leucoxene are fairly plentifully disseminated through the rock. A little epidote is present as occasional irregular masses and veinlets.

The rock is an altered dolerite or diabase.

68-168. *S of Deloraine* [605815]

The hand specimen is a medium- to fine-grained, greenish grey, sheared rock, with white crystals of feldspar, black crystals of a ferromagnesian mineral and greenish patches of chloritic material in a very fine-grained greyish matrix.

In thin section the rock is very cloudy with much fine, opaque, white material. Scattered crystals and crystalline aggregates of feldspar are common. Oligoclase can be identified, although some crystals are extensively zoned and most of them are semi-opaque due to alteration.

Euhedral crystals of colourless to pale greenish augite are common and are associated with chlorite and possibly a little epidote.

The matrix is a very fine-grained mixture of the same minerals, and is rendered semi-opaque by alteration.

The rock is a tuff.

68-169. *S of Deloraine* [615820]

The hand specimen is a medium-grained leucocratic rock consisting of grains of pink feldspar up to 2 or 3 mm across, a lesser number of larger irregular angular grains of quartz and rarer basic material in patches up to 1 cm in length.

In thin section the rock is seen to consist of a mosaic of sub-angular grains with a little interstitial material which is largely choritic with some fine-grained siliceous, ferruginous and epidotic material.

The feldspar is oligoclase. It is cloudy and shows simple and lamellar twinning. Quartz is in clear, irregular, angular grains with peripheral fritting and incipient recrystallisation. It tends to have inclusions of chlorite which is also common as interstitial material sometimes associated with epidote.

The rock is in indurated arkose.

33. Alberton

69-430. *Bottom of Bore No.* 1, *Alberton*

The hand specimen is a small piece of core about ¾-inch thick, consisting of a pale yellowish brown much altered fine-grained granular rock, very soft and friable. Under magnification it consists mainly of white crystalline laths of feldspar in a darker matrix.

The lath-like crystals are normally less than 1 mm in length, but occasional crystals reach 2 mm.

In thin section the rock has a trachytic texture consisting of laths of completely sericitised feldspar showing relics of multiple twinning, minute needles of apatite and skeletal crystals of leucoxene after ilmenite. Fine-grained carbonate of secondary origin is freely disseminated through the mass.

There are also occasional rather shattered phenocrysts of feldspar completely altered to sericite and carbonate.

The rock is an altered keratophyric lava.

34. Winnaleah (fig. 43)

The following are descriptions of specimens of basalt collected from scarps above the Winnaleah-Warrentinna Road by Geologist, D. J. Jennings.

SPECIMENS 1, 4, 7

In hand specimen this basalt is a medium-grained black rock showing prominent cleavage faces of pyroxene.

In thin section the texture is porphyritic, glomeroporphyritic, intergranular and intersertal with single crystals of titanaugite up to 1.5 mm long, groups of crystals up to 2.5 mm and crystals and aggregates of olivine only a little smaller. The phenocrysts are set in a matrix of lamellar-twinned andesine laths averaging 0.5 mm in length, forming a network enclosing granules of augite, olivine and magnetite and indefinite interstitial masses of feldspar and glass.

The augite is a strongly coloured, pleochroic, titan-rich variety showing marked zoning and containing numerous inclusions that tend to be parallel with the zoning.

Specimen 1 contains iddingsite, whereas in specimens 4 and 7 a little of the olivine has been altered to serpentine.

The order of crystallisation was magnetite, olivine, pyroxene, andesine but some small laths of andesine are partly enclosed by titanaugite.

The rock is an olivine-andesine basalt.

SPECIMEN 6

The hand specimen is a fine-grained black rock consisting of minute lighter coloured grains mostly below 0.25 mm across set in a dark matrix.

In thin section the rock consists of euhedral and subhedral crystals of olivine (a few of which are partly altered to serpentine), averaging 0.2 mm across, in a matrix containing prisms of pale brown augite averaging 0.015 mm in length and octahedra of magnetite, 0.005 mm in diameter, in a yellow-brown glass.

The rock is a limburgite.

SPECIMEN 10

The hand specimen is a fine-grained black rock with occasional filled vesicles and numerous crystals showing bright cleavages—all less than 1 mm.

In thin section there are numerous euhedral or shattered and slightly rounded, phenocrysts of titanaugite, all in a trachytic matrix of andesine needles about 0.5 mm in length with intergranular titanaugite and ilmeno-magnetite and interstitial glass. Vesicles contain alternate bands of fibrous zeolite and microcrystalline silica or carbonate.

The rock is an olivine-andesine basalt.

SPECIMENS 5, 9

The hand specimens are fine-grained black rocks showing minute crystal faces. Specimen 5 contains vesicles rimmed with calcite.

In thin section the rock contains phenocrysts of olivine up to about 0.25 mm long in a matrix of intersertal texture consisting of laths and prisms of feldspar and titanaugite averaging 0.15 mm in length, with the interstices filled with granular titanaugite, rods and octhedra of ilmeno-magnetite and a brownish glass. The feldspar is andesine.

The rock is a fine-grained limburgitic olivine-andesine basalt.

SPECIMEN 8

The hand specimen is a greyish black rock consisting of light phenocrysts, averaging 0.2 mm across in a black matrix with occasional vesicles and some patches of olivine up to 3 mm across.

In thin section the rock consists of phenocrysts of olivine, often euhedral but usually somewhat rounded and cracked, in a fine-grained matrix of titanaugite crystals, granular magnetite and a little colourless glass.

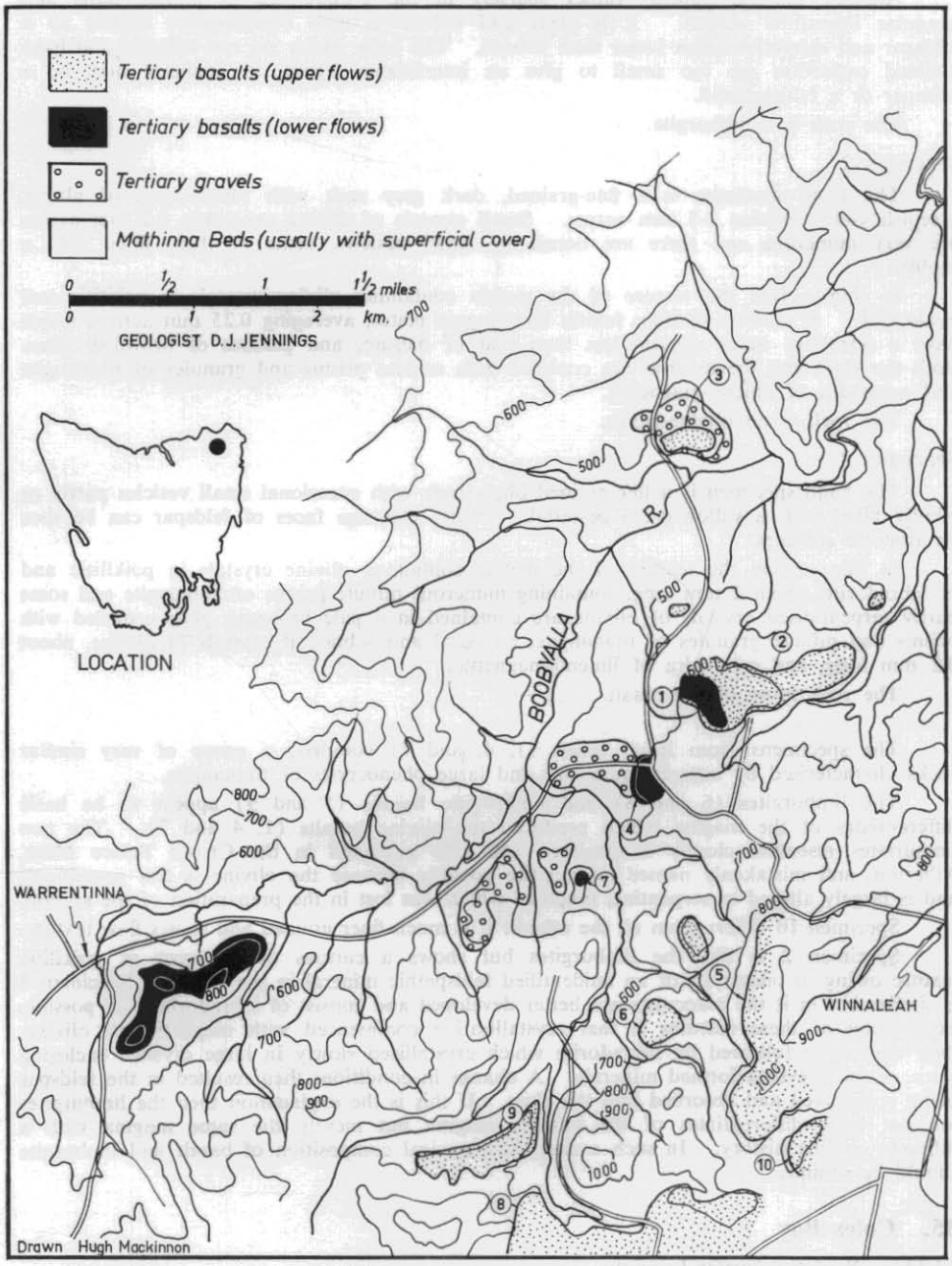

FIGURE 43. Specimen locality map, basalt outcrops between Winnaleah and Warrentinna.

5 cm

Another mineral appears rather sparsely in the groundmass as minute laths and irregular interstitial shapes. It is clear and colourless with birefringence similar to a feldspar and refractive index lower than balsam. The laths which are not twinned and have inclined extinction are too small to give an interference figure, the mineral may be a feldspar or a feldspathoid.

The rock is a limburgite.

SPECIMEN 2

The hand specimen is a fine-grained, dark grey rock with phenocrysts of glassy, greenish yellow olivine 1-3 mm across. Small crystals of olivine averaging 0.2 mm across are very numerous and there are occasional small vesicles, some of them filled with a zeolite.

In thin section the texture of the matrix containing olivine crystals is pokilitic and hyalopilitic. It consists of thin, faintly birefringent plates, averaging 0.25 mm across, which have a refractive index slightly less than that of balsam, and patches of brownish glass. Both the glass and the mineral are crowded with minute prisms and granules of titanaugite and octahedra of ilmeno-magnetite.

The rock is an olivine-basalt.

SPECIMEN 3

The hand specimen is a fine-grained black rock with occasional small vesicles partly or wholly filled with a yellow-green material. Pearly cleavage faces of feldspar can be seen on fracture surfaces.

In thin section the texture of the matrix containing olivine crystals in poikilitic and of labradorite, about 2 mm long, containing numerous minute prisms of titanaugite and some partly serpentinised crystals of olivine are contained in a pale brownish glass crowded with prisms and minute granules of titanaugite, euhedral and subhedral crystals of olivine, about 0.2 mm long, and octahedra of ilmeno-magnetite.

The rock is an olivine-basalt.

The specimens from lower levels (1, 4, and 7) comprise a group of very similar rocks characterised by coarser grain size and large phenocrysts of titanaugite.

The limburgites (6 and 8) and limburgitic basalts (5 and 9) appear to be basic differentiates of the magma which produced the olivine basalts (1, 4 and 7). The two limburgites resemble closely a specimen (40 U8) collected in the Crown Prince Mine, Alberton, and mistakenly named an augitite possibly because the olivine is less prominent, and is largely altered to serpentine, much of which was lost in the preparation of the section.

Specimen 10 differs from all the others: it is much finer grained and shows flow texture.

Specimen 2 is like the limburgites but shows a curious development of poikilitic texture owing to oikocrysts of an unidentified feldspathic mineral in the matrix. Specimen 3 is similar but in it the oikocrysts are better developed and consist of labradorite. A possible explanation of these textures is that crystallisation commenced with magnetite or olivine, then titanaugite followed by labradorite which crystallised slowly in large crystals enclosing some of the previous formed minerals. A change in conditions then resulted in the feldspar being redissolved and absorbed into the glass. If this is the explanation then the limburgites are not basic differentiates of the basaltic magma but merely the same magma with a different cooling history. In such a case the chemical composition of basalt and limburgite should be similar.

35. Coles Bay

69-327. *N of Freshwater Lagoon*

The hand specimen is a fine-grained, indurated, oxidised sandstone, pale salmon-pink in colour and with numerous small voids.

In thin section, the rock is a tight mosaic of sub-rounded triangular grains of quartz and feldspar with a few lithics and with a varying but usually minute amount of interstitial sericite stained brown by iron oxides. Twinning is rare but an appreciable number of the grains show recrystallisation.

A grain count gave 50% quartz, 35% feldspar, 15% lithics. The rock is therefore an arkose.

36. Pontville

Several specimens of sandstone from a quarry at Pontville including two shaped blocks were received from Materials Research Laboratory, Public Works Department, for examination in connection with the flaking of thin laminae from the weathered surface of the stone.

SPECIMEN A1

A dense, while somewhat friable, fine-grained sandstone from the bottom of the quarry. It is composed of grains of quartz, white opaque material, occasional small flakes of white mica and a trace of graphite.

In thin section it consists of an interlocking mass of sub-angular to sub-rounded grains averaging 0.2 mm across with not more than about 5% of intergranular material, mainly of a very fine micaceous or clayey nature. The rock consists of roughly 60% quartz grains, showing occasional slight recrystallisation; 30% feldspar with simple, albite and microcline twinning, and showing slight alteration in some instances; a small proportion of lithics and traces of zircon, rutile, sphene and garnet.

Sections cut in different directions showed a slight preferred orientation of elongate grains of quartz and feldspar, but little or none of the mica flakes.

The rock is an arkosic sandstone.

SPECIMEN B

A white sandstone from the top of the quarry which resembles A very closely. Graphite flakes though not prominent are commoner than in A.

In thin section the resemblance to Specimen A in grain size and texture is still marked and the specimen contains about 50% quartz, 25% feldspar, 15% lithics, 5% muscovite, 5% matrix and traces of graphite, tourmaline, zircon and chlorite.

The rock is an arkosic sandstone.

SPECIMEN C

A shaped block of pale brown- and yellow-banded fine-grained sandstone with numerous visible flakes of muscovite and rare small black spots or masses of graphite flakes.

In thin section the rock is similar to those already described but the matrix and lithic and altered fragments are heavily stained by limonite. The rock contains about 50% quartz, 32% feldspar, 10% matrix, 7% lithics, 1% muscovite and traces of zircon and graphite.

The rock is an arkosic sandstone.

SPECIMEN D

A shaped block of stone very similar in appearance and grain size to specimens A and B. A few small black spots of graphite and many white flakes of mica are visible.

This specimen also closely resembles A and B in thin section, in texture and in mineralogy. The rock contains approximately 45% quartz, 40% feldspar, 10% lithics, 4% matrix, 1% muscovite with traces of zircon, graphite, biotite and sphene.

The rock is an arkosic sandstone.

SPECIMEN E

A cream-coloured fine-grained rock with a tendency to crumble easily under pressure. It also tends to cleave into small, flat lenticular slabs.

In thin section the proportion of matrix was a little higher than in the previous specimens and the grains were less angular.

The rock contains about 50% quartz, 30% feldspar, 13% matrix, 5% lithics, 2% muscovite and is therefore an arkosic sandstone.

SPECIMEN F

A small piece of fine-grained white sandstone with a weathered face from which a flake about 1.5 mm thick is in the process of peeling off.

In thin section the specimen is similar to the previous ones and contains 55% quartz, 30% feldspar, 10% matrix and 5% lithics.

The crack separating the flake continues into the rock parallel to the weathered edge as a line of altered material containing some rounded and peripherally altered feldspar grains, grains of quartz and smaller fragments of quartz and feldspar in a sericitic matrix.

Weathering has apparently begun in some adventitious parting in the rock wherein moisture has remained after the surface of the outcrop has dried in the air. As a result weathering has been more severe in the crack than on the surface and the consequent expansion in volume has caused the crack to extend just under the surface by a wedging effect, allowing further alteration. The result has been the peeling of flakes from the weathered surface.

No difference between the various specimens has been observed to account for any one tending to peel off rather than another. All are sandstone with a high feldspar content and are therefore liable to peel if the above explanation is correct.

37. Granton area

69-331. *Malbina E Member, Mt Nassau*

The hand specimen is a fine-grained brownish-grey rock.

In thin section the specimen consists of sub-angular fragments of quartz and quartzite, schistose and other rock fragments and partly altered grains of feldspar showing simple and lamellar twinning. Crystalline calcite is fairly common and there are numerous wispy, ragged flakes of biotite and shelly fragments.

The rock is a lithic greywacke.

38. Kingston

(*a*) Specimens from Bore Hole 11, Whitewater Creek and from the road cutting in the Channel Highway at Doctors Hill.

Specimen DH 3 from Doctors Hill closely resembles Specimens 3, 4 and 5 from the drill hole.

The poorly consolidated material from the drill hole (Specimens 1 and 2) is not tuffaceous. It appears to be a river gravel: from the variety and shape of the fragments it does not appear to have been transported far. Paxton (1968) mentions scree material in the cutting and postulates a valley down which the basalt flowed.

SPECIMEN 1. *DDH* 11; 28 *ft*

The specimen consists of pieces of rubble from the drill hole, including slightly worn but considerably weathered pebbles originally held together in a matrix of smaller fragments and clay.

In thin section the material consists of angular fragments of quartz and sub-angular pebbles and fragments of basalt, dolerite, quartz-sericite schist and mudstone.

SPECIMEN 2. *DDH* 11; 40 *ft*

The specimen consists of rounded to sub-angular rock and mineral fragments, in a matrix of clay and much finer rock and mineral fragments all stained red by opaque red hydrated iron oxides. Fragments and pebbles up to about one inch across of basalt, schist, mudstone and quartz are seen.

In thin section fragments of dolerite, granophyre and quartzite, and cryptocrystalline silica with minute veinlets penetrating the nearby rock are also seen. Most of the soft cementing material was lost in the preparation of the section, but what remains consists of very fine-grained opaque clay material stained red with iron oxides containing angular mineral fragments of quartz, feldspar, sericite, biotite, iddingsite and rock fragments.

The rock is a breccia conglomerate.

SPECIMEN 3. *DDH* 11; 47 *ft*

The specimen is a very fine-grained black rock similar to Specimens 4 and 5, but the phenocrysts are replaced by irregular whitish patches and veinlets.

In thin section the rock is a little coarser grained than in Specimens 4 and 5 and consists of sub-oriented microlites of oligoclase up to 0.1 mm long in a matrix of minute needles of pyroxene, crystallites of ilmenite and glass. The ilmenite crystallites are surrounded by clouds of white opaque material.

The rock is a mugearite.

SPECIMEN 4. *DDH* 11; 67 *ft*

The hand specimen is a piece of core consisting of a very fine-grained black rock with fewer and more irregular phenocrysts than in Specimen 5.

In thin section it lacks the fluidal banding of Specimen 5 but is similar in grain size, texture and mineralogy. The phenocrysts are of more irregular shape and show complete alteration to montmorillonite except for some reddish brown patches in the rock where they consist of iddingsite. The feldspar microlites have almost straight extinction and consist of oligoclase.

The rock is a mugearite.

SPECIMEN 5. *DDH* 11; 83 *ft*

The hand specimen is a piece of core that has turned over in the drill hole and been drilled in different directions. It consists of a very fine-grained black rock with angular opaque white, and glassy transparent phenocrysts up to about 0.5 mm across.

In thin section the rock is not quite uniform but shows fluidal banding in a very dark groundmass consisting of microlites of feldspar and pyroxenes in a brownish glass with abundant ilmenite. There are a few phenocrysts of pyroxene but most are of olivine largely altered to carbonate. The maximum extinction angle of the feldspar microlites is 15° and they are therefore oligoclase.

Patches of finely crystalline montmorillonite sometimes showing crustification fill minute cavities, but the origin of this mineral is shown by occasional cores of unaltered olivine.

The rock is a mugearite.

SPECIMENS DH 1, 2. *Doctors Hill*

The hand specimen is a fine-grained black rock crowded with small brown phenocrysts rarely exceeding 1 mm in length and showing bright cleavage faces.

In thin section the texture is trachytic consisting of sub-parallel laths of oligoclase with inter-granular ilmenite and pyroxene in minute prismatic grains. Fine needles of pyroxene penetrate the laths of feldspar and pyroxene occurs in rare interstitial masses of small prisms.

Reddish brown phenocrysts of iddingsite after olivine are very common and occasionally they show reaction rims.

The rock is a mugearite.

SPECIMEN DH 3. *Doctors Hill*

The hand specimen is a very fine-grained black rock (finer grained than DH 1, 2) from near the basalt/sandstone contact.

In thin section the texture is obscured by white opaque material derived from the breakdown of the feldspars and possibly of the ilmenite as well. However there is still plenty of black ilmenite and fresh feldspar remaining. The feldspar is oligoclase as before. Brown phenocrysts also are common but the alteration to iddingsite is incomplete and the phenocrysts consist in part of unaltered olivine.

The rock is a mugearite.

(*b*) Specimens of diamond drill core from the upper dam site, Whitewater Creek. Kingston:

69-114. *DDH* 11; 91 *ft*

The piece of core is a white friable siliceous rock with angular fragments of quartz up to 1 or 2 mm across.

In thin section it consists of completely unsorted angular fragments of quartz with subordinate feldspar, muscovite, biotite and tourmaline together with a small amount of clay minerals; the finest material is opaque white.

The rock is a poorly compacted siliceous mudstone.

69-115. *DDH* 13; 50 *ft*

The specimen of core is a fine- to medium-grained rock composed of grains of quartz and flakes of white mica with occasional angular fragments of quartz and irregular black pieces of lustrous masses of graphite flakes up to 1 cm across.

In thin section the rock is similar in mineral content to 69-114, but the grain size is much coarser and opaque interstitial siliceous and argillaceous material though still present, is very much less, so as to be no more than a cement. The larger quartz grains show evidence of strain and recrystallisation.

There is also about 10% feldspar and 10% lithic fragments, some of which may be weathered feldspar.

The rock is a gritty feldspathic sandstone.

69-116. *DDH* 14; 30 *ft*

The hand specimen is a creamy white somewhat friable rock consisting of quartz grains about 0.5 mm across, a few flakes of muscovite, some opaque white clay material and occasional black masses of lustrous graphite flakes.

In thin section the rock is a mosaic of angular quartz grains, some showing peripheral regrowth, with subordinate feldspar, lithics, white mica and opaque white material.

The rock is a feldspathic sandstone.

69-117. *DDH* 14; 60 *ft*

The hand specimen is a slightly friable fine-grained white rock with small irregular patches of dark organic material. Opaque white grains and flakes of white mica are visible.

In thin section the rock is a mosaic of angular quartz grains averaging 0.25 mm across with a little fresh feldspar showing lamellar twinning, a few lithic fragments and some white opaque interstitial material.

The rock is a feldspathic sandstone.

69-118. *DDH* 15; 163 *ft*

The hand specimen is a white and grey mottled fine-grained rock with abundant angular, glassy fragments of quartz up to 1 mm across but rather poorly sorted and averaging 0.2 mm across, together with dark lithic fragments and much very fine-grained soft white material.

In thin section the rock consists of angular grains of quartz and lithic fragments set in a plentiful very fine-grained white opaque matrix. Among the lithic fragments are pieces of basaltic material consisting of feldspar needles and glass and there is also dark brownish glass in the matrix.

The rock is a tuffaceous sandstone.

69-119. *DDH* 17; 37 *ft*

The hand specimen is a creamy white to dark green granular mass merging into solid opaline silica of similar colours.

In thin section the rock is a porous mass of loosely compacted opaque grains which on thin edges are seen to be composed of masses of irregular globules of silica about 0.02-0.03 mm across. The globules have a radial structure and show a black cross between crossed nicols.

The rock consists of opaline silica.

69-120. *PL* 2; *c* 30 *ft*

In thin section the rock is a mosaic of angular quartz grains averaging 0.25 mm across. Grains of feldspar and rock fragments are also present and there is a small amount of white argillaceous matrix.

The rock is a feldspathic sandstone.

REFERENCE

PAXTON, G. C. 1968. Geology of the Kingston area. *Pap. Proc. R. Soc. Tasm.* 102: 31-40.