Strath Fionan & Schiehallion
Sat 23rd Aug 2014

Leaders: Ben Browne, Maggie Donnelly
Reporter; Maggie Donnelly Participants: 19

Fifteen of us set off by coach on a damp morning, driving up the A9 (and getting caught in heavy traffic north of Perth!) to Ballinluig. We turned west along the A827 to Aberfeldy, took the B846 towards Tummel Bridge, and then a minor road NW through Strath Fionan to the Braes of Foss car park where we met another six participants. We planned to visit some of the localities from The Geologists' Association Guide No. 67: The Dalradian of Scotland, by Jack Treagus (2009), indicated by bold numbers in brackets below. We had been told that the coach company had double booked us for this evening, so that we would have to be back in Glasgow for 6 pm instead of the anticipated 6.30 pm – this meant that our trip would be rushed if not a little curtailed!! Ben began by giving us an excellent introduction to, and explanation of, the geology

The rocks of the Dalradian Supergroup lie between the Great Glen Fault and the Highland Boundary Fault. They were deposited mainly in shallow water in a subsiding basin within the supercontinent of Rodinia from about 750 Ma ago. This crustal extension finally culminated in the eruption of the Tayviallich volcanics, 603 Ma, and the opening of the Iapetus Ocean which would separate the Laurentian plate to the NW from the Gondwanan plate to the SE. The rocks were later folded and metamorphosed during the closure of the Iapetus (locally the Grampian Event, *ca* 470 – 460 Ma). Roughly from NW to SE the Dalradian is divided into the Grampian, Appin, Argyll & Southern Highland Groups, younging from the NW to SE. The metamorphic grade increases from SW, where sedimentary structures are best seen, to NE where higher grade metamorphic minerals occur; the metamorphic grade in the Schiehallion area is in the region of kyanite grade. The Dalradian Supergroup can be traced for 1300 km from Connemara to Shetland with some very persistent beds. Strath Fionan to the north of Schiehallion offers exposures of a continuous succession within the Islay Subgroup, Argyll Group, down through the Appin and Grampian Groups. Today with one walk of 1.5 km on a good track and well grazed grass, and three walks of up to 300 m on rough grazing we would view the upper nine beds, from the Schiehallion Quartzite down to the Meall Dubh Graphitic Schist. The rocks are deformed by two major folds as well as by the broad swing of the Bohespic Antiform, and there are spectacular metamorphic minerals. We would have the opportunity to examine the Schiehallion Boulder Bed, deposited during the late Neoproterozoic Glaciations, and to discuss the controversial theories associated with the latter.

We drove NW and parked in a layby (**locality 4**) at NN 740 563 where there was a good view of the stratigraphy as revealed by the topography. The strath and road follow the softer beds of the Strath Fionan Limestone and the Strath Fionan Banded Formation; the ridges and high ground to the north are composed of Meall Dubh Quartzite, Meall Dubh Graphitic Schist and then Grampian psammites, while to the south lies the impressive mountain of Schiehallion Quartzite. We passed through a gate and followed a feint path over a narrow deep burn and uphill to NN 742 565 where, at the base of a crag line, was an exposure of Meal Dubh Graphitic Schist with numerous superb black kyanites. There were further exposures about 35 m to the east. We then drove on to an old quarry at NN 726 566 (**locality 7b**), and made our way 200 m SSE across tussock grass and a burn to tree lined crags. The lower beds to the east of the crags (NN 728 563) were of dramatic white dolomitic Strath Fionan Limestone with an extensive outcrop of spectacular tremolite rosettes. Above lay the contact with Strath Fionan Dark Graphitic Schist.

We returned to the coach and on to a quarry in the Strath Fionan Dark Schist and Limestone at NN 715 574 (**locality 8a**).

This comprised three alternating strata of dark limestone and of dark graphitic schist. A dramatic clear, clean limestone pavement above the quarry displayed tight D2 folds, also exposed in the quarry face, and very well developed clints and grykes.

Clints, grykes & folding in limestone pavement above the quarry

Photograph Bill Gray

We spent some time examining the folds and the myriad features, before driving further up the glen to park in a forest road entry, next to an exposure of Banded Semipelite at NN 701 578.

We crossed to the north side of the road and found, just over a gate, a large and impressive erratic boulder of the Schiehallion Boulder Bed (**locality 9***)* with granite, quartzite and schist clasts of various shapes and sizes set in a mudstone matrix, and typical of the upper beds of the Boulder Bed – the lower beds are predominantly of dolomitic clasts.

Erratic boulder of Schiehallion Boulder Bed at ***locality 9***
Photograph Maggie Donnelly

We started up a track from East Tempar Farm, NN 690 575, (**locality 9a***)*………………Lunch!!! Because we were pressed for time, many of us had started eating on the coach and on the hoof, but at this point a few of us rebelled and sat down on the grassy slope – the sun had come out – and relaxed with our pieces. The rest of the party turned south after the first wall to clean exposures of Schiehallion Quartzite in the Tempar Burn, NN 691 570, where they confirmed a NNW strike and steep ***NE*** dip, younging SW, because these beds are inverted locally by the Bohespic Antiform. A little further upstream, just before a wire fence, there were Dolomitic Beds with small scale graded bedding younging westwards. Upstream from this, were conglomerates – difficult to find in this overgrown gorge, so the group regained the track and met up with the lunchtime rebels. We continued uphill looking out for exposures of the Boulder Bed in and near the track, and began to find isolated outcrops. At last we came upon a particularly good exposure almost hidden in the bracken, ~ NN 696 565. It contained grey and pink granite, pink and white quartzite, dolomitic limestone and schist clasts, in a great variety of shapes and sizes (up to 4 cm here), widely spaced, not sorted and considerably deformed. The carbonate clasts were most deformed and strongly weathered so that they were mainly identified as distinctive ellipsoidal cavities; the least deformed granite and schist clasts retained their irregular and angular shapes. The matrix was gritty and highly feldspathic, and the cleavage clearly defined, curving round each clast. This curving cleavage can be mistaken for a sedimentary feature, indicating that the clast is a 'dropstone', and has fallen from an ice floe into mud. While it is agreed that some of the global Neoproterozoic Glaciation deposits are the result of the latter process, here it would appear that we are dealing with a deformational and not a sedimentary feature.

Because these Neoproterozoic glaciogenic sediments occur on most continents, it has been suggested that they represent the repeated spreading of ice sheets from pole to pole; this would lead to run-away cooling and create a totally ice-bound Earth – the "Snowball Earth Hypothesis". Unsurprisingly, many workers do not agree with these extreme views, finding it difficult to reconcile a totally frigid planet with the survival of any life forms. While they agree that the glaciations were widespread, a model of a "Slushball Earth" is preferred. In addition, it is difficult to obtain precise dates for rocks as old as these – the margins of error ***do*** allow for diachronistic glaciations. The "Snowball Earth Hypothesis" is generally considered to be too dramatic, sensationalistic, and lacking in solutions to some key issues.

We headed back to the coach and set off for home – heavy traffic on the A9 again! – but managed to get back to the Gregory Building for 6.10 pm……….amazing, considering all that we had accomplished today!!

References

Excursion Notes by Ben Browne and by Maggie Donnelly
Jack Treagus. 2009. The Dalradian of Scotland, Geologists' Association Guide No 67
Stephenson, D, and Gould, D. (1995). The Grampian Highlands, British Regional Geology, BGS