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# Jedburgh–Melrose–Kelso

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O.S. 1:50 000 Sheets 73 Galashiels and Etrick Forest, Kelso and 80 The Cheviot Hills

B.G.S. 1:250 000 Sheet 55N 04W Borders

Route: (Figure 22)

## Introduction

This part of the Borders Region sits astride the Devonian conglomerates and red sandstones which lie between the folded Lower Palaeozoic greywacke uplands to the west and the Lower Carboniferous sedimentary basin of the Merse to the east. Volcanic activity has left its legacy in the Lower Devonian lavas of the Cheviots and the Lower Carboniferous lavas of the Kelso Traps. The same age as the latter are the dolerite and agglomerate plugs which form many of the sharp hills rising out of the general glaciated landscape. The softer Devonian sediments, best seen in incised valleys, have a glacial cover with a SW–NE drumlinoid grain produced by ice-flow from the south-west. The excursion has a selection of localities at which the many rock types can be studied and where the varied landforms produced by different geological formations can be seen. The whole excursion could be completed in a day, or selected localities could be combined with other excursions in the area. Private transport is essential.

## 1. Penielheugh Hill: Dolerite Plug, Viewpoint

One of the best overall views in the Scottish Borders can be obtained from the Wellington Monument on Penielheugh Hill. This can be included in the 6 km waymarked walk from the Woodland Visitor Centre [NT 642 245] just off the A68 on the B6400 Ancrum-Nisbet road. Alternatively it is a short steep climb from limited road-side parking [NT 646 267] WNW of the hill. The monument was erected by William Kerr in 1815, full details being given on two stone tablets on the monument. The Wellington Monument sits on a crag-and-tail feature, the crags of dolerite lying to the south-west, the tail running north-east. The intrusion, a dolerite of Jedburgh type, is a black fine-grained non-porphyrific rock, seen on glaciated surfaces around the monument, and in a quarry 150 m to the south-west. This quarry probably provided the black stone for the bulk of the monument, but the red dressed sandstone used in details has come from further afield. On a clear day the panoramic view through 360° shows all the prominent geological features of the eastern Borders.

**NW.** The three peaks of the Eildon Hills show red screes of the Carboniferous igneous rocks (Eildon Hills excursion).

**NNW.** Black Hill, looking reddish, and Redpath Hill, looking blackish and topped by a working quarry, are both Carboniferous intrusions.

**N.** Smailholm Tower sits on a ridge of intrusive Carboniferous dolerite (locality 7) below the distant skyline of the gently rounded Lammermuir Hills, carved out of Ordovician and Silurian greywackes.

**NNE.** Dirrington Laws, two rounded hills in the far distance are Lower Carboniferous granites intruding the Lower Palaeozoic greywackes.

**NE.** Kelso, a cluster of buildings round a prominent church spire, nestling at the confluence of Tweed and Teviot, is surrounded by the drumlin landscape of the Merse.

**E to SE.** The Cheviot Hills form a lumpy skyline of Devonian volcanics along the Scottish-English border, the most prominent being Auchhope Cairn. Across the Tweed valley Morebattle is visible in the middle distance at the far end of the open valley of the Kale Water.

**SE to S.** The fells around Carter Bar have a smoother skyline reflecting Carboniferous sediments and lavas, whereas isolated lumpier hills of Devonian volcanics can be seen below the horizon.

**S.** Jedburgh itself is hidden in the incised valley of the Jed Water cut in Old Red Sandstone sediments (localities 2 and 3).

**SSW.** Dunion Hill has the rugged shape of a quarried Carboniferous dolerite plug (locality 4). CSW. Rubers Law with its conical shape is a similar dolerite plug.

**WSW.** The Minto Hills, across the Tweed are two bare rounded Carboniferous agglomerate-filled vents (locality 5), whereas the wooded Fatlips Castle crags to their left is a dolerite-filled vent.

**W to WNW.** The Lammermuir Hills, forming soft rounded hills on the skyline beyond the TV masts behind Galashiels, consist of Ordovician and Silurian greywackes.

**WNW.** Down Law with the tower of Baron's Folly emerging from the wood in the foreground, shows the classic drumlin shape typical of the lower ground round about. The drumlins strike of SW–NE follows the local ice flow direction.

## **2. Riverside Park: Upper Old Red Sandstone sediments**

In cutting into the sides of its incised valley, the Jed Water has created several prominent cliffs of Old Red Sandstone sediments, both to the north and to the south of Jedburgh. One of the more accessible of these, provided the river is not in spate and it is not a winter Saturday afternoon, is beside the Jed-forest Rugby Club ground at Riverside Park, where there is off-road parking [NT 657 223]. A path along the north side of the ground leads to the 20m high cliff. The beds of red to purple sandstones and silty sandstones are evenly bedded to massive, with green staining at some horizons. The beds dip gently southwards

## **3. Allars Mill: Hutton's Unconformity**

The most famous geological site in the Jedburgh area is Hutton's classic unconformity at Allar's Mill. While still impressive it cannot be as spectacular as when Hutton described 'the Schistus standing upright in the bed of the river, the bed of Puddingstone comprising the wreck of the Schistus, beds of red and marly sandstone deposited above as horizontal beds'. (Figure 23). Leaving Jedburgh to the south by the A68 look out for the red sandstone structure marking the entrance to Allerley Well Park. Take the road to the right 30 m beyond down to park beside the former mill [NT 650 199]. At the time of writing there are plans to restore this site to how it was in Hutton's time and provide public access. Meanwhile it is within the mill land and permission for parking should be obtained. In the river bed and the lower part of the bank vertical Silurian greywackes and shales can be seen striking east-west. The upper part of the bank is formed of horizontal Old Red Sandstone sandstones. The unconformity between these two lithologies marking the long time gap during which the Silurian beds were folded, uplifted, and eroded prior to the deposition of the sandstone in Upper Old Red Sandstone times, is normally obscured by scree and vegetation.

## **4. Dunion Hill Quarry: Dolerite plug**

Dunion Hill is a Carboniferous volcano, filled with a plug of basalt/dolerite intermediate between Jedburgh and Markle types. The now abandoned quarry has worked out the upper part of the plug but has left good exposures even though part of the area is used as a tip. Access is from the B6358 Jedburgh-Denholm road with roadside parking at the quarry gate [NT 625 196]. The quarry is oval with 25 m high faces of well-jointed black dolerite, the joints reflecting the original intrusive shape. Fine examples of horizontal hexagonal jointing at the west corner, for example, lie at right angles to the vent margin. The black fine-grained dolerite has scattered macro- and micro-phenocrysts, 1–5 mm diameter, mainly feldspar with some olivine. Black Law, a dolerite and agglomerate-filled plug, lies a kilometre to the south-west. The reddish, grass-covered Minto Hills are the sites of agglomerate filled vents (locality 5), whereas the rocky bluff on which stands Fatlips Castle is a dolerite plug, these features standing out of the glaciated drumlin terrain.

## 5. Minto Hills: Vent agglomerate

The twin hills are volcanic vents of vent agglomerate rising prominently above the drift-covered Upper Old Red Sandstone sediments. Erosion of the softer country rocks has exhumed their original oval shape. Park in the small lay-by at the north end of Minto golf course [NT 564 208]. Take the path obliquely up to the col between the two hills, and then on to the larger, southern hill. Crags, partly quarried, show the vent agglomerate to consist of angular to rounded fragments mainly of sandstone, greywacke, felsite and vein quartz, generally 1 to 2 cm diameter, a few as much as 5 to 10 cm, set in a matrix of brownish unbedded tuff. Ascend to the trig point, set in agglomerate. Pause to reflect that the geological surveyor, despite the paucity of exposure confidently mapped the vent as totally filled with agglomerate. Were there any dolerite intrusions they would surely have stood out more prominently as outcrops. To the south on either side of the Tweed lie the villages of Minto and Denholm, the latter dominated by the dolerite plugs of Rubers Law. Return carefully obliquely down towards the starting point, cutting back to visit the small quarry in agglomerate above the two tall conifers .

## 6. Scott's View: Viewpoint

Sir Walter Scott's favourite view, looking to the Eildon Hills from Bemersyde, can still be appreciated by today's traveller from the lay-by on the B6356 Earlston–Dryburgh road [NT 593 343]. Scott stopped here so regularly to admire the view that it is said that on his final journey his horses automatically stopped the funeral cortege. The geologist too should spare the time to admire the view:- the three volcanic peaks of the Eildon Hills (Trimontium to the Romans — Eildon Hills Excursion) to the south west, the vents of the Minto Hills (locality 5) in the distant south, and the Black Hill plug to the north. The glaciated low ground is underlain by Lower Palaeozoic greywackes while far below the River Tweed sweeps across its alluvial plain.

## 7. Smailholm Tower: Dolerite intrusion, restored castle

The Tower, a 15th century fortified farmhouse erected by the Pringle family, is under the care of the Historical Buildings and Monuments. The location [NT 640 347] is well signposted from the village of Smailholm on the B6397 to the north-east. It is an impressive approach to the tower-house, sitting on the rugged glaciated and quarried rocks of Sandyknowe Craigs, another Carboniferous intrusive plug. The black, fine-grained, non-porphyrific dolerite looks remarkably fresh. Rough angular blocks of this stone were used to build most of the tower. A soft red sandstone from Melrose was dressed for use on the corners and round doors and windows, but incongruously a cream sandstone has been used for a later restoration of the crow-step gables on the roof. The small entry charge is worth paying, both for the fascinating historical exhibits on four levels and for the spectacular views from the north and south balconies. From the former the Eildon Hills to the west again catch the eye, as do Borthwick Hill, Hume Castle and the glaciated lowland of the Merse to the east. From the latter can be seen the distant Cheviots to the south-east, Penielheugh Monument (locality 1) and Rubers Law to the south-west. Glaciation has impressed a SW–NE grain on the dolerite of Lady Hill below the Tower and in the drumlin topography on either side of the River Tweed in the middle distance.

## 8. Roxburgh: Lower Carboniferous sediments

Carboniferous sediments lying above the Kelso Traps underlie the eastern end of the Tweed Basin. Exposures near Roxburgh can be reached from roadside parking on the A699 at the entrance to Roxburgh Barns farm [NT 703 332]. Scramble down through the wood to the riverside where good sections are normally accessible. Grey, green and red interbedded siltstones mudstones, ripple-bedded sandstones and cementstones dip gently NW. A hard nodular white limestone, 80 cm thick, resting on a green-purple nodular mudstone, forms a natural weir across the river.<sup>9</sup>

Chapel-on-Leader: Lower Old Red Sandstone Conglomerate. A large deposit of conglomerate fills an ancient valley in the Lower Palaeozoic greywackes, now partly exhumed along the valley of the Leader Water. Roadside cuttings have been excavated along the A68 between Earlston and Lauder. The best of these [NT 477 563] can be reached from a large lay-by off the southbound lane, just to the north of the cutting. The rounded boulders and cobbles of the conglomerate consist predominantly of the Lower Palaeozoic greywackes, with some of vein-quartz, quartzite and

