

Eildon Hills - an excursion

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Introduction



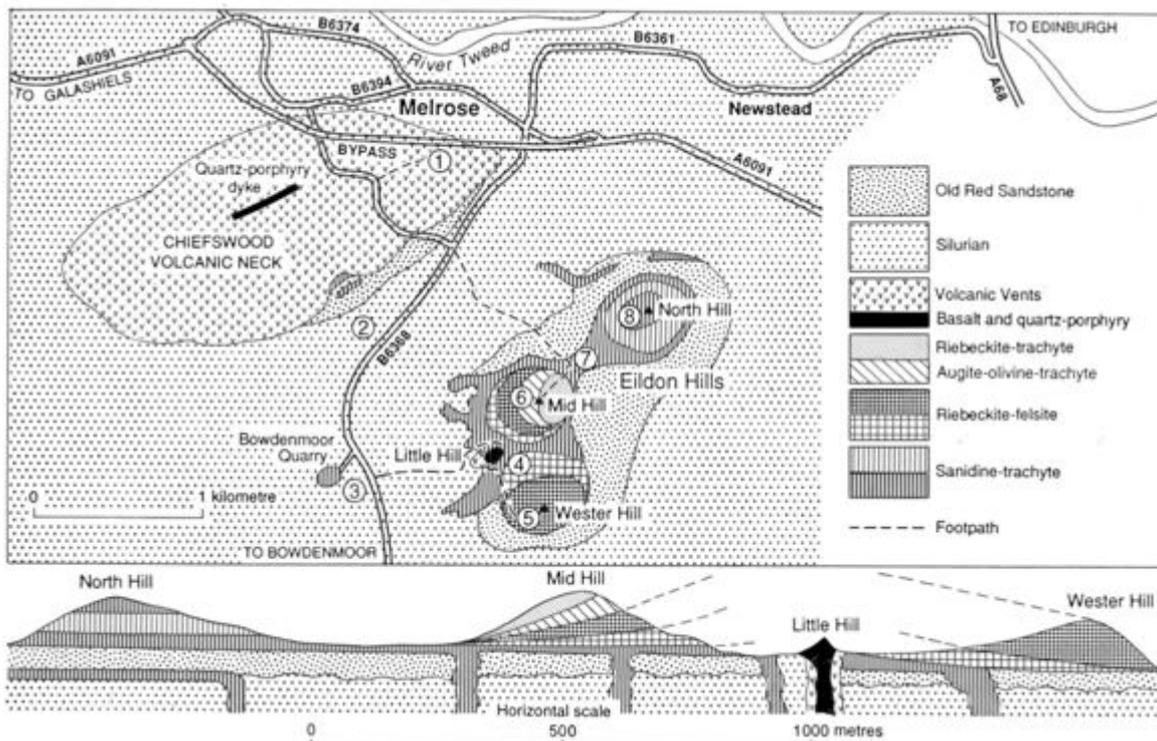
The Eildon Hills, near Melrose, from the north-west. Roxburghshire. The hills are the denuded remains of a composite laccolith of trachyte rocks intruded into the Upper Old Red Sandstone in Carboniferous times. Much of Eildon Wester and Eildon Mid is formed by riebeckite-

felsite disposed in two layers. The summit of Mid Hill is occupied by orthopyric riebeckite-trachyte overlying a sheet of augite-olivine-trachyte. Eildon Hill North consists of porphyritic and non-porphyritic sanidine-trachyte. A laccolith is an intrusive dome-like mass of igneous rock which arches the overlying sediments and has a flat floor. If there have been several phases of emplacement of different materials then it is said to be composite. P000584

Topographically, the Eildon Hills form a pleasing profile bordering the south side of the Tweed valley beside the romantic burgh of Melrose in Roxburgh District. The hills consist of three principal summits rising above the cultivated lands and groves of the countryside. Eildon Mid Hill reaches a height of 420 m above sea-level while the North and Wester hills attain heights of 402 m and 368 m respectively. A smaller hill, known as Little Hill, lies on the west side of the valley between the Mid and Wester hills. Geologically, the Eildons have been regarded as the remnant of a large composite laccolith consisting of several sheets of intermediate and acid rocks intruded into sedimentary strata of the Upper Old Red Sandstone and thus of later date, probably early Carboniferous. Little Hill is a small volcanic vent of agglomerate, with an intruded plug consisting of two types of basalt, and almost certainly of later date than the acid rocks of the Eildons. A quarry in the great volcanic pipe at Chiefswood, to the south-west of Melrose, and another quarry at Bowdenmoor usually have been regarded by the authors as part of their excursion to the Eildon Hills and are dealt with in this itinerary. A comprehensive account of the igneous rocks of the Melrose district was published by Lady McRobert in 1914 and quotations in the text are from her paper.

The excursion starts from Melrose which lies by the River Tweed on the A72 road east of Galashiels, and near the A7 Edinburgh-Hawick road. For a party the best transport arrangement for this excursion is travel by private coach, and this account is described accordingly. A full day is required to complete the itinerary, but if a shorter day is desired one of the following abridged programmes is suggested:

1. Chiefswood and Bowdenmoor quarries - Little Hill.
2. Bowdenmoor Quarry -Little Hill -columnar felsite (Wester Hill-summit of Mid Hill).
3. Little Hill-summit of Mid Hill-North Hill



Eildon Hills - excursion map.

1. Chiefswood Quarries: Agglomerate in Volcanic Neck

Follow the route from Melrose as described for locality 6 in the [Border Abbeys Excursion](#) where there is a description of this partly infilled quarry (NT 339 542).

Although the quarry is situated near the margin of the vent no contacts are seen with the country-rock of Silurian strata, but exposed junctions of this kind occur in the nearby Rhymer's Glen. Red sandstones and marls of Upper Old Red Sand stone age, with some small felsitic intrusions, form a narrow strip bordering the vent-agglomerate on the south side of Quarry Hill. Near Chiefswood House, situated near the centre of the area of the vent, the agglomerate is cut by a quartz porphyry dyke. It is probable that this large vent and other smaller orifices in the district, at Faldonside, Little Hill and Bowdenmoor, originated during the great period of vulcanicity which began in the south of Scotland in late Upper Old Red Sandstone times and reached a maximum of activity in the Lower Carboniferous. It is remarkable that no plug has so far been found in the Chiefswood vent and it is a matter for speculation whether or not lava was ever ejected from this or any of the vents referred to here.

2. Melrose-Bowdenmoor Road south of Chiefswood: Viewpoint for Eildon Hills

From the coach travelling south-westwards to Bowdenmoor Quarry, the Eildon panorama of hills is in full view. Away to the north-east lies the Black Hill of Earlston, easily distinguished by its fine outline and prominence. The North and Mid hills form the middle foreground, the latter clad in heather and much loose reddish scree. Little Hill is prominent in the valley between Mid Hill and the long heather-clad slopes of Wester Hill, whose steeper sides lie towards Bowden and away from this viewpoint. The foreground is largely covered by boulder clay and the final ice-movement along this part of the broad Tweed basin was from south-west to north-east; drumlins and crag-and-tail ridges are numerous. On the sheltered eastern side of the Eildon Hills boulder clay lies to a height of about 300 m. Exposures of the country-rock occur mainly in stream-courses and gullies and show folded greywackes, grits and shales which have been assigned to the Llandovery division of the Silurian. These rocks are generally, stained red, a coloration considered to have been derived from overlying

red sedimentary rocks long removed by denudation. Only a few relatively small areas of rocks of the Upper Old Red Sandstone are preserved in the district and they lie unconformably on the folded Silurian sediments. These outliers of the Old Red Sandstone owe their preservation to the protection afforded by more resistant igneous rocks which have been intruded into them. This phenomenon is exemplified in the structure of the Eildons where sheets of trachyte and felsite, perhaps in the form of a composite laccolith, have preserved a pedestal of some 100 m of strata of the Upper Old Red Sandstone. The basal layer of intrusive rock is a porphyritic sanidine-trachyte which outcrops irregularly around the North and Mid hills at about the 300 m and 330 m contour levels. Low on the west side of Mid Hill are three tongues of this basal trachyte which cut across the pedestal of Old Red Sandstone and pass into the underlying Silurian rocks at about the 210 m level. They have been regarded as portions of feeder-dykes centrally situated beneath the laccolith; the acid sheets of the Eildons may thus represent only a part of the eastern half of the original intrusion. Reference may be made here to the occurrence of the relatively rare mineral riebeckite, which occurs in certain of the trachytic and felsitic rocks. It was first discovered by Professor Bonney in 1882 in granite from Socotra. In 1887 Professor Sauer of Leipzig examined rocks from Socotra collected by Dr Riebeck and detected a blue mineral in them, which he referred to the amphiboles and named 'riebeckite'. In 1891 the mineral was recognised by Teall in rocks from Ailsa Craig. Barron in 1896, discovered it in the trachytes of the Black Hill of Earlston and in Eildon Mid Hill, making the first record of its occurrence on the mainland of Scotland.

3. Bowdenmoor Quarry: Sanidine-trachyte and Inclusion

Bowdenmoor Quarry (NT 536 318) lies 50 m west of the Melrose-Bowden road. It was developed for road metal an isolated mass of sanidine-trachyte and is, roughly, circular in plan. The trachyte has been quarried on two levels, the lower, 2 to 3 m in height, forms a bench about 30 m wide against the back or south sector. The overall height of the face in part of the east sector is about 15 m. Lady McRoberts described the rock, as 'a fine-grained, pink compact trachyte showing scattered small sanidine-phenocrysts, generally decomposed. These lie in a trachytic groundmass (sanidine-laths, with a certain amount of primary interstitial, quartz; sometimes enclosing the laths optically. The rock as a whole resembles the trachyte of the spur extending westwards from Eildon Wester Hill' (McRobert 1914, p. 310).

Bowdenmoor Quarry is remarkable in that four relatively large masses of sedimentary rocks are seen enclosed, or involved in the trachyte. One of these masses is conspicuous in the central part of the quarry, having been left by the quarrymen as unsuitable material. It is in the form of a ridge and consists of some 3 m of almost vertical beds of hardened and shattered sandstone, conglomerate and mudstone, all with considerable earthy haematite in patches and cavities. The length of the mass is about 12 m, measured along the strike, which runs roughly NE. Another smaller and more broken mass of similar strata occurs in the north-west part of the quarry. Patches of chilled trachyte still adhere to these sediments which are altered and coloured green near the contacts. In the south face some 3.5 m of beds of purplish and greenish mudstones, with rough sandstone bands, are clearly 'floated' as a mass in the trachyte. The length of this mass is almost 10 m and the bedding is regular with a gentle dip towards the west. A similar mass of mudstone lies in the trachyte a short distance to the right or west of the last mentioned mass but is less well-defined owing to talus. These enclosed masses are composed of types of sediments common to the Upper Old Red Sandstone and they may have been split off and carried along by the molten trachyte sheet. This outlier of sanidine-trachyte may be a remnant of the basal western part of the Eildon laccolith.

On joining the main road the route enters the field on the east

side of the road at a farm gate near the plantation which surrounds a small reservoir. From this point an overgrown footpath leads eastwards over a dome of boulder clay and by two wicket-gates to

the base of Little Hill.

4. Little Hill: Basalt Plug and Agglomerate in Volcanic Neck

This conspicuous, though small, hill (NT 546 319) is a volcanic neck composed of agglomerate with two kinds of intruded basalt forming a plug. The rocks are stained red and contact junctions are not well-defined. The main basalt is a fine-grained non-porphyrific type and occurs around the craggy summit area, while a lower craggy hill at the west side is

composed of a Markle type basalt with large and well-defined phenocrysts of labradorite. Agglomerate occurs in contact with this basalt and it is seen in a small outcrop located in the grassland south of the western end of the hill. Contacts with the sedimentary rocks are not seen. Fine-grained sanidine-trachyte, of the basal Eildon sheet, occurs as a narrow strip on the north side of the hill where it is in contact with red-stained, highly altered platy greywackes and shales. As already stated this vent appears to be of later age than the acid rocks of the Eildons, Professor B.C.J. Upton comments:

'The plug may represent magma congealed in a (relatively late) volcanic conduit. Possibly a stratified magma chamber developed in the area with trachytic magma above (intruded first) and basaltic magma beneath'.

5. Wester Hill: Riebeckite-felsite

The whole of the Wester Hill (NT 548 316) is composed of riebeckite-felsite which probably occurs in two layers. McRobert (1914, pp. 308-9) states that 'In the lower layer the rock is pink, with small dark patches of riebeckite. Under the microscope the riebeckite growths are minute, and largely altered to limonite. In the upper layers the rock is purplish grey, weathering pale pink or white, with conchoidal fracture. Fresh riebeckite is abundant in nests and irregular aggregates.' A good exposure of hard pink felsite with fine vertical jointing, of a columnar type, may be easily reached from Little Hill by following sheep walks about the 300 m contour to a small quarry 500 m to the SSE. The felsite of Wester Hill rests partly on Upper Old Red Sandstone rocks and partly on the basal sheet of sanidine-trachyte. It may be noted here that on the west side of the hill the basal sheet of trachyte passes into a feeder-like spur.

6. Mid Hill: Riebeckite-felsite and Trachyte Sheets

The ascent of Mid Hill (NT 547 323) is conveniently made from the col between the Mid and Wester hills just east of Little Hill. The lower slopes of the hill are covered by loose scree but from the col a rising traverse bearing to the east should be made for a short distance to a well-defined narrow bench. From this point upwards there are numerous outcrops of riebeckite felsite, similar to that of Wester Hill, among the scree between the 330 m and 360 m contour levels. A further short traverse to the east side should now be made where good craggy outcrop of orthophyric riebeckite-trachyte occur over the south-east face and continue to the summit of the hill. A sheet of augite olivine-trachyte lies below the riebeckite-trachyte but this is best seen a short distance west and south-west of the trig point. The felsites and higher trachyte of Mid Hill have been shown by Lady McRobert in plan and section as wedge-shaped sheets tilted towards the north-east where the wedge-edges of the sheets come successively in contact with the basal sheet of sanidine-trachyte. The same author describes the summit-rocks as follows:

'Two interesting rocks occur towards the top of the Mid Hill. The actual summit consists of orthophyric riebeckite-trachyte, while to the west of this occurs augite-olivine-trachyte. Hand specimens from the junction can be selected showing the two types intimately mixed.'

The cognate xenolith of riebeckite-granite described by Dr. Phemister (in Eckford and Manson, 1928)^[1] was collected near this junction. Again, 'The orthophyric riebeckite-trachyte is a very hard, compact, brown rock with a contorted fluxion-cleavage, recalling in appearance corrugated iron. Riebeckite is conspicuous in blue mossy aggregates. The augite-olivine-trachyte is a very hard, compact, grey-green rock, with good felspar-phenocrysts. It weathers to a buff colour, and has an irregular fracture.'

'This augite-olivine-trachyte closely resembles specimens from Traprain Law and the Bass Rock (East Lothian)', (McRobert 1914, p. 3(9))^[2].

An indicator on the summit of Mid Hill shows the landmarks and features of interest visible on a fine day. It would be difficult to find a better vantage point from which to view the extensive panorama of the Borderland and feel the magic of its appeal. Sir Walter Scott claimed that he could point out forty-one historic sites from this summit and for him the Eildons were 'the delectable mountains'.

7. Valley between Mid and North Hills: Sanidine-trachyte and Baked Mudstone

From the summit of Mid Hill a steep footpath is followed northwards downhill across much scree to the valley between the Mid and North hills. In an old quarry (NT 550 325) near the footpath in the valley a thin bed of hardened mudstone occurs between two sheets of sanidine-trachyte dipping to the west at a fairly high angle. The upper sheet is reddish and shows a chilled basal edge while the top of the lower sheet is rough and spongy. Lady McRobert considered this exposure as part of the basal sheet of sanidine-trachyte connecting the Mid and North hills.

8. North Hill: Varieties of Sanidine-trachyte

At this point reference may be made to the rocks and structure of North Hill (NT 553 328). Lady McRobert has shown that this hill consists almost entirely of three sheets of sanidine-trachyte which give it a stratiform appearance. The lowest and topmost sheets are porphyritic types while the central thicker sheet is mainly non-porphyritic. The lowest sheet lies on the pedestal of Upper Old Red Sandstone. In character it resembles the trachyte of the basal layer as found in other parts of the complex and in Bowdenmoor Quarry. On North Hill the basal trachyte is followed upwards by a thick sheet of non-porphyritic sanidine-trachyte which, in places, contains much quartz. In the upper part of the sheet idiomorphic phenocrysts of quartz occur which suggest the presence of a sheet of quartz-porphry but exposures are inadequate to make this certain. The summit sheet is highly porphyritic with phenocrysts of fresh sanidine and much quartz. Like Barron, Lady McRobert considered that the rocks of North Hill are petrographically distinguishable from those of the Mid and Wester hills and that they were part of a subsidiary dome to the laccolith. The summit area of North Hill has been successively an Iron Age fort and a Roman signal station and earthwork remains, these may still be seen.

From the valley between the Mid and North hills the route follows the footpath down to the golf course. At a locality about a third of the way down (NT 558 327) sandstone is exposed near some mounds of debris. The site is indicated on old maps by the word 'Bourjo' in old English lettering and tradition asserts that the Druids performed their sacrificial rites on these mounds. On the other hand it seems more probable the stones were quarried here for building purposes as there are also traces of an old road way leading from the site towards Melrose Cross the golf course and rejoin the coach at the road near the club house for the return to Melrose.

References

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2. [↑] McRobert, (Lady) Rachel W. 1914. Acid and Intermediate Intrusions and Associated Ash-Necks in the Neighbourhood of Melrose (Roxburghshire). Quart. J. Geol. Soc. Land. 70, 303-315.

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