Excursion 5 Campsie Glen

Key details

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Themes	To examine part of the Lower Carboniferous succession, including the Clyde Plateau Lavas and the sedimentary sequences immediately above and below them, and the effect of the Campsie Fault. Minor intrusions and other evidence for faulting will be observed as well as the effects of Glacial and post-Glacial erosion and deposition.
Features	The Campsie Fault Scarp, Cementstone Group, Campsie Lavas, dykes, the Lennoxtown essexite intrusions, Campsie Main (Hurlet) Limestone, fossils.
Maps	O.S. 1: 50 000 Sheet 64 Glasgow B.G.S. 1: 63 360 Sheet 30 Glasgow
Terrain	Muddy paths in Campsie Glen, some steep walking in vicinity of Campsie scarp, rough hill walking.
Distance and Time	The normal itinerary is 9 km (5.5 miles) long: add 5 km (3 miles) if the ascent of Lairs Hill is included; a day is required to cover it fully on foot.
Short	The excursion can be shortened by missing out Localities Itinerary: 7 and 8 or, if returning via Campsie Glen, Localities 9 to 11.
Access	Campsie Glen can be reached by private transport or by a frequent service from Buchanan Street Bus Station (Telephone (041) 332 7133 for departure times). Permission for access is not required but no dogs please as there are sheep on the hill. Care should be taken not to disturb livestock, particularly in the lambing season. The return bus to Glasgow can be boarded at Lennoxtown Cross.

Introduction

The first detailed account of the Campsie District (Young 1868) appeared in volume one of the Transactions of the Geological Society of Glasgow. The reprinting of this in new editions in 1868 and 1893 testifies to the early popularity of the area with members of the Society. The Campsie district is still recognised as an area for teaching the fundamentals of geology in the field.

A major part of the local succession is occupied by the Clyde Plateau Lavas but parts of the Carboniferous sedimentary sequences above and below the lavas can also be studied. The scenery is dominated by the dramatic southward-facing scarp of the Campsie Fault. This fault, which has a downthrow to the south of possibly as much as 900 m, results in a dropping of the lava succession so that its top is encountered south of the fault (Figure 5.1); as a result a large part of the Lower Carboniferous succession can be observed within a small area. Although not seen at the localities given here, the top of the lava sequence, to the south of the fault, occurs a little to the west of Campsie Glen in Fin Glen, as does the Campsie Fault itself.

The striking scenery of the area owes much to the effects of the Glacial Period and its aftermath. Results of the erosive power of ice and water are evident and there are extensive glacial and periglacial deposits. The broad valley between Strathblane and Lennoxtown is at present occupied, for the most part, by insignificant streams and there is a watershed about 5 km west of Lennoxtown. Its present form resulted from erosion by a major glacier, originating in the Loch Lomond area, which flowed eastwards past Strathblane and Lennoxtown, its path traced by boulders plucked from outcrops of the Lennoxtown essexite (see Locality 9). On the retreat of the ice, steep unstable scarps were left at Strathblane and to the east of Campsie Glen. In places these have collapsed to form major landslips (Figure 5.1).

During the process of deglaciation enhanced run-off of melt waters led to the formation of gorges in Campsie Glen and neighbouring Fin Glen. The recent collapse of part of the Campsie Glen gorge (Locality 4) testifies to the continuing action of erosion of the unstable land forms which emerged at the end of glaciation. Other evidence of glacial processes is evident in the widespread deposits of boulder clay which blanket many of the higher slopes above Campsie Glen and are exposed in the banks of tributary burns.

From the car park and bus terminus at the Clachan of Campsie [NS 610 796] proceed to Locality 1 by the public footpath which starts to the east of the estate office. Although not visible the Campsie Fault crosses beneath the path some metres south of the gate which leads on to the hillside and into Campsie Glen. In the glen itself there are outcrops of the Cementstone Group and the overlying lavas (Figure 5.1).

Papers relevant to the volcanic history include Whyte and MacDonald 1974 and MacDonald and Whyte 1981.

Locality 1. Ballagan Beds cut by carbonated dykes (Figure 5.1)

The first outcrops in the stream are of gently dipping strata of the Cementstone Group (Ballagan Beds), consisting of grey, green and dullish-red-brown mudstones, sometimes sandy, alternating with beds of nodular argillaceous dolomite (cementstones). At this locality the sediments have been intruded by a narrow N–S trending dyke which forms a waterfall and a cliff a little bit back from the west bank of the burn. The dyke was probably basaltic but has been very strongly carbonated and veined with calcite so that it is pale in colour, even on fresh surfaces. The line of the dyke is displaced by a fault which crosses it obliquely in the stream bed. Tilting of the sediments indicates a downthrow to the NW. The shales in the contact area have been indurated, sheared and brecciated, suggesting that faulting and intrusion were contemporaneous. About 15 m upstream similar structures occur in the bed of the burn, again indicating a small downthrow to the northwest along the line of a multiple carbonated dyke.

Locality 2. Multiple dyke complex (Figure 5.1)

At this locality the burn is crossed by a multiple doleritic dyke complex which forms a prominent waterfall. The individual units of this intrusion are, in places, separated from each other by narrow screens of sediment which have been altered by contact metamorphism to such an extent that it is often difficult to tell which is dolerite and which is cements tone. The eastern end of the multiple dyke complex is displaced by a NE–SW trending dextral fault which is concealed below a jumble of boulders. This fault obliquely crosses the plunge pool of the waterfall where it is associated with another carbonated dyke, similar to those seen at Locality 1, clearly visible when the water level in the burn is low.

Across the flat area above the fall, other units of the dyke complex occur as far as the confluence with the Aldessan Burn which runs over a small waterfall of alternating cementstone and shales to join the main burn at this point. Between here and Locality 3 the uppermost part of the succession of the Ballagan Beds can be examined in Aldessan Burn and on the steep slope of its northern bank. Over 18 metres of sediments occur here, the lower half consisting of shales which alternate with both nodular and massive horizons of cementstone. The upper half of the succession consists mainly of shale but is interrupted by a thin sandstone bed about 4.6 m from the top of the sequence. At the top are red mudstones covered by a 46 cm (1.5 feet) layer of ash immediately below the lowermost lava flow.

Locality 3. Spout o'Craiglee

Here Aldessan Burn runs over a high cliff formed by the first three flows of the Campsie Lavas. Although thinner than the others, the second flow shows best the contrast between the more solid lower part and the upper vesicular part where gas bubbles were trapped as the lava cooled. The layer of red bole which lies on top of flow 1 shows that its slaggy top was subjected to a period of tropical weathering prior to the eruption of flow 2. Boles of varying thickness occur between many of the flows indicating that there were often time gaps of several years between some eruptions. The basal ash, below flow 1, can be examined to the left and right of the waterfall, where it contains occasional fragments of rock resembling Old Red Sandstone.

Returning to the main burn the path climbs up to the entrance to the gorge, the sides of which are formed by outcrops of the lowermost lava flows. Red bole is again exposed at the point where the path levels out. Note the size of the large boulders which have fallen from the sides of the gorge after it was excavated by the stream. It is probable that the most active period of downcutting took place during the process of deglaciation, when vast amounts of meltwater would have produced a more rapid rate of erosion than occurs at the present day.

Locality 4. Faults cutting the lavas

At this point a recent major rock fall confirms that erosive processes continue. The cliff has given way at the intersection of two fault planes. One of these, a normal fault, crosses the gorge and displaces the lava succession downwards to the SW by about the thickness of flow 2. The other plane of movement, now clearly exposed on the south-east side of the gorge has near-horizontal slickensides which indicate that it must have been a strike slip (tear) fault when it last moved. Near the intersection of the two faults, high up on the cliff, a dyke has been exposed with a trend close to that of the strike slip fault.

A little further on a set of rock-cut steps and some minor scrambling leads to the head of the gorge at Locality 5. The conditions, however, are potentially dangerous here for all but the sure-footed, particularly in wet weather when the rock can be very slippery. An easier and safer route involves retracing one's steps to the foot of the glen and climbing up to Locality 5 along paths through the trees above the east side of the gorge.

Locality 5. Nick Point

At the head of the gorge there is a pronounced nick-point above which the glen has a V-shaped cross-section. Note here the pot holes eroded in the top of flow 3. A short distance upstream flow 4 outcrops on the southeast bank. The central part of this flow, which forms the lower part of the small cliff, has pronounced platey jointing parallel to the flow orientation of feldspar microphenocrysts. This texture is characteristic of basaltic hawaiites. The lower part of the lava sequence at Campsie Glen consists of 17 flows of microphyric basalt and basaltic hawaiite referred to in BGS publications as Jedburgh basalt, a useful field term, although strictly speaking some of the flows are less basic than basalt (MacDonald and Whyte 1981).

From Locality 5 climb up the slope to the large car park at the corner of the Crow Road [NS 613 801]. From here a path leads upwards to the east, crossing successively higher lava flows, until it reaches the cairn on Lairs Hill (504 m). On a clear day the energetic will find it worth while to make the ascent for the view from the summit but even from the car park one can see the easterly dip of the Kilpatrick Hills in the west and, far to the east, the Pentland Hills on the other side of the Midland Valley Syncline.

Locality 6. Markle basalt Quarry

To reach Locality 6 cross the road from the car park and start uphill along the path to the summit. About two hundred metres uphill from the Crow Road turn to the left just before a small concrete outhouse which was the explosives store of a long abandoned quarry in flow 18 (Markle basalt). The lava here is highly vesicular in places and rather weathered but is notable for the size of its feldspar phenocrysts, some of which exceed 25 mm (1 inch) in length. Comparatively fresh specimens can be obtained from loose material in the talus on the slope between the quarry and the Crow Road. Note the narrow dyke which cuts the basalt at the NE end of the quarry.

To reach Locality 7 descend to the Crow Road and follow it to the NE (keeping a watchful eye for traffic) past Jamie Wright's Well. The granite setting of the well has inscribed on it a verse by the Kirkintilloch Poet, James M. Slimmon, who died tragically in 1898 on the brink of a promising career. He did however see the first copy of his book, 'The Dead Planet and Other Poems', on his death bed.

Locality 7. Campsie Dyke

Just north of the confluence of the main burn with the Alvain Burn both streams are crossed by the Campsie Dyke, one of the set of E–W trending quartz-dolerites which were intruded in late Carboniferous times. This dyke can be traced from Blanefield in the west as far east as Denny and it probably continues to the Firth of Forth at Grangemouth. At Campsie Glen it is about 20 m in thickness and shows well the contrast between the rounded spheroidal weathering of the central part (with its widely spaced cooling joints), and the much finer grained chilled margin which stands up as a cliff on the south side of the intrusion where its crosses Alvain Burn. To the north of the dyke in Alvain Burn the first two waterfalls run over the same Markle basalt flows as the one which occurs at Locality 5. On horizontal surfaces at the edge of the waterfall one can see that the elongate plagioclase feldspar phenocrysts display a pronounced preferred orientation suggesting a line of flow movement on a NNE-SSW trend (Whyte and MacDonald 1974). Similar phenocryst orientations occurs where this flow crosses the main burn about 300 m to the NE.

Locality 8. Varved Clays

Cars can be parked at the confluence of the Nineteentimes Burn and Alnwick Burn [NS 625 808]. Just west of the first outcrops in the Alnwick Burn the steep northern slope of the bank contains outcrops of laminated glacial clays. The individual layers are graded indicating that they were laid down by successive influxes of sediment into a lake which probably occupied the ground on either side of Nineteentimes Burn. In places the layers have been disturbed by slumping. Much of the ground to the west is occupied by hummocky glacial deposits, including moraine which probably dammed the main burn to form the temporary lake in which the clays were deposited. Further up Alnwick Burn a variety of flows including mugearite occur.

Localities 9 and 10 may be reached either by returning along the Crow Road or by following, on foot, the old drove road which is situated farther up the hillside. Near locality 9 the drove road cuts across a major landslip which is thought to have been caused by an earthquake some hundreds of years ago.

Locality 9. Lennoxtown essexite [NS 623 794]

This is the lower outcrop of the Lennoxtown essexite . Here the rock is a porphyritic microgabbro or dolerite with well shaped black augite phenocrysts which stand out well from the paler groundmass on weathered surfaces. In thin section the rock contains about 40% plagioclase feldspar, 30% augite and 10% olivine with lesser amounts of opaque ores, apatite, analcime, biotite and occasional nepheline. Note the well developed vertical joints. The magnetic anomaly associated with this intrusion suggests that it has a plug-like form. The exact position of the Campsie Fault here is uncertain but the combination of topographical and geophysical evidence suggests that it may run along the north side of the essexite plug, or indeed that the essexite may be intruded at the junction of the Campsie Fault with another, lesser, fault which splays off to the SW. A limited amount of car parking is available here by the side of the road.

The essexite is highly distinctive in appearance and so has proved to be a valuable tracer for ice movements. Fragments of this rock occur as far as 20 km (12.5 miles) to the east, within 2 km of Larbert (Shakesby 1978); traces of augite which may have originated in the essexite occur in sediments and soils even farther to the east. This confirms that the main movement of ice from the Loch Lomond area was to the east and there must have been a major glacier moving along the strath from Blanefield. Further evidence of the direction of ice movement is provided by Dunglass plug, opposite Ballagan Glen, 5 kin (3 miles) to the west. Its pronounced crag and tail feature is visible from this locality.

Locality 10. Upper essexite intrusion

Further up the hillside to the NE, on the other side of the drove road, is the upper essexite intrusion. The lower contact occurs in a water course where the clay-rich weathered top of one of the basalt lava flows has been thermally metamorphosed by the essexite. The intrusion appears to have the form of a sheet which is dipping steeply northwards into the hillside. At its west end it ends rather abruptly against a line of basalt outcrops which show signs of thermal metamorphism and hence an intrusive contact; to the east outcrops peter out short of another major landslip. Although the essexite of the upper outcrops lacks the prominent augite phenocrysts of Locality 8, it is in every other way similar to the lower essexite.

Locality 11. Hurlet Limestone [NS 634 790]

Further to the east, to the south of the Campsie Fault and above the golf course, there are sporadic outcrops of the sediments which lie on top of the Clyde Plateau Lavas. These include the Campsie Main (Hurlet) Limestone which was quarried during the 19th century and earlier. There are extensive grassed-over spoil heaps but part of the quarry face is still exposed. At the eastern end of the old quarry the flaggy upper part of the limestone has yielded numerous fragments of shelly fossils including productid brachiopods, bivalves and crinoids. Several shafts were sunk in the area to extract coal from a thin seam (the Hurlet Coal) which underlies the limestone. The coal was used as fuel in lime kilns, the remains of which occur at the corner of the Crow Road as it turns for the descent into Lennoxtown. It is reputed locally that lime from the Lennoxtown district was used in the construction of Glasgow Cathedral.

If on foot return to the main road and follow it into Lennoxtown. The bus to Glasgow can be boarded at Lennoxtown Cross and refreshments can be obtained in a nearby cafe.

References

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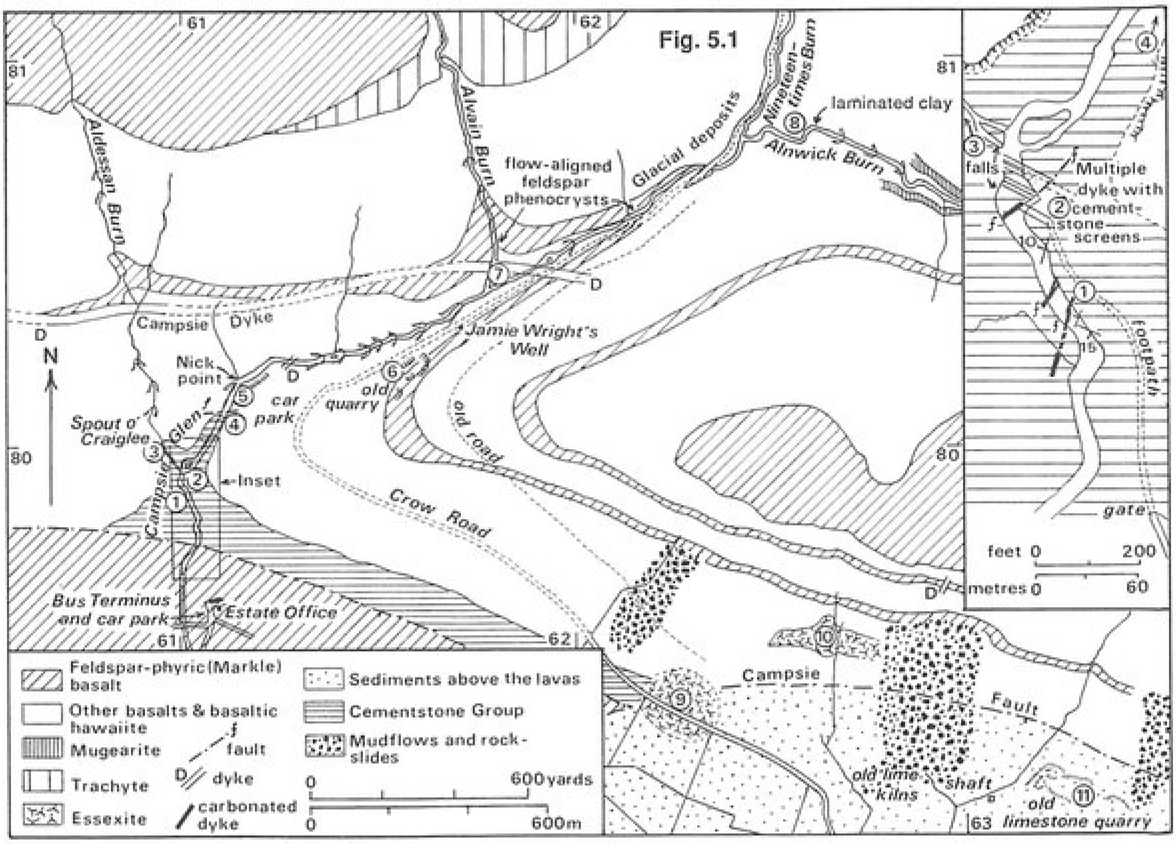

(Figure 5.1) Geological map of the Campsie Glen district.