
Càrn na Canaich

[NH 110 845]–[NH 086 820]

R.W.H. Butler

Introduction

The NNE-trending ridges of the Càrn na Canaich area, on the eastern side of the mountain massif of An Teallach (Figure 5.38) show one of the simplest developments of the Moine Thrust Belt. Here, Moine metasedimentary rocks are juxtaposed over Cambrian quartzites, Fucoïd Beds and Salterella Grit, separated only by a single thrust. The Càrn na Canaich area is important because it contains various lateral transitions in thrust structure and provides an excellent example of 'smooth-slip' behaviour of the Moine Thrust.

For much of its preserved outcrop length, the Moine Thrust is separated from the foreland by subsidiary thrust structures, sheets and imbricate stacks. These testify to progressive abandonment of the Moine Thrust with displacements transferring onto lower structures. As a consequence, culminations in the thrust belt are developed such as in Assynt and at Dundonnell (see Ben More Assynt–Conival–Na Tuadhan, Sgonnan Mòr–Dubh Loch Beag–Upper Glen Oykel and Dundonnell GCR site reports, this chapter). In other areas the underlying imbricate zones and thrust sheets are truncated by new, low-angle faults, such as at Knockan (see Knockan Crag GCR site report, this chapter). However, considerable portions of the central part of the Moine Thrust outcrop are characterized by no appreciable thrusting in its footwall. Elliott and Johnson (1980) coined the term 'smooth-slip' to describe this behaviour.

An Teallach is famous for its extensive exposures of Torridonian sandstones (Peach *et al.*, 1907) and its remnant cappings of Cambrian quartzite as erosional outliers. However, east of An Teallach, Moine metasedimentary rocks cap the main outcrops of Cambrian strata (Figure 5.39). The simplicity of these field relationships reinforced the earlier misconception that the Moine succeeded stratigraphically from the underlying Cambrian strata (see Oldroyd, 1990). The area was remapped by the Geological Survey, showing that the Moine Thrust lay between Moine metasedimentary rocks and the underlying strata (Peach *et al.*, 1907), but since these early studies the area has been seldom visited by research geologists (Butler, 2000).

The Moine Thrust itself carries a suite of mylonites that can be traced eastwards into the Fannich Mountains (Kelley and Powell, 1985; see Meall an t-Sithe and Creag Ftainich GCR site report, Chapter 7). In general the thrust glides on a footwall situated at the top of the Salterella Grit. However, there is a local imbricate system developed in the Fucoïd Beds and Salterella Grit that weakly bulges the Moine Thrust. Elsewhere there are thin slices of far-travelled Torridonian sedimentary rocks, which contain internal imbricate thrusts. However, these are local structures, and generally the Moine Thrust has slipped smoothly across a footwall that remained generally undeformed.

Description

This GCR site area lies just east of the An Teallach mountain group in the Dundonnell Forest, where the Moine Thrust and the underlying Cambrian quartzites form a prominent NNE-trending scarp and dip-slope topography. The upstanding ridges culminate in Càrn na Canaich (471 m above OD). Geologically the site lies between the Dundonnell culmination and the more-extensive thrust systems farther south near Kinlochewe. The Moine Thrust trends NNE and crops out along the length of the pass between Strath na Sealga and Conde Hallie on the A832 (Figure 5.38). The mylonitic rocks in its hangingwall appear to be exclusively derived from Moine metasedimentary rocks and show an intense mineral-stretching lineation that plunges almost due east. In general, these mylonites lie directly on Cambrian strata of the foreland. In the north of this area, in Gleann Chaorachain, Salterella Grit is present in the footwall. However, on the slopes leading down to the south, mylonites lie on the Pipe Rock without the stratigraphically younger strata. Presumably in this sector the An t-Sron Formation, together with the Durness Group, which is absent through this site, has been carried off in the hangingwall of the Moine Thrust. Thus the thrust shows a low-angle lateral ramp in its footwall.

The transition in footwall to the Moine Thrust is exposed on Càrn na Canaich [NH 097 827]. The west face of this hill displays a series of lateral ramps; movements on the Moine Thrust generally lie within the top of the Furoid Beds, but movement locally climbs to the top of the Salterella Grit. However, the geometry is complicated by a thin slice of Torridonian sandstones and siltstones overlain stratigraphically by a few metres of the lowest part of the Eriboll Sandstone Formation. These rocks represent a small, far-travelled horse that is accreted to the base of the Moine Thrust Sheet. Bedding within the Torridonian and Cambrian strata is very difficult to recognize in the field, and both units are strongly deformed. Localized zones of especially strong deformation within the Torridonian slice climb up to involve the overlying Moine mylonities. This has resulted in local interleaving of Moine and Torridonian strata. Consequently the Moine Thrust must have transferred displacement locally onto the base of the horse in its footwall.

The northern slopes of Càrn na Canaich (Cul a' Chairn; [NH 102 834]) display a tectonically thickened section of Furoid Beds beneath a thin veneer of Salterella Grit in the footwall to the Moine Thrust. The western part of this slope [NH 101 835] displays four repetitions of Salterella Grit, each separated by thin seams of Furoid Beds. Thus the tectonic thickening of the Furoid Beds represents a duplex, here termed the 'An t-Sron Formation duplex'. The underlying Pipe Rock remains gently dipping towards the ESE. Consequently the duplex may be inferred to have a floor thrust along the stratigraphical top of the Pipe Rock. The roof is the Moine Thrust that here is not breached by foot-wall structures. However, it is folded by the underlying duplex.

Notwithstanding the An t-Sron Formation duplex, in general the Cambrian strata beneath the Moine Thrust at Càrn na Canaich is not affected by deformation linked to the Scandian thrusting (Figure 5.39). Indeed, the Pipe Rock is wonderfully exposed on large ESE-inclined dip-slopes, where *skolithos* trace fossils (burrows) are patently undeformed, retaining circular sections on the bedding surfaces. Similarly there are excellent exposures of the False-bedded Quartzite below, together with the unconformable contact with the underlying Torridonian sandstones. This unconformity is well exposed around the headwall of Coire a' Ghiubhsachain and famously as an outlier on Sail Liath [NH 072 825], the south-eastern summit of the An Teallach massif.

The Moine Thrust and underlying strata are offset by NE-trending steep to vertical faults that throw down to the north-west. These late structures are well exposed on the west side of Gleann Chaorachain, where they are masked by deep gullies and small escarpments on the glaciated dip-slope of Pipe Rock quartzites. Displacement on the faults appears to decrease towards the north-east.

Interpretation

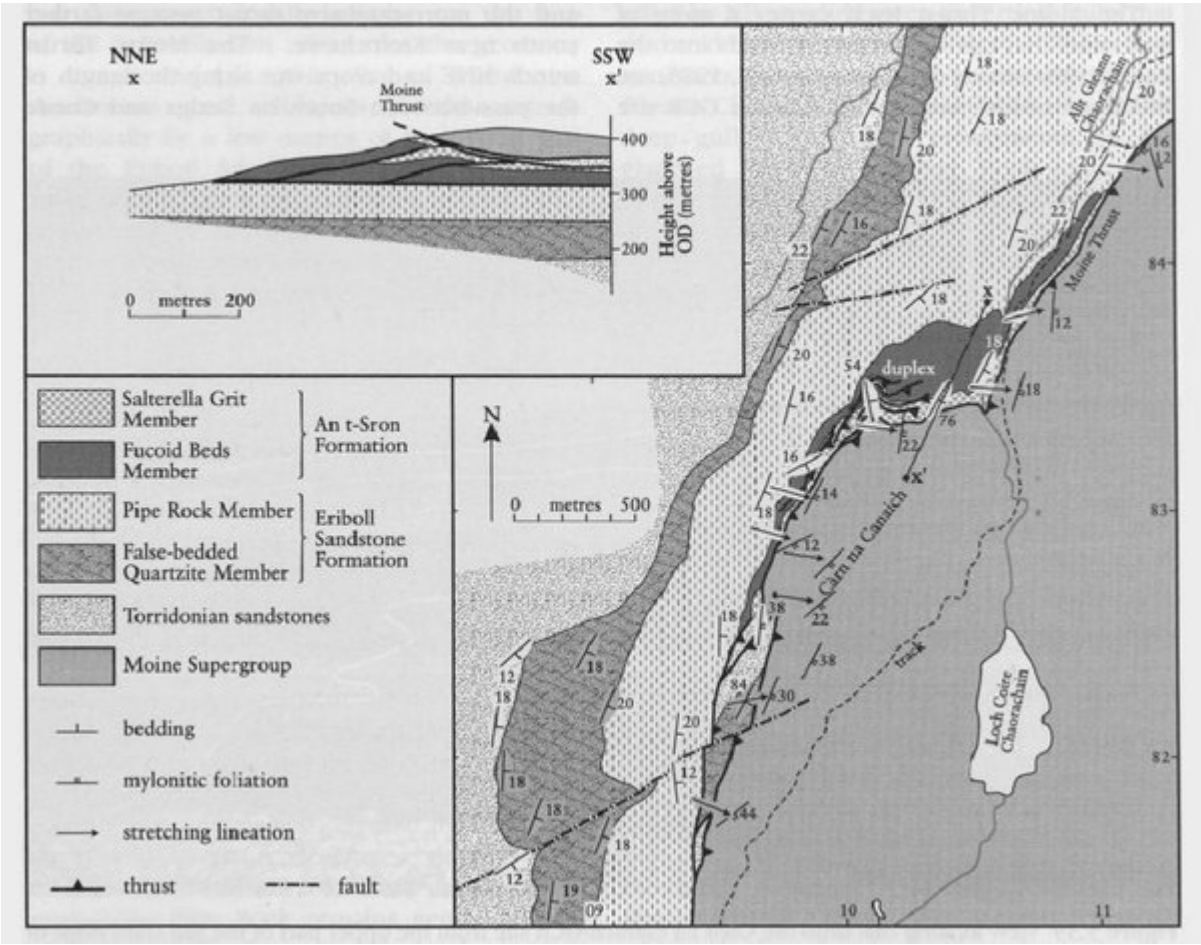
The Moine Thrust Belt in the Càrn na Canaich area is remarkably simple, in essence represented by the Moine Thrust alone with only local development of imbrication in its footwall. At first sight these relationships are similar to those in south Assynt (see Knockan Crag GCR site report, this chapter), where the Moine Thrust Sheet is brought into juxtaposition with the foreland because of late displacements at the base of the sheet. At Càrn na Canaich, the Moine Thrust acted as a roof to the local duplex of An-t Sron Formation in its footwall and the Moine Thrust Sheet is folded by these lower structures. The Moine Thrust was presumably the first structure to develop in this sector, possibly pre-dated by the mylonites in its hangingwall. These mylonites are interleaved with Torridonian strata from the footwall. Consequently the last displacements across the system certainly occurred after shearing within the mylonites. This supports the contention from several other areas in the Moine Thrust Belt that the Moine Thrust formed early in the overall thrust sequence.

Conclusions

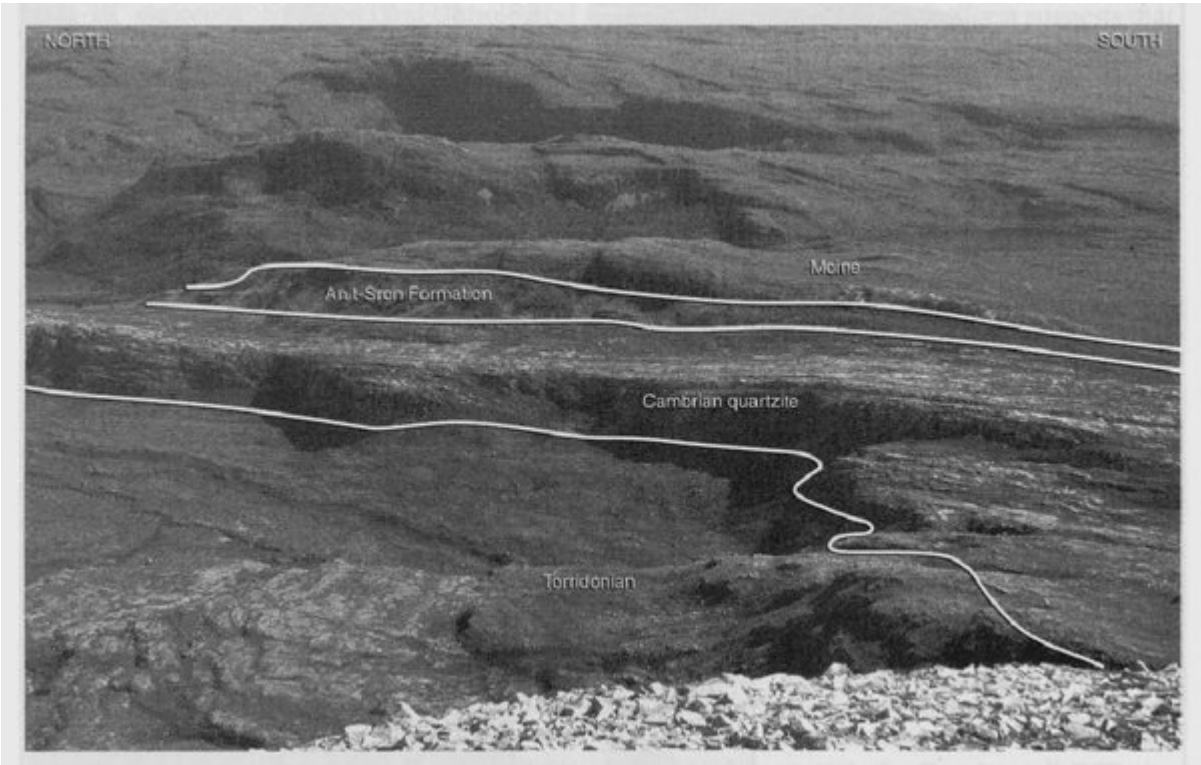
The Càrn na Canaich outcrops are nationally important because they display examples of the Moine Thrust in its simplest form, having moved without developing significant imbricate zones in its footwall. A minor duplex is developed locally that bulges up the Moine Thrust. However, for the most part the foliation in the Moine mylonites is parallel to bedding in the adjacent foreland successions of Cambrian quartzites. The relationships reflect simple 'smooth-slip' on the Moine Thrust. This behaviour is unusual compared with the Eriboll, Assynt and Achnashellach districts, and shows that large displacements on thrusts are possible without necessarily developing imbricate zones in their footwalls. The geology is

strongly reflected in the scarp and dip-slope topography.

References



(Figure 5.38) Map and cross-section of the area of Càrn na Canaich. Section x—x' is constructed at right angles to the thrusting direction.



(Figure 5.39) View looking east onto the Càrn na Cainich GCR site from the upper part of the Sail Liath ridge of An Teallach. Moine rocks have been thrust towards the viewer over a duplex formed in the An t-Sron Formation. (Photo: R.W.H. Butler.)