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## Excursion 16 Roadside Stops around the North-west Highlands

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*Purpose:* This excursion provides details of a number of individual, roadside stops which do not fall easily into any one excursion, but which nonetheless are of significant interest geologically. These localities could be visited in a single day's road trip, or many of them could be taken in whilst driving to or from the main excursions. Roadside localities which fall in the main excursions, but which could also be visited as part of a road trip across the area, are mentioned briefly. These localities do not provide a full overview of the geology of the area, and for those with only a day to spare, the first halves of Excursions 1 and 6 are more suitable as an introduction.

*Aspects covered:* Classic exposures in the Lewisian Gneiss Complex, the Cambro-Ordovician succession, and the Moine Thrust Zone.

*Maps:* OS: 1:50,000 Landranger sheet 15 Loch Assynt and 9 Cape Wrath. BGS: 1:50,000 special sheet, Assynt district and 1:50,000 sheet 101E, Ullapool.

*Terrain:* These outcrops are all close to the road.

*Time:* Most of these localities would take less than an hour to visit. They could be treated as an excursion on their own and visited as part of a day's road trip.

*Access:* There are no access constraints for this excursion, although great care should be taken at roadside stops.

### Locality 16.1 [NC 1770 0279]

The Moine Thrust at Langwell.

This stop requires a short walk of about c.1 km round trip on a good track, but the outcrop itself is somewhat slippery. The locality, which is not particularly well known, provides an excellent exposure of the Moine Thrust. Take the A835 road north from Ullapool. Approximately 10 km north of Ullapool, turn off to the right at Strathcanaird and drive towards Langwell Lodge. Do not drive as far as the lodge but park at a small parking place on the left, c.500 m before the lodge at [NC 167 028]. Walk along the track past the lodge to a bridge over a side stream. The Moine Thrust is exposed above a small waterfall in the River Canaird at [NC 1770 0279] (Figure 111).

This is a very complicated outcrop of the Moine Thrust, which here overlies a small culmination – the Langwell Culmination (Elliott and Johnson, 1980). The Langwell Culmination is cut by a NNE–SSE-trending fault that occurs in the gorge of the stream to the north; this partially allowed the excellent outcrop to develop. The Moine Thrust here overlies dark-pink granitic to syenitic Ullapool Gneiss, part of the Lewisian Gneiss Complex that occurs within the Ullapool Thrust sheet (see Excursion 5), but a complex sequence of deformed rocks is associated with the thrust. In detail, the following sequence can be seen. The River Canaird flows over pink to green, densely fractured Ullapool Gneiss. Above this is c.0.5 m of fractured quartz arenite, which locally contains pink feldspar and is thought to be Basal Quartzite Member. Above this is a 10–30 cm. thick layer of white mylonitic carbonate, with anastomosing contacts with another layer of fractured quartz arenite. This is followed by a 10–50 cm. thick layer of pale green phyllonitic rock with strong anastomosing mylonitic fabric, not unlike the Oystershell Rock seen at Sango Bay (Excursion 14). The protolith of this rock is unclear. Above this is a brittle fault, with locally clayey fault gouge, marking the brittle Moine Thrust. Above the thrust is fractured mylonitic Moine psammite.

### Locality 16.2 Moine mylonites. [NC 169 056]

Between Strathcanaird and Knockan, there are good exposures of Moine mylonites in roadside cuttings along the A835 at [NC 169 056]. The exposures are 500 m NNE of the turn-off to Achiltibuie; there is a large lay-by on the east side of

the road. The road cuts stretch for c.200 m and are all composed of psammitic mylonite, becoming more mylonitic towards the west. At the south-western end of the cuttings there are small outcrops of the Salterella Grit and Fucoïd Beds members, indicating that the Moine Thrust occurs near the corner; the thrust itself is not exposed.

### **Locality 16.3 Elphin: extensional faults above the Sole Thrust. [NC 208 104]**

Park at a large lay-by on the A835 in the village of Knockan [NC 212 106]. Walk south along the road for c.500 m passing a bed & breakfast, to the road cut at [NC 208 104]. This road cut contains Eilean Dubh Formation dolostones, cut by a thin sill, and shows a number of west-dipping extensional faults, with the bedding in the individual fault blocks dipping fairly steeply eastwards (Coward 1982). This zone of extensional faults overlies the Sole Thrust, which may be represented by a fault breccia at the western end of the road cut. Coward (1982) interpreted the extensional faults as part of a small-scale 'surge zone', where one part of the thrust zone moved farther onto the foreland than adjacent parts, by gravitational spreading of the thickened thrust mass.

### **Locality 16.4 Allt a'Mhuillin Quarry. [NC 287 096]**

Disused quarry just north of the A 837, 2.5 km ESE of the Altnacealgach Motel. This location contains some of the best exposures of the rock-type 'borolanite' (pseudoleucite-syenite) in the Loch Borralan Pluton. It is fully described in Locality 10.6.

### **Locality 16.5 Loch Awe Quarry. [NC 250 157]**

This small, intermittently active quarry lies 3.5 km north from Ledmore Junction on the A837. The quarry contains excellent exposures of the Fucoïd Beds Member, and a variety of trilobites have been found here. The rock splits more easily than at most outcrops of the Fucoïd Beds Member, partly because of the quarried nature and partly because it is locally metamorphosed; this also renders the siltstones very splintery and great care should be taken when hammering. The most common species is *Olenellus reticulatus* Peach, 1894, but *O. intermedius* Peach, 1894, *O. lapworthi* Peach and Horne, 1892, and *O. hamoculus* Cowie and McNamara, 1978, have also been found here; this is the type locality for the latter. Other, very rare, components of the fauna include *Salterella*, hyolithids, gastropods, echinoderm fragments and non-articulate brachiopods (Cowie and McNamara, 1978; Prigmore and Rushton, 1999).

### **Locality 16.6 Stronchrubie cliffs. [NC 248 200]**

Park at the large lay-by at [NC 248 200], 2 km south of Inchnadamph, and look up at the cliffs to the north-east.

Along the road are outcrops of Pipe Rock Member, which dips some 10° to the east and is part of the foreland. In the rough ground east of the road, scattered outcrops of Fucoïd Beds and Salterella Grit members are seen. The lower part of the cliffs to the east consists of dark grey dolostone of the Ghrudaïdh Formation, cut by a prominent pale grey sill of vogesite. Above are pale grey banded dolostones of the Eilean Dubh Formation. The dolostones in the lower and middle parts of the cliff dip gently to the east, but steeply dipping slices of pale grey Eilean Dubh dolostone can be seen in the uppermost part of the cliffs to the north-east (Figure 112). These are the Stronchrubie imbricate thrust slices which root into a floor thrust (Stronchrubie Thrust) that runs along the upper part of the cliff, separating gently dipping strata below from deformed, steeper strata above. Further to the east, the Stronchrubie Thrust links with the Traligill Thrust (Excursion 7). Below the Stronchrubie Thrust, the Sole Thrust lies roughly at the base of the cliffs. Here there has only been relatively minor displacement along the Sole Thrust.

### **Locality 16.7 Peach and Horne Monument at Inchnadamph. [NC 248 222]**

On a hillock just west of Inchnadamph, overlooking both Loch Assynt and the Assynt Culmination, is a monument to Benjamin Peach and John Horne, the Geological Survey geologists who were instrumental in the mapping of the Moine Thrust Zone at the end of the 19th century. In 1912 they organised a field-trip to Assynt to summarise their results, and a

page of the visitors book, showing the international flavour of this trip, is exhibited in Inchnadamph. The monument was erected in 1930 and the opening ceremony was attended by H. M. Cadell, by then the only surviving member of the original Geological Survey team that mapped the North-west Highlands.

### **Locality 16.8 Loch Assynt to Skiag Bridge section. [NC 210 250] to [NC 240 240]**

Exposures along the A837 near Skiag Bridge, 3 km NNW of Inchnadamph [NC 235 244], provide the classic section through the foreland, introducing the different rock types of the area. This section is described in full in Excursion 1.

### **Locality 16.9 Cnoc Breac: viewpoint for the double unconformity. [NC 234 248]**

A large layby on the west side of the A894, some 500 m north from Skiag Bridge, provides a good viewpoint of the famed 'double unconformity'. Being on a north facing slope, the view is best photographed early or late in the day

On the south side of Loch Assynt is the hill of Beinn Garbh (539 m). At the base is hummocky ground, underlain by rocks of the Lewisian Gneiss Complex (Figure 113). Above this, much of the north face of the hill is formed of flat-lying layers of Torridon Group sandstone (mainly Applecross Formation). The eastern side of Beinn Garbh is a dip slope of Basal Quartzite Member (Eriboll Formation), dipping some 10–15° to the east, capping the eastern slopes and giving Beinn Garbh its roughly triangular shape.

The formation of the double unconformity requires the following sequence: (1) deposition of Torridon Group on Lewisian Gneiss Complex, forming the first, Neoproterozoic unconformity; (2) westward tilting (*c.* 10–15°) and erosion to form a flat peneplain by Cambrian times; (3) deposition of the Eriboll Formation; (4) eastward tilting of *c.* 10–15°.

The double unconformity can be regarded as the intersection of two approximately planar surfaces. On the southern shore of Loch Assynt, this intersection is positioned *c.* 100 m above loch level. In contrast, on the northern shore of Loch Assynt, the double unconformity lies some 10–20 m below loch level, some 500 m west of Skiag Bridge. The double unconformity can thus be used to accurately constrain the displacement along the Loch Assynt Fault (Krabbendam and Leslie, 2010), which records both pre- and post-thrust movement.

### **Locality 16.10 Loch Glencoul. [NC 236 321]**

A viewpoint on the A894 at Unapool with an SNH interpretative panel offers one of the classical geological views (Figure 114). On the hill north of Loch Glencoul, the easterly-dipping Glencoul Thrust emplaces rocks of the Lewisian Gneiss Complex (forming the hummocky topography on the upper slopes of Beinn Aird da Loch) over cliffs of pink Cambrian quartz arenite of the Eriboll Formation, which in turn rests unconformably upon Lewisian gneiss of the foreland. Note that Krabbendam and Leslie (2004) argue that the Glencoul Thrust Sheet terminates against a lateral ramp along Loch Glencoul, and that the Lewisian gneiss to the north of Loch Glencoul is continuous with that forming the Ben More Thrust Sheet farther south-east.

Further to the east, the Stack of Glencoul is visible. This hill is composed of mylonites of the Moine Supergroup and Eriboll Formation. The Moine Thrust is exposed at the base of the west face of the Stack (see Excursion 9).

### **Locality 16.11 Loch na Fiacail – the 'multicoloured rock stop'. [NC 232 486]**

Some 2.5 km north of Laxford Bridge, on the A838, is a large lay-by with an interpretational panel. Road cuts opposite the lay-by give a good introduction to the complexities of the Lewisian Gneiss Complex, and three main elements can be seen (Figure 115). Grey quartzo-feldspathic gneisses show a well developed gneissosity, dipping gently to the south. Dark-green to black amphibolite-bearing basic sheets also dip gently south and are approximately parallel to the gneissosity. However, detailed examination along the contacts shows that the basic sheets have cross-cutting relationships with the gneiss. The basic sheets are probably Scourie Dykes, but have been deformed and generally contain a fabric. Clearly, the Scourie Dykes intruded the gneisses at a relatively high angle and have been deformed into

sub-parallelism to the gneissosity by later deformation. Both the gneisses and the basic sheets are cut by a swarm of pegmatitic granite sheets, some of which show boudinage. One of these granite sheets has been dated at c.1855 Ma (Friend and Kinny, 2001); these are Laxfordian granites, similar to those seen on the south side of the Laxford Shear Zone at Tarbet (Excursion 13). However, this locality lies to the north of the Laxford Shear Zone, in the Rhiconich Terrane.

## [References](#)



*(Figure 111) The Moine Thrust, well exposed and picked out by the River Canaird, east of Langwell Lodge. Above the stream is psammitic mylonite; below is granitic Ullapool Gneiss. The thrust plane itself contains slivers of different rocks. View to the east. (BGS photograph P595958, © NERC)*



*(Figure 112) The imbricate thrust stack in Eilean Dubh Formation dolostones in the Stronchrubie cliffs, viewed from the lay-by to the south-west. (BGS photograph P667674, © NERC)*



*(Figure 113) The double unconformity on View southwards from the north side the north-facing slopes of Beinn Garbh, of Loch Assynt. (BGS Photograph with Loch Assynt in the foreground. P527482, © NERC)*



*(Figure 114) The Glencoul Thrust from Unapool. Lewisian gneiss, characterised by rather hummocky topography, forms the upper slopes of the hill; this has been thrust over the Eriboll Formation quartz arenites that form the prominent cliff line. (BGS photograph P500377, © NERC)*



*(Figure 115) Road cuttings in the Rhiconich Terrane of the Lewisian Gneiss Complex, showing grey tonalitic gneisses cut by black Scourie Dykes and pink Laxfordian granite. (Photograph: © K. M. Goodenough)*