
Excursion 14 Craig Rossie

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Purpose: To examine a distinctive flow-banded rhyodacite lava in the Ochil Volcanic Formation (Arbuthnott–Garvock Group); to view the extensive landslips that have affected the eastern slopes of the hill.

Logistics: From Stirling, take the A9 to the western turn off to Auchterarder. In the village, where facilities are available, turn right at the east end along the B8062 Auchterarder–Dunning road, passing Pairney Farm [NN 977 131] and turning southwards about 200 m farther east into the approach road to the large disused quarry south of Pairney. This excursion is suited to cars and small buses. Walking distance is around 10 km on tracks and on grass and heather. Proper hill gear should be worn. A public footpath goes across the land belonging to Pairney Farm.

Maps: OS 1:50,000 Sheet 58 Perth & Kinross; OS 1:25,000 Sheet 368 Crieff; BGS 1:50,000 Sheet 39E Alloa; locality map (Figure 14.1).

Craig Rossie is a prominent topographic feature on the northern edge of the Ochil Hills near Auchterarder. It is geologically notable on account of the distinctive flow-banded rhyodacite lava of Early Devonian age, which occupies its summit and north-western slopes. The locality is also of interest for the extensive landslip, which involves the rhyodacite on the eastern side of the hill. Craig Rossie is an SSSI and Geological Conservation Review (GCR) site (Stephenson *et al.*, 1999), lying close to the boundary between the Ochil Volcanic Formation and the younger Scone Sandstone Formation, which occupies lower ground north of the hills. These rocks dip to the NW, towards the axis of the Strathmore Syncline. One of the youngest lavas in the Ochil sequence, this rhyodacite constitutes a lenticular mass, which dips below a trachyandesite lava on Thorny Hill, north of Pairney, the younger lava being interposed between the rhyodacite and the succeeding sandstone. The lavas of the Ochil Volcanic Formation comprise mainly basaltic andesites, with a lesser proportion of basalts, andesites and trachyandesites. There are also a small number of rhyodacites, of which the Craig Rossie lava is the most important, the best exposed and the most accessible. It typically has pale-grey feldspar phenocrysts (oligoclase) together with phenocrysts of biotite and quartz set in a fine-grained brown or pink matrix. Together with other felsic lavas in the northern Ochils, this unit differs greatly in appearance from the dominant basaltic andesites, which are darker in colour.

Locality 14.1 [NN 9770 1277] Pairney Quarry: rhyodacite

The quarry displays large faces in banded rhyodacite lava, which was quarried as a raw material in the manufacture of rock wool. It is currently being landfilled and has been used intermittently by the farmer for tipping. Also, by the nature of the rock, the main faces are unstable, and **great care should be taken**. The rock is locally brecciated, bleached and silicified (Plate 14.1). Veins of green malachite and xenoliths, 5–10cm across, of bright green, badly rotted porphyritic dioritic or gabbroic rock are found (Plate 14.2). The following description is taken from the GCR volume (Stephenson *et al.*, 1999):

The Craig Rossie rhyodacite is brown, dull red or pink in colour. It contains phenocrysts, particularly of pale-coloured feldspar but also of quartz and biotite, in a fine-grained crystalline matrix. As far as is known, the rhyodacite is a single lava and no separate flow units have been recognised. Its most striking feature is the widespread occurrence of colour-contrasted flow banding due to subtle mineralogical differences. This flow-banding developed as the cooling magma passed through a viscous phase, developing folds just prior to solidification. The folds are usually open in form but locally become overfolded. Undeformed flow-banding is seldom parallel to the base of the flow. Other features noted include amygdales of calcite and red chalcedony near the supposed top of the rhyodacite and patches of fine-grained sedimentary rock, which have been recorded as infilling fissures or spaces between autobrecciated blocks near the base.

Locality 14.2 [NN 9755 1295] Pairney Burn

On returning to the quarry entrance descend westwards to the Pairney Burn and proceed upstream through the deep valley cut in the rhyodacite between Castle Craig to the east and Kay Craig to the west. Flow banding is well exposed in weathered exposures. In places on the east bank, close to the burn, flow lineation is visible on the planar flow surface.

Locality 14.3 [NN 9750 1265] Tributary burn.

Proceed upstream as far as the right-angled bend in the Pairney Burn south of Kay Craig. At this point a tributary gully, following a concealed NW-trending fault, descends from the SE. Amygdaloidal grey basaltic andesite lava, which underlies the rhyodacite of Castle Craig, is exposed on the NE side of the gully about half way up. The basaltic andesite, juxtaposed with rhyodacite thrown down on the SW side of the fault, contains patches of fine-grained sedimentary rock, a characteristic of Lower Devonian lavas of this composition. The sedimentary rock was formerly believed to represent the infillings of fissures in a flow breccia but more recent interpretations of such features suggest that they are peperitic textures resulting from the contact of magma with wet sediment. To the NW, the fault crosses the Pairney Burn, on a line extending west of the rhyodacite of Kay Craig. It again crosses the Pairney Burn downstream of Pairney, where it passes between the amygdaloidal upper part of the rhyodacite (not now exposed) and sandstones of the Scone Sandstone Formation (exposed near the railway bridge). There is a well-marked track at the head of the gully. To the left the track leads northwards back to the quarry through a glacial meltwater channel, which has been badly damaged by quarrying. In the opposite direction the track continues southwards along the east bank of the Pairney Burn.

There are two practicable routes to the top of Craig Rossie. The shorter and steeper diverges from the track a short distance south of the head of the gully, where a fence on the left of the track extends uphill in an ESE direction. This may be followed until it changes direction. Thereafter the route to the summit of Craig Rossie is south-eastwards above the line of crags on the SW side of the hill. The summit can be reached in about 40 minutes. There are few exposures on this route, but the views are extensive towards Ben Effrey, and to the active screes below the western and southern side of the summit of Craig Rossie (Plate 14.3). The second route continues along the track. Beyond a sharp bend in the course of the burn [NN 9758 1245], small exposures of rhyodacite on the uphill side of the track are not far above the unexposed base of this lava. The rock here is thrown down to the SW in relation to that on Craig Rossie by the NW-trending fault, which extends from the gully west of Castle Craig to pass east of an outlier of rhyodacite, also thrown down to the SW, which forms the summit of Ben Effrey. Opposite Upper Coul the outcrop of the base of the rhyodacite east of the Pairney Burn turns ESE to ascend the north bank of Green's Burn [NN 9755 1205]. Here, underlying dark-grey amygdaloidal andesites are exposed on the south side, where the track crosses the burn.

Locality 14.4 [NN 9765 1160] Track-side

At a point on the track directly downhill from the southern end of the crags on Ben Effrey, there are exposures of a brecciated rock which contains a variety of inclusions, including fragments of pink felsic lava. This material is sporadically exposed as far as a gully that crosses the track at [NN 9785 1125]. Beyond this are exposures of grey porphyritic lava, succeeded to the south by further sporadic exposures of brecciated rock of silicic composition. A deeply rutted track, which forks left uphill before the Beldhill Burn is reached, may be followed to the top of Beld Hill [NN 9825 1080]. From here the summit of Ben Effrey, where there are the remains of a fort, lies about 500 m along the ridge to the NE. If Ben Effrey is not visited, the route to Craig Rossie from Beld Hill is north-eastwards towards the western boundary of a forestry area. The forestry fence can be followed northwards along a broad ridge towards the summit of Craig Rossie.

Locality 14.5 [NN 9800 1150] Ben Effrey

On Ben Effrey the rhyodacite comprising the summit outlier is well exposed. South-west of the rhyodacite outcrop and a short way down the western slopes of the hill, there are exposures of a highly decomposed basalt dyke, which has been reduced to a brown sand in places, and areas of scree. The top of the hill is a fine viewpoint, the base of the rhyodacite ascending the SW face of Craig Rossie being especially prominent from here. There is also a good view towards the SW, where the transverse valley that carries the drainage of the valley of the Coul Burn into the Pairney Burn is conspicuous. From the summit of Ben Effrey the route to the forestry fence is first SE then eastwards, avoiding the valley of Green's

Burn.

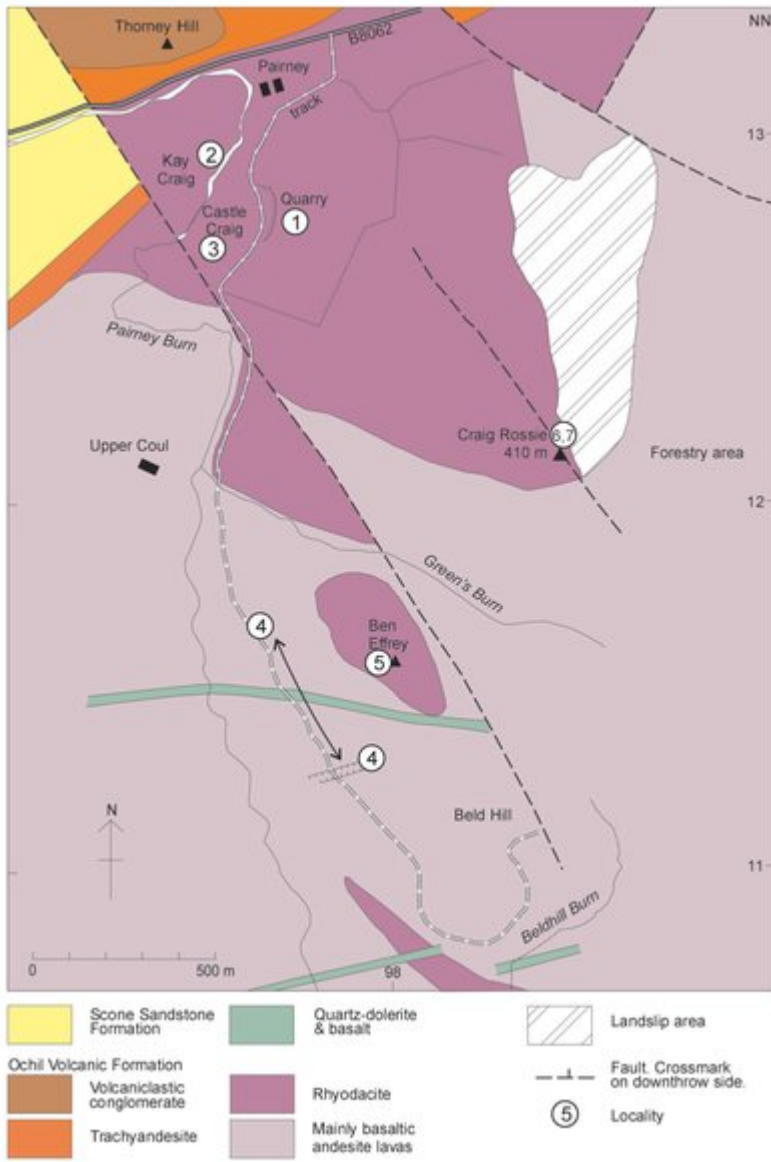
Locality 14.6 [NN 9850 1212] Craig Rossie

There are rhyodacite crags both east and south of the summit of Craig Rossie, with extensive screes to the south. A grassy corridor descending between exposures south of the summit triangulation pillar marks the site of a NNW-trending fault, which throws down 10 m to the east. From the lower ground south of the summit, it may be observed that the crags east of the fault descend to an appreciably lower level than do the rhyodacite exposures west of the fault.

Locality 14.7 [NN 9853 1207] East face of Craig Rossie: landslips

The east face of Craig Rossie, as seen from east of the summit, shows an upper line of rhyodacite crags, descending northwards and forming the edge of the unmoved mass of the hill (Plate 14.4). East of this line, a 400 m-long slice of the lava has broken off and slid downhill to form a subparallel second rocky scarp at a lower level. The upper surface of the displaced mass is tilted backwards towards the hill, and joints in the rock, formerly vertical, now dip away from the hill, both effects being caused by rotation during movement. Rocky irregularities of the upper surface reflect differential movement of individual parts of the landslipped slice. To the north, other prominent rhyodacite masses have travelled farther downhill and they become more and more disorientated in this direction, resulting in a scene of chaotic disarray. Towards the bottom of the hill, near Tarnavie, the landslide terminates in completely broken material with large blocks of the lava carried forward on lobate projections, probably consisting in part of superficial deposits at the extreme limit of movement. There is no historical record of landslide activity, and it is probable that the principal movement was of Late Devensian age, following closely upon the final deglaciation of the area. The rock has broken away on planes, probably faults of north to NNW trend, and is likely to have involved the subjacent andesites, although none of this material has been detected in the landslide. The landslide lies within an enclosed, partly afforested, area. To return, follow the slopes beside the screes on the north side of Green's Burn and back to the track.

[References](#)



(Figure 14.1) Geological map of the area around Craig Rossie, showing localities for Excursion 14.



(Plate 14.1) Locality 14.1. Rhyodacite with brecciation and mineralisation, Pairney Quarry.



(Plate 14.2) Locality 14.1. Rhyodacite with flow folds (centre) and green xenolith of rotted igneous rock, top left of notebook, Pairney Quarry.



(Plate 14.3) Locality 14.3. Craig Rossie scarp and talus (scree).



(Plate 14.4) Locality 14.7. Craig Rossie viewed towards the SW, showing major landslides; note esker in foreground.