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## Excursion 5 The Canna Lava Formation in north-west Rum

### Highlights

This excursion is concerned with the lavas and conglomerates of the Canna Lava Formation, the youngest manifestations of volcanicity on Rum, apart from a few dykes that intrude the lavas. The lavas crop out in north-west Rum (Figure 2) and are at some distance from Kinloch. Examination of the major localities involves a walk of over 20 km, climbing to about 500 m altitude near Orval (at [NM 334 993]) and about 300 m on Bloodstone Hill [NG 315 006]. Shorter alternatives are indicated.

Take the Harris track to Malcolm's Bridge [NM 3596 9937], as for Excursion 4. Then follow the path on the east side of the stream for about 1 km to the north and west-north-west. Exposure is poor, but after about 700 m scattered exposures of feldspathic peridotite give way to gabbroic rocks and then to intrusion breccia (Figure 33) and (Figure 51).

### (Table 2) The Canna Lava Formation on Rum

Orval Member	Thick flows of basaltic hawaiite, some feldspar-phyric. Overlies Western Granite and flows of the Lower Fionchra Member.
Guirdil Member	Two flows of tholeiitic andesite ('icelandite'), each underlain by lenses of fluvialite conglomerate. Overlies flows of the Upper Fionchra Member, the Main Ring Fault, the Western Granite and sandstones of the Torridon Group.
Upper Fionchra Member	Flows of tholeiitic basaltic andesite underlain by fluvialite conglomerates of variable thickness. Overlies flows of the Lower Fionchra Member, the Main Ring Fault, the Western Granite and sandstones of the Torridon Group.
Lower Fionchra Member	Flows of olivine basalt and rare basaltic hawaiite flows. Underlain by lenses of fluvialite conglomerate up to 50 m in thickness. The member rests on a weathered surface of Western Granite on Orval (Black, 1952) and sandstones of the Torridon Group, and overlies the Main Ring Fault.

### Locality 5.1 North-west of Malcolm's Bridge – contact between Central Intrusion and Western Granite [NM 354 998]

Intrusion breccia is present at the contact between microgranite to the west and later mafic rocks of the Central Intrusion. A large peridotite plug also cuts the microgranite hereabouts but exposure is poor. Leave the path where 'fords' are indicated on the OS 1:25,000 map [NM 351 999] and walk about 350 m slightly west of north to the west side of the lochan near a flat-topped hill ('West Minishal' [NG 349 003]). The hill consists of several near-horizontal olivine basalt flows belonging to the Lower Fionchra Member of the Canna Lava Formation. The lochan is on the line of a fault that marks the eastern limit to the formation on Rum.

### Locality 5.2 'West Minishal' – conglomerates containing clasts derived from central complex [NG 3475 0064]

Lavas overlie a thick (c. 65 m) fluvialite conglomerate that crops out on the steep, north-facing hillside to the north-west of the lochan. Coarse, unbedded conglomerate on the upper slopes contains boulders and cobbles of gneiss, amphibolite, red sandstone, tholeiitic basalt (including amygdaloidal rocks) and dolerite, and additionally, gabbro, altered bytownite troctolite, microgranite, porphyritic rhyodacite and other rocks all clearly derived from the Rum Central Complex.

### **Locality 5.3 Maternity Hollow – fluvial conglomerates faulted against Torridonian sandstone [NG 3472 0062]**

Exposures at Maternity Hollow are in much finer grained rocks than at Locality 5.2. Pebble- and granule-rich beds predominate and small logs and other plant remains have been found here. The bedded rocks on the north side of the stream are overlain by superficial deposits that contain similar clasts to the Paleocene conglomerates, including pristine bytownite troctolite (in contrast to the bytownite troctolite clasts with thoroughly altered olivines in the earlier rocks). The Paleocene deposits terminate to the east at a fault which has brought them against Torridonian sandstone. This fault continues south-south-east to the lochan and marks the eastern limit of the Canna Lava Formation on Rum (Figure 51).

From Maternity Hollow, follow the stream uphill in a west-south-west direction. Just west of the hollow, red (Torridonian) sandstone crops out on the south side of the stream. Discontinuous exposures of conglomerate occupy the next 100 m of the stream bed, as far as the first lava flow. This lava, which forms a small shelf at [NG 3457 0059] is about 20 m lower than the basal lava of West Minishal and a small fault presumably separates the localities. Exposure is poor over the next 300 m until an east-facing, mound-like mass of coarse conglomerate is encountered in a shallow amphitheatre.

### **Locality 5.4 East of Fionchra – varied clasts in fluvial conglomerates; palaeovalley in lavas [NG 342 005]**

The clasts in the conglomerate forming the mound are similar to those seen at localities 5.2 and 5.3, but with the addition of (altered) olivine basalt. This conglomerate is locally over 20 m thick and occupies a palaeovalley eroded in flows of the Lower Fionchra Member. To the north and south, olivine basalts form the steep sides to this valley, and the conglomerate here is clearly younger than that seen at Locality 5.3. Nearby, to the north, the lavas have shelf-like outcrops, which are commonly peat-covered. Their contact with the red Torridonian sandstone (around [NG 3438 0076]) is highly irregular, and they were evidently erupted onto a hilly sandstone landscape (Emeleus, 1985). The lavas hereabouts are cut by twin, 2 m-wide north-trending olivine basalt dykes.

### **Locality 5.5 North-east side, Fionchra – hyaloclastites (including pillows) exposed in fallen blocks [NG 341 005]**

The lower slopes of the steep, north-east face of Fionchra [NG 339 004] are mantled by block scree derived from hyaloclastite breccia. This breccia forms a c. 50 m-thick bed around the base of the hill and extends westwards to Coire na Loigh [NG 331 009] (see below). The breccia is best examined in the large blocks. It consists of small basaltic pillows and pillow fragments embedded in a comminuted, basaltic matrix (Figure 52), (Figure 53). The matrix contains shards of fresh, yellowish glass with microphenocrysts of plagioclase, pyroxene and olivine, although most of the glass has been devitrified and palagonitised. The rock is a tholeiitic basaltic andesite, similar to the flows that form the upper levels of Fionchra. The flows, hyaloclastite rocks and conglomerate of the dome belong to the Upper Fionchra Member of the Canna Lava Formation.

If desired, the excursion may now be shortened. Contour around the east end of Fionchra to the Bealach a'Bhràigh Bhig [NG 340 000]. The exposures at the bealach (Locality 5.11, see below) should be examined before returning to Malcolm's Bridge by the well-marked path and thence to Kinloch. The longer excursion continues along the steep slopes on the north side of Fionchra, contouring at about 370 m altitude, where there is an ill-defined deer path just below the base of the cliffs. Exercise care, as the grassy and rubble-covered slopes may be slippery, especially in wet conditions. Streams draining the north side of Fionchra provide transects through the lower part of the Upper Fionchra Member. About 400 m north-west of Fionchra summit, 30 m of bedded gritty and pebbly sandstone with silty partings underlies the hyaloclastite breccia, resting on red sandstone belonging to the Torridon Group.

### **Locality 5.6 North side, Fionchra – stream section through plant-bearing silty sandstones [NG 3365 0068]**

The finer grained rocks close to and below the deer track contain delicate leaf and stem impressions and a variety of organic remains. These remains have been used to date the deposits to 58.0 to 58.2 Ma (Jolley, 1997). Continue west-north-west, keeping at much the same level until a pronounced gully is reached after 360 m.

### **Locality 5.7 North side, Fionchra – coarse fluvial conglomerate underlying feldspar-phyric lava [NG 3346 0088]**

The gully exposes about 30 m of coarse fluvial conglomerate overlain by a feldspar-phyric basaltic andesite. Boulders and cobbles of red sandstone predominate in the lower part of the section; at higher levels clasts of altered olivine basalt also appear, derived from flows of the Lower Fionchra Member. Continue north-west for a further 150 m, to Coire na Loigh.

### **Locality 5.8 Coire na Loigh – conglomerates and lavas faulted against Torridonian sandstone [NG 3322 0098]**

Red sandstone (TCAS) crops out to the north of the cliff at Coire na Loigh. It is separated from the lavas and conglomerates by a north-north-west-trending fault, which defines the northerly limit of the Canna Lava Formation on Rum. To the south, columnar basaltic andesite overlies about 10 m of conglomerate. Bloodstone has been obtained from the base of the lava hereabouts.

### **Locality 5.9 Coire na Loigh – lava with thin, glassy basal selvedge overlying conglomerate [NG 3314 0092]**

Some 150 m to the south-west of Locality 5.8, hyaloclastite deposits are exposed at the back of Coire na Loigh. They are separated from the underlying conglomerate (now reduced to about 2 m thickness) by some 2 m of columnar lava with a thin glassy selvedge at its base. Impersistent basalt scarps below the conglomerate and up to 400 m to the west belonging to basalt flows in the Lower Fionchra Member, and conglomerates at the base of this member, are exposed at 90 m elevation in the stream in Coire na Loigh (at [NG 3279 0131]). Nearby, steep dips in the 30 m-thick basal conglomerate and adjoining red sandstone (TCAS) are attributed to drag on the continuation of the north-north-west-trending fault noted at Locality 5.8.

There are excellent views of Bloodstone Hill [NG 315 006] from Coire na Loigh. Flat-lying lava flows overlie and are banked against featureless sandstone (Torridon Group) and, higher in the succession, two flows of tholeiitic andesite ('icelandite') of the Guirdil Member (Table 2, page 79) may be distinguished. They fill a valley eroded in earlier flows. The Bloodstone Hill outlier may be reached from Coire na Loigh by descending to about 50 m in Guirdil and ascending the steep hillside to the west, to the base of the lava crags (at Locality 5.13 [NG 3167 0066]). The relevant localities are described later.

To continue the traverse around Fionchra from Coire na Loigh, follow the lava cliff until it dies out about 100 m to the south-west. Traverse around the west end of Fionchra for about 250 m in an east-south-east direction, climbing gently to about 320 m altitude until a prominent 250 m- long cliff is reached on the south side of the hill (Figure 56). This feature is formed by a 20 m-thick tholeiitic andesite (icelandite) flow. This flow and the underlying 1–2 m of conglomerate belong to the Guirdil Member (Figure 54), (Figure 55); they overlie strongly feldspar-phyric basaltic andesite (similar to the basal flow on the east face of Bloodstone Hill and at Locality 5.7) and are banked against hyaloclastite deposits of the Upper Fionchra Member. The relationship between the hyaloclastite rocks and the feldsparphyric flow are obscured by talus. Both are at the base of the Upper Fionchra Member succession.

### **Locality 5.10 South side, Fionchra – lava and conglomerate ponded against wall of hyaloclastite**

## [NG 3363 0038]

Conglomerate and the flow-banded base of the tholeiitic andesite (icelandite) are well exposed towards the eastern end of the cliff (Figure 54). The clasts are broadly similar to those in previous localities, except that they include tholeiitic basaltic andesite cobbles (including strongly feldsparphyric varieties) derived from the Upper Fionchra Member. Flow structures at the base of the lava wrap around cobbles and boulders in the irregular surface of the conglomerate and the flow has characteristic close-set, irregular jointing. The conglomerate and tholeiitic andesite die out at the east end of the cliff, where it can be verified that the lava is banked against a steep surface formed by hyaloclastite deposits belonging to the Upper Fionchra Member (Figure 55). The tholeiitic andesite flow flooded a steep-sided valley parallel to the present hillside. Conglomerate exposed a short distance to the east-south-east of the cliff (at [NG 3366 0037]) belongs to the Upper Fionchra Member. To complete the traverse around Fionchra, continue south-east to the Bealach a'Bhràigh Bhig, at the head of Guirdil.

## Locality 5.11 Bealach a'Bhràigh Bhig – lava resting on rubbly microgranite surface [NG 3395 0010]

The tholeiitic andesite flow examined at Locality 5.10 is continued in the prominent dark, west-facing cliff about 150 m north of the bealach. It rests on a surface formed by rounded masses of microgranite considered to be *in situ*. Patchy outcrops of conglomerate occur up to 200 m west of the bealach (Figure 55) where flat-lying gritty layers have yielded plant fragments; conglomerate also crops out in the path north-west of the bealach. From the bealach it is an easy climb over basaltic andesite flows to the summit of Fionchra, from where there are fine views of the hills in north-west Rum and Canna, with the Outer Isles in the far distance. To the north of Glen Shellesder a prominent hill is formed by a peridotite plug near Loch Sgaorishal [NG 348 022] (Excursion 6); beyond this, across the sea, are the cliffs and hills of the Skye Lava Group west of Loch Brittle and the mass of the Skye Cuillin, which dominates the skyline. The lavas in that part of Skye pre-date the Cuillin gabbros and have interbedded conglomerates that contain clasts derived from the Rum Central Complex (Williamson and Bell, 1994).

The excursion may be terminated at this point and the return to Kinloch (8 km) made by the path to Malcolm's Bridge and the road. To continue to Bloodstone Hill (3 km), follow the path west, along the northern slopes of Orval. After about 700 m, walk uphill for about 600 m in a south-east direction to the cleft visible to the east of Orval.

## Locality 5.12 Orval – classic locality where lavas were shown to rest on weathered microgranite [NM 335 992]

Thick flows of basaltic hawaiite belonging to the Orval Member form steep slopes and cliffs to the east (Figure 56), but at about 490 m elevation in the cleft there is a series of thin, shelf-forming flows that may be traced up to the low pass east of Orval (Figure 56), (Figure 57). These olivine basalt and basaltic hawaiite flows are considered to belong to the Lower Fionchra Member (Emeleus, 1985). Early workers on Rum had assumed that all the lavas in north-west Rum pre-dated the Rum Central Complex since they were thought to have been intruded and metamorphosed by the Western Granite (Harker, 1908; Bailey, 1945). In the 1950s, however, a trench dug at the base of the lavas hereabouts exposed lavas overlying a weathered microgranite surface (Black, 1952). This crucial evidence, together with that provided by other exposures (e.g. Locality 5.11) and the clast content of the conglomerates, demonstrates beyond doubt that the lavas of north-west Rum post-date the Rum Central Complex.

Return to the path and follow it west to the lochan at the Bealach an Dubh Bhràigh [NM 321 997], then for about 600 m across peaty ground with scattered microgranite exposures. A thick (7 m) north-north-east-trending picritic dolerite dyke may be examined where the path crosses a stream flowing north at [NM 3262 9959]. At about [NG 3155 0012] the northern (faulted) edge of the microgranite is crossed. For the next 150 m exposures are rare, although there is much loose sandstone, and sandstone crops out nearby in the headwaters of the Allt Airigh na Maith-innse [NG 3119 0006].

The low cliff at [NG 3148 0026] on Bloodstone Hill is formed by the upper of two tholeiitic andesite flows (Guirdil Member) which may be traced over much of the summit area.

### **Locality 5.13 Bloodstone Hill – lavas lying on weathered sandstone, overlain by valley-fill lavas [NG 317 006]**

The two tholeiitic andesite flows are well exposed in the east-facing cliffs where each is underlain by a thin, impersistent fluvial conglomerate. The silty beds at the top of the conglomerates that separate the flows, contain plant fragments and very thin (< 2 cm) seams of poor coal. The flows fill a steep-sided palaeovalley eroded in sandstone (TCAS) and in lavas belonging to the Upper Fionchra Member. The underlying Lower Fionchra Member is up to 100 m thick, thinning rapidly to the south. These flows occupy an older palaeovalley of which only the southern (sandstone) slope remains.

The precipitous cliffs on the north-west face of Bloodstone Hill are formed by flows of the Upper Fionchra Member. The cliff edges must be avoided since close-jointed crumbling basalt, and joints, clefts and hollows masked by heather, make them hazardous. The 19th-century excavations for bloodstone have been obliterated so that the only reliable present-day source of bloodstone is in the gravel and pebbles on the beaches near the Guirdil bothy [NG 3196 0134] (Excursion 6; Locality 6.12).

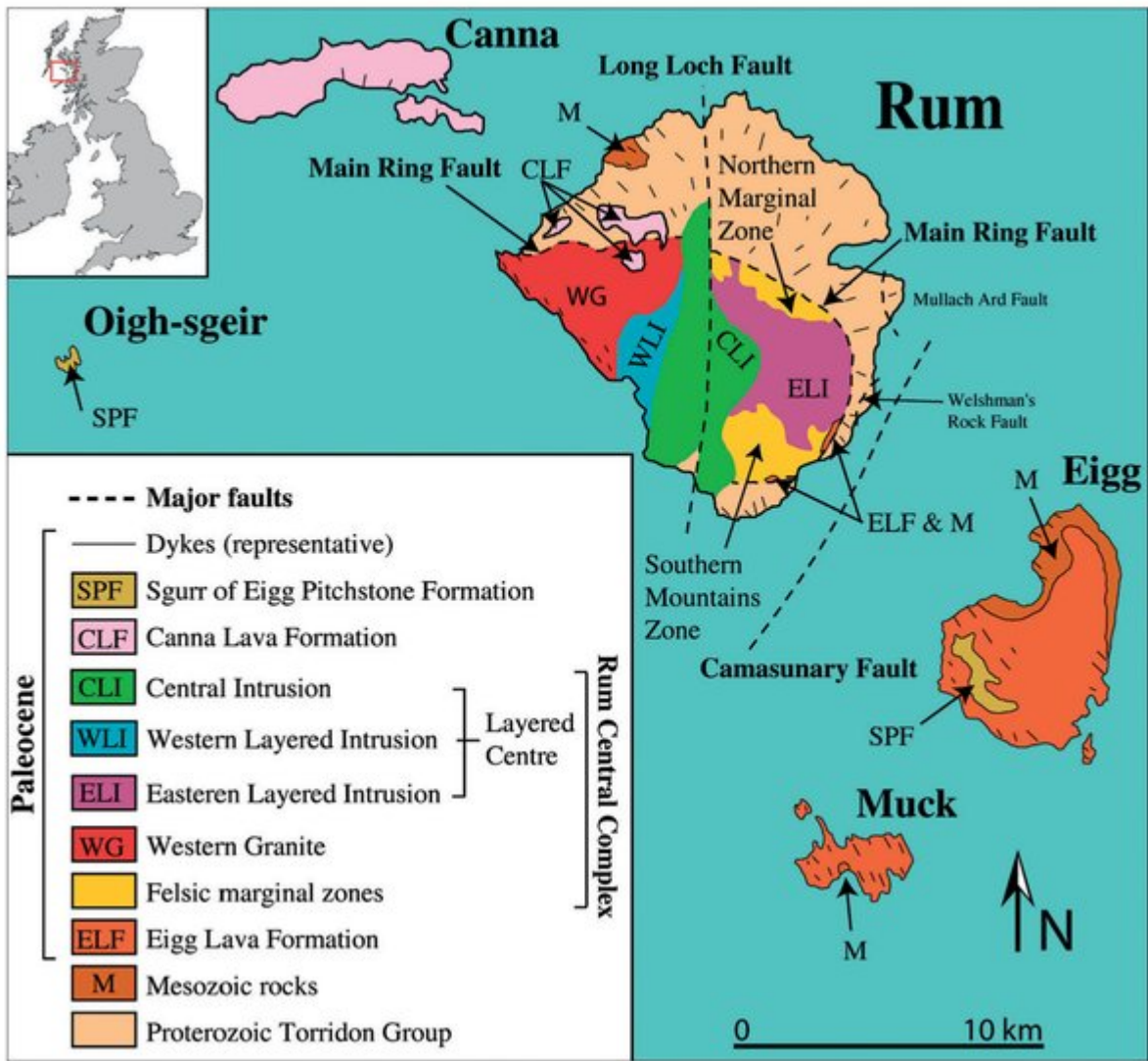
### **Locality 5.14 North end of Bloodstone Hill – lava on weathered sandstone [NG 3149 0082]**

The basaltic andesite flows on Bloodstone Hill generally rest directly on sandstone. An accessible basal contact is exposed at 300 m elevation on the north face of the hill where lavas lie on a regolith of sandstone fragments but without any development of conglomerate. This locality may be reached directly from the summit area, although the descent is steep and there are numerous small basalt crags. An easier approach is to follow the edge of the tholeiitic andesite flows downhill from Locality 5.13 and traverse around the hillside at about 300 m elevation, noting that the basal feldspar-phyric basaltic andesite flow resembles that near Locality 5.10.

### **Locality 5.15 West side of Bloodstone Hill – rhyodacite boulder in conglomerate [NG 3107 0035]**

The sole exposure of fluvial conglomerate at the base of the Upper Fionchra Member on Bloodstone Hill is somewhat inaccessible. The locality may be reached (with extreme care) along a steep, narrow goat path from the cliff top at [NG 3100 0009]. The path follows the palaeovalley contact between lava flows and sandstone. The exposure is notable for the presence of a very large (c. 2 m diameter) boulder of porphyritic rhyodacite. The return to Kinloch (c. 11 km) is along the path to the Bealach a'Bhràigh Bhig and Malcolm's Bridge. Alternatively, descend to Guirdil beach (Locality 6.11) to search for bloodstone and agate, and return to Kinloch by the path from the Guirdil bothy to Glen Shellesder, then continue east up the glen to join the Kilmory–Kinloch road (Excursion 6; (Figure 51)).

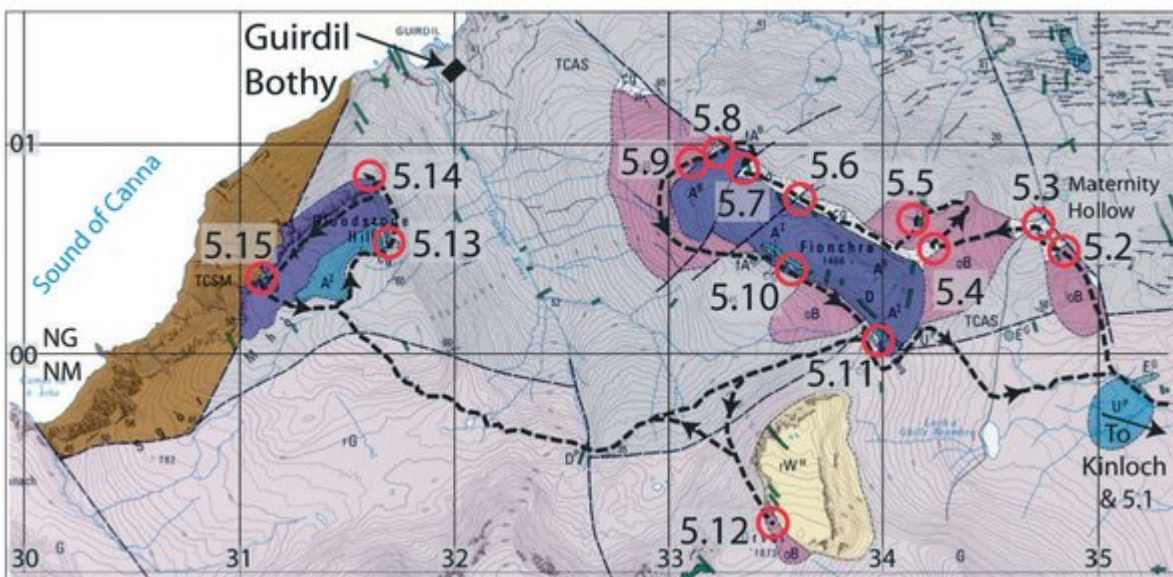
### **[References](#)**



(Figure 2) Simplified geological map of Rum and adjacent islands.



(Figure 33) Geological map of Excursion 4A, Central Rum, covering the northern end of the Central Intrusion and adjoining layered areas of the Eastern Layered Intrusion and Western Layered Intrusion ((Key) ; based on SNH 1:20,000 solid geology map; © SNH).



(Figure 51) Geological map of the Canna Lava Formation on Fionchra and Bloodstone Hill, north-west Rum. Excursion 5, for locality 5.1 and Kinloch road see (Figure 33). ((Key) ; based on SNH 1:20,000 solid geology map; © SNH.)

**Table 2: The Canna Lava Formation on Rum**

<b>Orval Member</b>	Thick flows of basaltic hawaiite, some feldspar-phyric. Overlies Western Granite and flows of the Lower Fionchra Member.
<b>Guirdil Member</b>	Two flows of tholeiitic andesite ('icelandite'), each underlain by lenses of fluvatile conglomerate. Overlies flows of the Upper Fionchra Member, the Main Ring Fault, the Western Granite and sandstones of the Torridon Group.
<b>Upper Fionchra Member</b>	Flows of tholeiitic basaltic andesite underlain by fluvatile conglomerates of variable thickness. Overlies flows of the Lower Fionchra Member, the Main Ring Fault, the Western Granite and sandstones of the Torridon Group.
<b>Lower Fionchra Member</b>	Flows of olivine basalt and rare basaltic hawaiite flows. Underlain by lenses of fluvatile conglomerate up to 50m in thickness. The member rests on a weathered surface of Western Granite on Orval (Black, 1952) and sandstones of the Torridon Group, and overlies the Main Ring Fault.

*(Table 2) The Canna Lava Formation on Rum.*



*(Figure 52) Pillows in a hyaloclastite deposit at the base of the Upper Fionchra Member of the Canna Lava Formation. Locality 5.5, north-east side of Fionchra. Scale: hammer head c. 15 cm.*





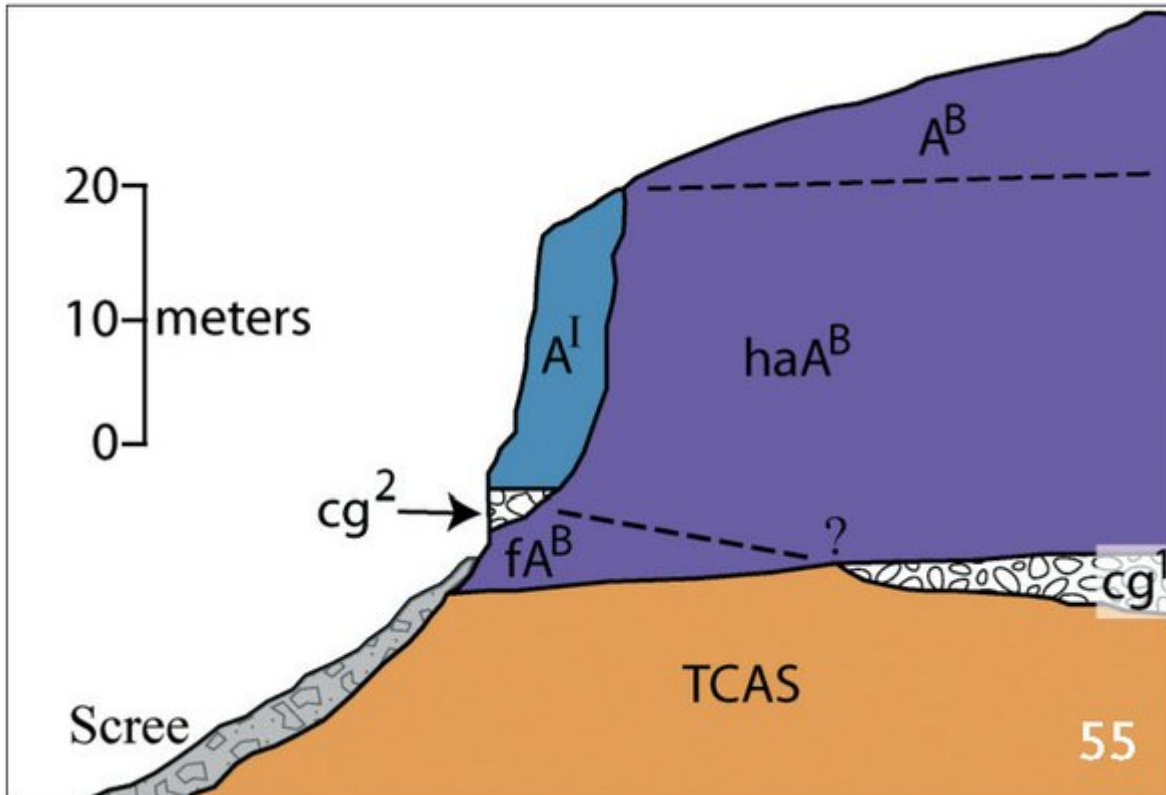
*(Figure 53) Fragments of glassy scoriaceous basaltic andesite in hyaloclastite deposits at base of Upper Fionchra Member of the Canna Lava Formation. Near Locality 5.5, Fionchra. Scale: c. 20 cm in length.*



*(Figure 56) Western Granite crags on the north side of Orval, overlain by lava flows of the Lower Fionchra and Orval members (Canna Lava Formation) forming dark exposures towards the end of the cliff. Fionchra is in the middle distance (note the cliff of tholeiitic andesite) and the Skye Cuillin is visible on the horizon. Note the moraine-dammed lochan. Pale crags and talus in the foreground are on the Western Granite.*



(Figure 54) Fluvial conglomerates underlying tholeiitic basaltic andesite ('icelandite') lava flow (Guirdil Member, Canna Lava Formation). Locality 5.10, south side of Fionchra. Scale: hammer shaft: 30 cm. (Photo: Emeleus/BGS© NERC)



(Figure 55) Cross-section showing the relationship between the valley-filling tholeiitic basaltic andesite flow ('icelandite') ( $A^I$ ) and underlying conglomerate ( $cg^2$ ) to the flows of the Upper Fionchra Member and feldspar-phyric basaltic andesite ( $fA^B$ ), and banked against a palaeocliff in hyaloclastite deposits ( $haA^B$ ) underlain by another conglomerate ( $cg^1$ ). Lower slopes are mantled by coarse talus. Locality 5.10, south side of Fionchra. Locality as for (Figure 54).



*(Figure 57) Western Granite on Ard Nev (left distance). Orval (right distance) has a capping of lavas of the Orval Member, Canna Lava Formation, on granite. Peridotite belonging to the Central Intrusion crops out in the foreground.*