EXCURSION REPORT

THE GLACIAL GEOLOGY OF THE CHESHIRE-SHROPSHIRE PLAIN

Leader Peter Worsley — Sunday September 1st 1985

A party of 24 members distributed between a Land Rover and a minibus departed from Nottingham and headed north-west via Leek to the first stop on a minor road (SJ 901639) some 4 km east of Congleton just below the summit of The Cloud. Here the leader outlined the rationale of the days campaign, namely an examination of evidence relating to the Devensian cold stage in the Cheshire-Shropshire lowlands. This would consist of glacial and periglacial sediments and landforms. He remarked that from the vicinity of Leek until shortly after the last locality to be visited the journey would be entirely over ground covered by the Late Devensian ice sheet only 20,000 or so years ago. The glacial limit was not readily observable in the field.

From the vantage point below The Cloud the sharp topographic contrast between the western Pennine front (corresponding roughly to the Red Rock Fault) and the Triassic floored Cheshire Plain was clearly seen. Unfortunately, the overall visibility was poor in marked contrast to that 13 weeks previously on Dr Lloyd Boardman's excursion to the North Staffordshire coalfield when at Mow Cop, 6 km to the south-west, the Welsh Borderlands were clearly visible 60 km to the west. However, 12 km to the north-west the unmistakable dish profile of the University of Manchester's radio telescope at Jodrell Bank was evident and this served as a very useful locational marker, for the next locality to be visited—Chelford, was close by. From The Cloud the party proceeded via Congleton to Lapwing Lane a minor road east of Withington Hall on which the entrance to the current sand quarry was located.

Chelford-Oakwood Quarry (East) SJ 825718 is one of the more important Quaternary localities in Britain. In the Chelford area the land surface forms a rather featureless plain developed on the products of the Late Devensian glaciation, now known as the Dimlington Stadial. These products consist of a glacigenic complex—tills, sand and gravels, lacustrine silts, etc., which are grouped into the Stockport Formation. At the time of the visit this formation, as exposed uniformly around the quarry margins, was only 2 m thick. Beneath lay the Chelford Sands Formation, a suite of alluvial sands of exceptional purity and high degree of sorting with a dominant near-horizontal stratification.

The precise location of sand workings at Chelford has inevitably changed over the years. The present quarry at Oakwood had only been under development for two years or so and consequently it was not, as yet, very extensive. However, a view was taken of the now abandoned Oakwood (West) Quarry on the opposite side of the access road enabling some appreciation of the sand-body geometry to be made. The sands infill and bury a palaeovalley which falls to the north-west—the original workings at Farm Wood lying in its 'downstream' extension. This valley is cut into the Mercia Mudstone, but in places a thin glacigenic sequence overlying biogenic rich sills and gravels occurs between the basal sands and the bedrock. Unfortunately, exposures of these older sediments were no longer available due to flooding.

In the new quarry it was remarked that the ground water abstraction pump was situated close to the palaeovalley axis. Approximately in the middle of the Chelford Sands a thin succession consisting of peat, organic muds and macro plant material was exposed. This was the lateral equivalent of the bed originally exposed in the Farm Wood Quarry (1.5 km to the north-west) during the 1950–60's and hence a representative of the Chelford Interstadial type succession. Analysis of the plant macro and micro fossils along with the Coleoptera suggest the former presence of a boreal forest with birch, pine and spruce. Exposures in the Oakwood Quarry (West) showed convincingly that the biogenic material occurred within a palaeochannel cut within the main sand body. It was possible for the party to see that the organics at Oakwood (East) were restricted in distribution and that the outcrop limit on the east face was consistent with a drape on the bank of an incised channel. Dumped masses of the peat enabled members to closely examine the organic material and collect examples of pine and spruce cones. Most of the smaller-diameter woody fragments (especially birch branches) showed major compression when viewed in cross section. Conventional wisdom assigns the Chelford Interstadial to the Brörup Interstadial of Denmark which is of early Weichselian (Devensian) age. However, at Chelford itself we have no firm stratigraphic control on its age other than it ante-dates the Late Devensian glacial advance and post-dates an earlier glaciation.

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pp. 225–228, 1 fig.

After leaving Chelford the route was via Middlewich and Nantwich to Whitchurch where lunch-break was made. Then the road leading to Oswestry was taken and as Ellesmere was approached the terrain character changed dramatically from an essentially featureless landscape to one of pronounced hills and depressions. The Ellesmere district has long attracted the attention of glacial geologists and the American H. Carville Lewis in the last century commented on the 'fine hummocks and large billowy hills' and stated 'this is a magnificent moraine'.

Sand and gravel extraction at the Wood Lane Quarry (SJ 422325) has been operative for several decades. Unfortunately its relative remoteness from higher education centres has discouraged long-term systematic logging of the faces and, as a result, there is currently no consensus as to its precise significance.

Members were able to examine three main lithofacies, tills, sands and sandy gravels, in exposures at the south end of the quarry, away from a pronounced ridge feature along the northern boundary. Former sections on the north side revealed major tectonic elements. Opinions on the mechanism of deformation differ, one school of thought favours subsidence deformation in association with buried ice wastage whereas the other prefers glacial thrusting.

The current workings were cut into hummocky terrain which has no obvious morphological trend. The exposed succession consisted of:-

6 m	Gravels—horizontally stratified
3 m	Pebbly sand with two tills of varying thickness and extent
4 m	Sands—base not seen

The leader explained that this basic tripartite succession had persisted throughout much of the quarry area south of the ridge. The most impressive unit was the middle one for this contained till bodies of very variable geometry. These were interpreted as the products of sediment flows [flow tills] which were emplaced subaerially upon an aggrading proglacial fluvial surface. Subsequent fluvial activity had partially eroded the tops of some flow units and, in addition, limited deformation had occurred through load displacements. Sometimes flat-lying recumbent folds were evident immediately below the base of the flow units.

It was suggested that the landforms and sediments should be assigned to a superficial depositional environment which may originally have had a low relief. Subsequent melt of buried ice had extensively deformed the initial depositional surface. Interestingly Richard Sanderson (aged 12) was asked to comment on his impressions on the relationship between the sediments and landform as the active quarry was approached and, without prompting, he remarked on the low amplitude flexuring of the extensive planar stratification structures and their concordance with the land surface.

Upon leaving Ellesmere the party was behind schedule, due in part to a group of visitors (prearranged) having found their car locked in the quarry, the main party fortuitously having avoided this hazard by walking in and out. It had been intended to pay a quick visit to the Mousecroft Lane Quarry at Shrewsbury where the Irish Sea glacigenic sediments could be seen overlain by similar materials of Welsh provenance. Unfortunately during the previous weeks the main exposures had been landscaped after many decades of availability so, in order to gain some time, Shrewsbury was avoided and, shortly after the A5 was attained at Atcham, the B4380 was followed passing the excavations at the former Roman town of Uriconium (Wroxeter) to the next stop at Leighton.

The River Severn, the longest river in Britain, has a very curious course since, after crossing the southern margins of the Cheshire-Shropshire Plain, it cuts through an upland area which originally formed part of the main English watershed. In doing so the Severn forsakes the 'easy' route northwards across the plain to the Irish Sea. There is almost universal agreement that this anomaly is the product of a glacially influenced diversion of drainage. The paradox is that the current understanding of the stratigraphy suggests that the diversion is as recent as Late Devensian in age and earlier glaciations do not appear to have achieved such an effect on the drainage. It was suggested that this may be due to Welsh ice having been more forceful in previous glaciations.

The main diversionary course extends in an arc for some 11 km from Coalbrookdale, immediately west of Iron Bridge, to some 3 km north of Bridgnorth. Within this section of the river an incised gorge some 100 m deep is largely the result of the drainage diversion rather than the adaptation of a pre-existing valley.

A detailed history of the gorge formation has yet to be convincingly demonstrated. The instability of the valley sides has erased any fluvial depositional terrace features which may have existed. A totally buried feature of comparable dimensions to the modern gorge exists beneath the plateau surface lying to the east and, immediately west of the modern gorge intake, a major buried channel occurs below the modern floodplain. At least an element of subglacial meltwater erosion appears to have been involved in its cutting although the classic interpretation involves simple ice-impounded lake overflow across the pre-existing watershed. Within the river

valley downstream of the gorge proper, close to Bridgnorth, glacigenic materials are associated with a major terrace feature and their altitude suggests that at least a significant element of the erosion had been achieved prior to the final phase of ice marginal withdrawal.

From a view point by the B4380 west of the gorge (SJ 618048) members were able to enjoy a fine view. To the east of the diversionary valley was seen to be clearly discordant in form to the general upland plateau. Below, to the south, the modern River Severn had developed a set of classical meander loops and the various elements of the meandering river depositional environment were evident, except an example of an ox-bow lake cut-off.

A short drive led to Iron Bridge itself and a brief stop was made in order to marvel at the oldest iron bridge in the world. Then the route lay east closely following the north bank of the Severn to a point just before Coalport. In this sector of the valley abundant evidence of valley side instability was seen, a testimony to the relatively recent cutting of the valley. From Coalport the road climbing steeply past the major industrial archaeological site at Blists Hill was taken and soon the plateau surface was attained. After negotiating the complex Telford new town road network, the simpler Roman routeway was soon joined north of Shifnal and a drive east along Watling Street soon brought the party to Gailey Corner where the A449 was taken southwards for the short distance to Four Ashes.

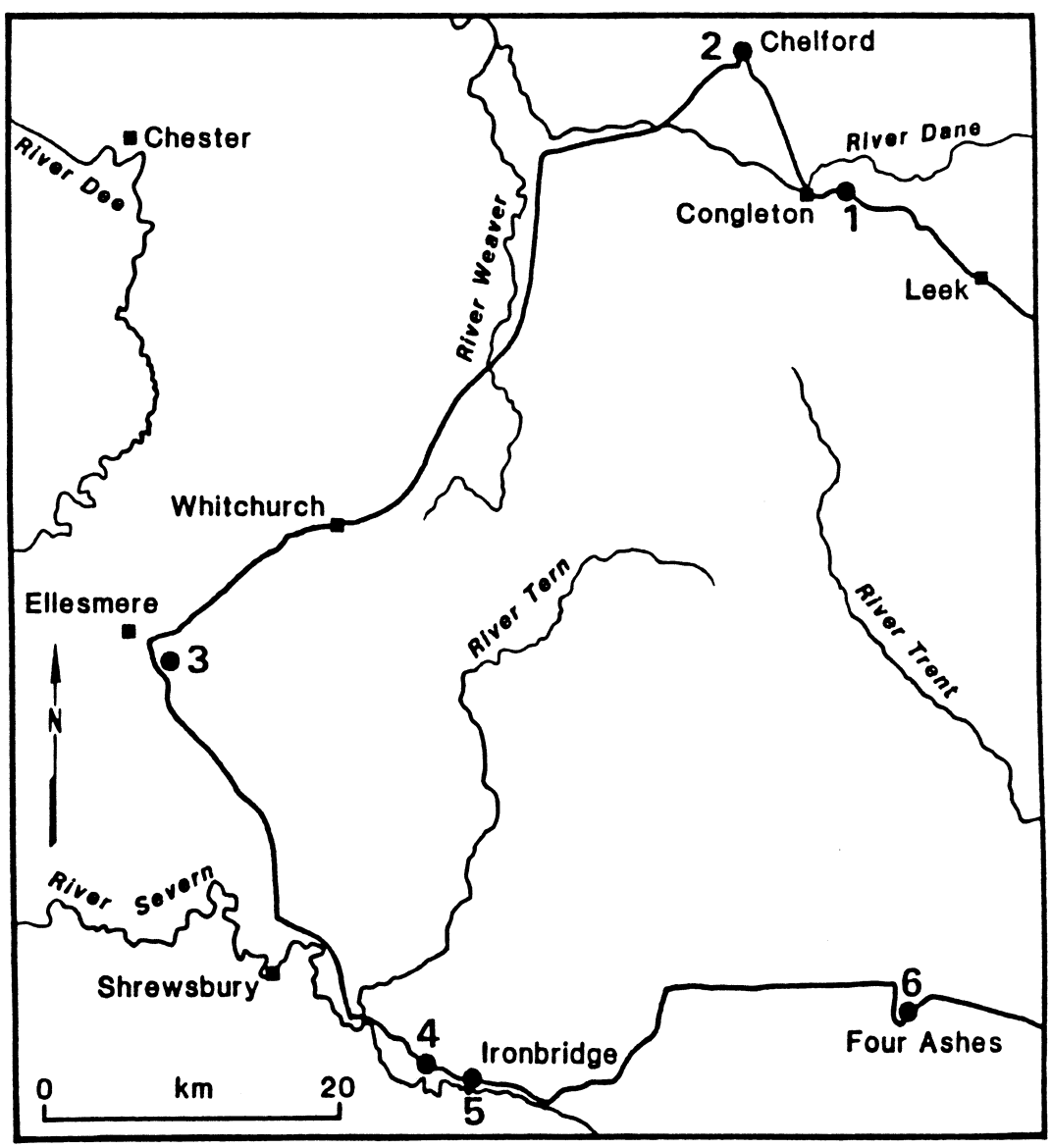

Fig. 1. Locality map.

Although the leader did not recommend a stop at Four Ashes (SJ 913084) the consensus view was in favour, despite the late hour and lack of any significant exposure. Having parked behind the Four Ashes public house it was suggested that the pub sign, a landscape of rural midland England, was as informative as the site itself! However, the party did penetrate the undergrowth and woodland to view the restored field which now occupies the site of the former quarry which in the 1960's yielded an astonishing abundance of organic rich lenses in a thin gravel succession overlain by Late Devensian till. An almost totally grassed bank did reveal some pebbly gravels and, towards the top, a silty clay material which with 'the eye of faith', could be taken to be the till. This bank is the sole remaining field representative of the type succession of the last British cold stage—the Devensian—and this historic fact appeared to justify the pilgrimage in the opinion of members, even though the main evidence has long since been quarried away. It can now be reported that in the near future the Nature conservancy will be excavating a clean section at the site down to the Triassic surface. Thereafter a direct return to Nottingham was made with a one-and-a-half hour late arrival for which the leader apologised.

Acknowledgements

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