

EXCURSION

Birchover sandstones

Leader: Ian Chisholm (BGS)

Sunday 14th May 2000

The excursion involved a short walk to six sites around Birchover, on the eastern fringe of the Derbyshire Peak District. All sites were in the Namurian Ashover Grit, but any thoughts that this was just millstone grit were quickly dispelled by Ian's story of the unravelling of the mysteries of some of the hillside structures.

Ian described how the Ashover Grit was indistinguishable from the other gritstones in the area, except that cross-bedding indicated that its formative river had flowed from the southeast, contrary to flows elsewhere that had been from the north. It seems that the distributary river had originated from the north, before being deflected by high ground, perhaps around Charnwood.

Ian's main challenge as a BGS surveyor was to explain a discordant ridge of sandstone that is cross-bedded at the base but massive at the top. One theory was that the contrasts were caused by faults, but others interpreted the ridge as a channel structure. Funding was found for two boreholes, one on the top of the ridge and one at the base, and these proved that the ridge was underlain by a rotational fault. The structures remained a mystery until Ian chanced on a paper with air photographs of similar structures in cliffs on Svalbard (Edwards, 1976). He then interpreted the Birchover structure as a large syndepositional slump scar that was filled with river sediment as it formed by collapse of the delta front. The local evidence and the unravelling of other fault slump structures nearby were described as the walk progressed.

1. Stanton Moor, 244628. The Stanton Syncline was viewed as a shallow fold on the eastern side of the Derbyshire Dome. Limestone underlies the

syncline, and rises to outcrop to the north, west and south. The fold core contains about 250 m of Namurian sediments with dark mudstones below and sandstones above. Typical, cross-bedded Ashover Grit from near the top of the exposed sequence is seen in a quarry near the road.

2. Harthill Moor, 227623. Natural crags expose a thick massive lithology, in contrast to the cross-bedded sandstone seen on Stanton Moor. The conspicuous ridge at Birchover, extending down from the skyline, is clearly discordant to the simple structure of the syncline, and is formed by the slump structures that Ian had recognised.

3. Rock House, 233619. Exposures on the Birchover ridge are of the massive lithology. The view east overlooks dip-slope topography formed by undisturbed beds on the fault's upthrow side.

4. Birchover ridge, 238622. At the toe of the ridge, massive sandstone has a steep eroded contact above cross-bedded sandstone. Higher up, thick massive sandstone is well exposed in Druid's Rocks with a vague dip to the south.

5. Birchover quarry, 242624. The quarry faces may be seen from the road. Massive lithology dominates again, but bedding planes and dips are more obvious. From the quarry car park the borehole sites may be related to the cross sections through the ridge. It is clear that the massive facies that yields 'dimension stone' is thick only on the downthrow side of the slump fault, so there is a limited supply for quarrying.

6. Top of Stanton Moor, 247627. Normal cross-bedded sandstone in small quarries (and at site #1) must overlie the massive sandstone of the ridge.

Literature

Chisholm, J.I. 1977. Growth faulting and sandstone deposition in the Namurian of the Stanton Syncline, Derbyshire. *Proceedings of the Yorkshire Geological Society* 41, 305-323.

Edwards, M.B. 1976. Growth faults in Upper Triassic deltaic sediments, Svalbard. *American Association of Petroleum Geologists Bulletin*, 60, 341-355.

Alan Filmer (from notes by the leader)

