EXCURSION TO DERBYSHIRE.

MONDAY, JULY 22ND, 1877, AND FIVE FOLLOWING DAYS.

Directors—REV. J. MAGENS MELLO, M.A., F.G.S., and ROOKB PENNINGTON, Esq., LL.B., F.G.S.

(*Report by the REV. J. MAGENS MELLO.*)

A large party of the Members of the Association and a few friends arrived by the mid-day train at Clay Cross, where they were received by J. P. Jackson and C. Binns, Esqrs., and by the Rev. J. M. Mello, M.A., F.G.S. On arriving at the collieries of the Clay Cross Company, they were entertained at luncheon by the owners, after which they proceeded to inspect some of the coal-pits, in which the numerous and beautifully preserved fossil plants, ferns, lepidodendra, etc., and the mode of occurrence of the coal, and the manner in which it was worked, created much interest. Attention was also called to the presence of an enormous sub-angular mass of Ganister rock in the clay, exposed close by in the receptacle that was being made for a new gasometer. At the offices of the Company a large series of beautiful fossils from the coal-shales were most kindly placed at the disposal of the visitors. Subsequently the party drove to Chesterfield, *viâ* Milltown and Ashover, examining on the way the extensive lead mines at the former place, and also during the journey the various members of the Carboniferous or Mountain Limestone, as it is usually called in Derbyshire, the Yoredale Series and the Millstone Grit, as they successively cropped out. The fine quarries in the "Rough Rock" or "First Grit," at Stannedge, attracted considerable attention, the rock here being very massive, and magnificently jointed.

On TUESDAY morning the Association left Chesterfield in carriages, and drove to Creswell, where the important bone caves lately explored and described by the Rev. J. M. Mello and Profs. G. Busk and W. Boyd Dawkins, at the Geological Society of London, were visited. The Rev. J. M. Mello explained the manner in which the various remains had occurred in the caves, and called attention to the great geological importance of the discoveries made there, which in some respects are unique; a distinct succession of beds containing evidences of the progress in civilization of Palæolithic man having been observed in these caves, a succession represented with such distinctness in no other single cavern. An en-

graved bone was also found here, the first discovery of the sort in Great Britain, and which correlates the old Derbyshire caves with those of France and Switzerland; another important discovery which had been made at Creswell was a canine tooth of the strange sabretoothed *Machairodus*. Several teeth of various animals and a few flint implements were found by members of the party among the *débris*. In the afternoon, after returning to Chesterfield, the geologists drove to Bakewell through Chatsworth Park.

On WEDNESDAY the party left Bakewell to visit Miller's Dale and Buxton. At Miller's Dale the Toadstone and lead mining operations were examined, and specimens of minerals obtained, galena, calamine, and calcite being the principal ones. In Tideswell Dale a curious bed of columnar clay was an object of interest; this, which was described in the "Quarterly Journal of the Geological Society," for February, 1871, and figured there, appears to be a volcanic mud, baked into its present prismatic form by the heat of the overlying igneous rock, which here was seen to consist of an almost basaltic rock, a very dense and fine-grained dolerite, containing numerous concretionary balls, like volcanic bombs in shape. Dr. Maybury advocated the opinion that the prismatic clay was really the result of the decomposition of the Toadstone, and not the result of mud subjected to its heat and pressure only. The Rev. J. M. Mello considered that analogy rather favoured the latter view, inasmuch as such red clays are frequently found interbedded with dolerites, and have been altered by their heat in some cases; also that the surface of the toadstone resting on the red clay is sharply defined from it, and is vesicular in character, it would also be difficult to account for the presence of the alumina in such abundance, it not being the prevailing mineral in the dolerite; and lastly it was often found that the clay in brickyards presented a precisely similar appearance to that in question.

From Miller's Dale, Chee Tor, a fine cliff of Carboniferous Limestone, was visited, and the gorge-like character of this part of the dale well seen. Some of the party walked from here to Buxton, where they were joined by the remainder, who preferred going by train, after previously disposing of some sandwiches and tea, which had been provided by Dr. Foulerton in a most cunningly contrived apparatus. Poole's Hole, and the extensive Limestone quarries were the objects of interest at Buxton. The cavern called Poole's Hole is too well known to need description; the museum attached

to it contains a most nondescript assortment of curiosities, together with a few Romano-British antiquities, and bones derived from the cavern itself, and it was felt to be a great pity that this cavern had not been systematically explored before its floor had been so much disturbed. On the way to the quarries the remarkable calcination of an extensive portion of the hillside above Poole's Hole was noticed, and as no traces of lime-kilns of modern construction were anywhere visible, and the huge calcined mounds were in many places overgrown with trees and shrubs, it was suggested, in the absence of any other information, that the Romans may have burnt lime there. The quarries were much admired, and the interesting effects of atmospheric denudation were well seen on the exposed upper surface of some of the beds.

On THURSDAY morning the party left Bakewell by train for Chapel-en-le-Frith, where R. Pennington, Esq., F.G.S., joined the party, and all set off in carriages to Castleton, examining *en route* the outcrop of the Yoredale Grits, and the Swallow Holes along the line of junction between the Yoredale Shales and the Carboniferous Limestone. At Eldon Hill a pause was made, and the barrow on the summit was looked at. It had been opened some time previously by Mr. Pennington and Mr. John Tym, the well-known mineralogist at Castleton, and some remains of interest obtained, which were described by Mr. Pennington. At Eldon Hole, which was close at hand, he also gave an account of his somewhat adventurous descent into it in company with Mr. Tym, and he described it as an almost vertical fissure, expanding at the bottom into a fine cavern. Some amusement was afforded on the ascent of Eldon Hill, by the illustration afforded by some of our friends of the doctrine of the "survival of the fittest;" the effort was almost too great for one or two, who made their appearance on the top as the rest began the descent. On the way to Castleton another pause was made at the Windy Knoll quarry, when Mr. Pennington gave a short sketch of his exploration of a fissure in Swallow Hole, in which a large assemblage of Bison, Reindeer, Bear and Wolf bones were found. It had apparently been a drinking place, where these animals, in the course of their annual migrations across the country had got engulfed. At this quarry some of the party entered a small "swallow-hole" or cave, which pierces the hill close by; and others secured specimens of *Elaterite* or elastic bitumen, a rare mineral, which occurs here in some abun-

dance, and also of "Blue John," and picked up many small fragments of the bones of some of the animals previously mentioned.

Leaving Windy Knoll, the well-known Blue John Mine was entered, and on the slopes of Trecliff some of the party, who had to walk in consequence of an accident to a wheel, were able to glance at the Odin mine, and to obtain some good Carboniferous Limestone fossils. At Castleton a capital luncheon, given to the Members of the Association and their friends by Mr Pennington, was done justice to, after which the admirably-arranged Castleton Museum was visited, Mr. Pennington explaining its contents. The geological collection here was found to be most instructive, containing typical fossils from all the formations, and including a remarkably fine series of bones and implements, illustrative of the lately finished explorations of Creswell Caves and Windy Knoll, as well as specimens from other localities. This little Museum quite puts to shame many a far more pretentious collection. On leaving the Museum, the entrance to the great Peak Cavern was visited, and then the party went to the Speedwell mine, which was beautifully illuminated by Mr. Tym, who was indefatigable in his efforts on behalf of his visitors.

On FRIDAY some of the hardest work during the excursion was done. The majority of those present walked by Back Tor, Edale and Grindsbrook Clough, over Kinderscout to the Snake Inn. The weather, which at first looked threatening, proved delightful, and the magnificent scenery, and instructive geological phenomena, rendered the walk over this wildest part of Derbyshire most enjoyable. The track followed led from the Carboniferous Limestone border at Castleton, over the Yoredale Shales of the valley, these, as the ascent was made up the slopes of Back Tor, were seen to be overlaid by the Yordale Sandstones and Grits, which often form fine escarpments, owing to the slips which take place through the denudation of the Shales; such slips were well seen on the flanks of Mam Tor, the whole hillside having fallen away, and carried with it part of a British Camp, traces of which were seen on the summit. The Yoredale Shales were again crossed in Edale, where they are covered by a very considerable thickness of coarse river drift. Passing up Grindsbrook, and ascending Kinderscout, the Yoredale Grits were seen to be capped by the lowest member of the Millstone Grit series, the Kinderscout Grit, here a conglomerate containing numerous rounded pebbles of white quartz. The

summit of Kinderscout presented some fine outcrops of weathered rock, and it was interesting to observe the contrast between the mode of weathering shown by the Kinderscout Grit and the more even nature of the escarpments formed by the other members of the Grit series, especially the "Third Grit." At the Snake Inn a halt was made for lunch, after which the great landslips in the valley of the Allport were visited. One lady of the party, undaunted by the hard march of the morning, outdid most of the gentlemen by an ascent to the top of the Allport "Castle," a piece of exertion which few seemed disposed to undertake, although it well repaid the extra labour, the view obtained being very fine, and the full extent of the huge landslip which has separated the masses of Yoredale rocks, called the Tower and Castle, from the main body of the moorland, being well seen. From the Allport a return was made in carriages by the lovely valley of the Derwent, through Hathersage and Calver to Bakewell.

On SATURDAY the concluding work of the week was done. The Rowtor and Cratcliff rocks and outlines of Kinderscout Grit were examined on the way to Matlock. At the Cratcliff rocks there is a curious little chapel, with a crucifix sculptured out of the solid rock, which may be of Saxon age. Matlock was only reached in time for a hasty visit to the Tufa quarry, and the great fissure in the High Tor. The tufa or calc-tuff, was seen to be deposited in great thickness, the accumulation still continuing, the constant evaporation of the lime-charged water adding day by day to the rock mass; recent snail shells, sticks, mosses, grass and other objects, were found buried in and encrusted by the lime. The fissure in the High Tor was entered, and found to be very deep and narrow, and should a stream of water ever again get access to it, it would probably lead to the severance of the present face of the Tor, and an enlargement of the ravine through which the river now flows, and which was formed, in all probability, in past ages along a similar fissure.

Thus the Excursion was completed, having been pronounced one of the pleasantest and most successful undertaken by the Association.