

Little Glen Shee Sat 29th July 2017

Leader: Dr Con Gillen

Reporter: Maggie Donnelly

We travelled by coach up the A9 and turned NE just north of Dunblane onto the A822 to Crieff where we stopped for a short break. Continuing east on the A85 we soon turned north again and then east onto the B8063, through Glen Almond. On the left, near Drumharrow Cottages [NO 0220 3080] and the signpost for Little Glen Shee, we followed a single track minor road for about 5 km, to the track up the glen [NN 9870 3410]. Here we parked in a space beside a sharp bend in the road and met our leader. We all then walked along a good track west past Little Glen Shee farm steading, until we came to a large boulder by the track painted (now faint) with "No dogs" [NN 9792 3447]. On the right hand side of the valley, the exposure [NN 9792 3453] was a 50 m-long, west-facing low cliff about 50 m up the bracken and heather-covered slope. Our group scrambled up for a closer look.

We were in the 'Birnam Grits', on the steep limb of the Highland Border Downbend and the inverted limb of the Tay Nappe, and folds of interbedded pale-greenish grey metasilstones and graded metasandstones could clearly be seen. There were sparsely preserved ripple cross-laminations; the folds had a spaced pressure-solution cleavage in the sandy layers which bent to a fan shape around the nose, and a slaty cleavage in the more-micaceous lithologies. These were high-level F_1 folds and they verged to the NW.

The grading was picked out by the refraction of cleavage towards the fold axial plane with decreasing grain size. Younging directions, determined from normal grading and possible cross-bedding, showed that the beds were inverted and that the folds were downward facing.

The pressure-solution cleavage fans were asymmetric about the fold axial planes, with the cleavage on the southern limbs of synforms generally closer to the fold axial plane than that on the northern limbs. On these southern limbs, original bedding laminations between the cleavage planes were commonly up to 80° oblique to the gross bedding and within some sandy beds the pressure-solution cleavage was folded. This was a truly amazing locality and having taken numerous photos we set off for the next one.

Close up of spaced cleavage curving and fanning round *Vicky Scott*



We drove to Bankfoot and followed the B867 (the old A9) north towards Dunkeld (having lunch *enroute*!!). 300 m before the junction with the new A9, we parked on the left-hand side of the road where a public footpath went under the railway [NO 0410 4045]. Following this path for about 50 m we took a footpath on the left signposted to Birnam Hill. Another 50 m [NO 0403 4049] further on, there was an overgrown track on the right leading to a small disused quarry in which there was an antiformal closure of 'Birnam Grits', again on the steep limb of the downbend and the inverted limb of the Tay Nappe. Here, it seems, large pyrite cubes can be found in the beds of greenish – and bluish – grey slaty metamudstones. However, our leader had decided against this locality as it had been very wet and muddy a few days earlier. Instead we continued a short distance north uphill and walked out into a huge quarry [NO 0378 4052], with a great black face of the 'Birnam Slates' staring back at us.....and it was dry underfoot!!!! A large antiform/syncline pair could be distinguished in the rock face, and again the folds in this locality are high-level F_1 folds. There was abundant loose material on the ground which we quickly fell to investigating,

finding tiny folds and minerals such as copper pyrites, galena and barites. The former was expected, but not the latter two – perhaps there had been a quartz vein now quarried out, or they may have been exotic, brought in rubble to floor the quarry. We then approached close to the wall and found slaty cleavage and evidence of bedding. Eventually we made our way back to the coach.

Driving north from Birnam Hill we joined the A9 and passed Little Dunkeld before turning to the left [NO 0138 4230], at the signpost for The Hermitage, and parked in one of the two large car parks. We set off along the path south-westwards by the river, and quickly met a stream of guests returning from a wedding in Ossian's Hall (National Trust) – at the hall we met the bride and bridegroom having photos taken!! We continued beyond the first right-angled bend upstream and gingerly made our way down onto the large and quite slippery(!) flat exposure in the Dunkeld Grit Formation [NO 0078 4178] on the north bank. These rocks were also within the steep limb of the Highland Border Downbend, and now only 800 m SE of its hinge. The metamorphic grade is higher than at Birnam Hill; the cleaved metasiltstones were phyllitic with a high percentage of muscovite and D₂ deformation was well developed locally with tight folding of the first pressure-solution cleavage (S₁). Thick composite sandy (psammitic) units were interbedded with mixed sandy and muddy (pelitic) units but convincing graded bedding has not been found, so that the structural facing cannot be demonstrated. Crossing the flat surface, we could see the relationship between F₁ and F₂, but it was difficult to identify the bedding in places. At the NE end of the rock pavement, below a low vertical face, S₁, a 0.5 to 1.0 cm spaced striping (tiny cleavage) in the metasandstone changes its orientation relative to bedding across the exposure. This indicated the presence of a fold – an F₁ synform. All the F₂ folds of S₁ verged towards the NW and had steep axial planes generally orientated close to bedding. Bedding here is also difficult to see, but can be detected by the absence of S₁ striping in more-pelitic beds. These beds carry a crenulation cleavage that dips at around 45° to the NW and is probably related to the downbend.

We returned to the car park and thanked our leader, Dr Con Gillen, for providing such an excellent day and an adventure in which we were shown aspects of geology seldom seen and which are truly fascinating.

Reference

Excursion Handout.

GEOLOGY OF THE STIRLING AREA. An Excursion Guide. Browne, M.A.E., & Gillen, C., (eds)
Edinburgh Geological Society 2015