

Thence the party adjourned to the pit in the same rocks at Watford Heath, where they inspected the fossils collected there by the late proprietor, Mr. Stone, then a member of the Association, and kindly exhibited by his son. Here also the pebbly Basement Bed of the London Clay was seen, and it was understood that from it the shark's teeth and oysters exhibited had been obtained, the members themselves verifying the fossiliferous character of the bed. Here the underlying sands were much better developed, and they are very pure and white. They go down far beneath the level of the quarry, some 14 ft. it was said, and it was rendered probable that they do so by the fact that though chalk is required at the kiln it is found more advantageous to cart it from Bushey than to seek for it on the ground itself.

After inspecting the quarry the members rode south over the London Clay by Greame's Dyke to "the City," where they had tea and then dispersed.

EXCURSION TO RICKMANSWORTH AND HAREFIELD.

SATURDAY, JUNE 10TH, 1899.

Directors: W. WHITAKER, B.A., F.R.S., Pres.G.S., AND
JOHN HOPKINSON, F.G.S., Assoc.Inst.C.E.

Excursion Secretary: A. C. YOUNG, F.C.S.

(*Report by J. HOPKINSON.*)

SOME of the finest and most instructive sections of the Upper Chalk in the neighbourhood of London are to be seen at Harefield, where, facing the Grand Junction Canal in the valley of the Colne, there are three large chalk-pits within a distance of a mile and a half, permission to visit which had been obtained.

Ascending a hill half a mile south of Rickmansworth, a very fine view of the valleys of the Colne, Chess, and Gade was obtained. The hill is capped by a thick bed of gravel, one advantage of which, Mr. Whitaker remarked, is that we may call it what we like and no one can contradict us, for it may be almost anything. He could only say that it was a pebbly gravel, as coloured on the Geological Survey Map. He believed that it was not Post-Glacial, and that it had nothing to do with the existing river in the valley below. In this valley water-cress beds might be seen, fed by springs from the Chalk, and sometimes by borings being made to obtain an increased supply of water.

Less than another half mile to the south is Woodcock Hill Kiln, and here the mottled plastic clays of the Reading Beds were seen surmounted by the Basement Bed of the London Clay,

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consisting of sandy clay and loam with a layer of flint-pebbles in the middle. Below the mottled clay are fairly-white and brownish sands, and resting in hollows in the London Clay is a clayey gravel. The mottled clays were seen to hold up water which percolates through the sandy bed above it.

A pleasant walk of two miles across the fields brought the party to Harefield, where tea was partaken of at the "King's Arms." The Harefield Brick and Cement Works, just beyond the southern end of the village, were then visited. There is here a very fine section of the Chalk, Reading Beds, and London Clay with its Basement Bed, which has been described by Mr. Whitaker in the *Geology of London*, vol. i, p. 196.

The section is now rather clearer than it was when this description was drawn up. The mottled clays of the Reading Series are fully exposed, and the grey sand and clay appear to have a considerable extent. The only foreign rock seen in the bed of flint-pebbles (at the bottom) was an iron-sandstone, rather friable. Mr. Whitaker remarked that this bed was much like the Hertfordshire pudding-stone, except that it was not in Hertfordshire and was not a pudding-stone. It was in Middlesex, but close to the Herts. border, and although the pebbles were not consolidated with silica, there was silica present in the form of sand.

Several fossils were obtained in the Basement Bed of the London Clay. Shells chiefly occur in masses, but not in a good state of preservation.

Passing the Asbestos Mills, formerly, as marked on the Ordnance Map, the "Copper Mills," the Harefield Lime Works were visited.* Here there is a section of the Upper Chalk nearly 100 ft. in height giving a better illustration of the phenomenon of "pipes" than is to be seen elsewhere within many miles of London. It was quite clear, Mr. Whitaker said, that the irregular masses of loose sand and gravel which extend downwards from the top of the pit had really been let down from above. No surface-action could have formed them; the chalk had evidently been dissolved away by water percolating through fissures, and the sand and gravel had gradually taken its place. The chalk was seen to be quite evenly bedded.

Crossing the fields to the Springwell Chalk Pit, it was noticed that the chalk was very little fissured by pipes, this being due to a bed of comparatively impervious clay on the top.† Although this pit has been worked for at least thirty years it is not marked on the 6 in. Ordnance Map.

After a hearty vote of thanks to the Directors, a short walk along the towing-path of the canal brought the party to Rickmansworth Station, those who returned to London leaving by the 8.10 train.

* See Plate VI, vol. vii, *Trans. Herts. Nat. Hist. Soc.*

† See Plate VI, vol. vii, *Trans. Herts. Nat. Hist. Soc.*

REFERENCES.

Geological Survey Map, Sheet 7.

Ordnance Survey Map, New Series, Sheet 255.

1882. WHITAKER, W., and HOPKINSON, J.—"Excursion to Rickmansworth." *Record of Excursions*, pp. 149-152. (See also other references there.)
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1894. HOLMES, T. V.—"Excursion to Harefield." *Proc. Geol. Assoc.*, vol. xiii, pp. 281-283.
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EXCURSION TO LICHFIELD AND CANNOCK.

SATURDAY, JUNE 17TH, 1899.

Directors: PROF. C. LAPWORTH, LL.D., F.R.S., AND PROF.
W. W. WATTS, M.A., F.G.S.

Excursion Secretary: A. C. YOUNG, F.C.S.

(*Report by THE DIRECTORS.*)

THE members reached Lichfield at about twelve, and a few minutes were spent in the Cathedral, the salient points in the architecture of which were explained by Mr. Frank Raw. After driving out from Lichfield the first halt was made below Lysways Hall, where a dam has been constructed by the South Staffordshire Waterworks Company, impounding the water of the Billston Brook and its tributary, the Ben Brook. The features of the drainage basin were pointed out by Mr. Hill, who accompanied the party. Re-entering the carriages the party were next driven across the New Red Marl and Waterstones to the entrance to Beaudesert Park, near to which occurs the more easterly branch of the eastern boundary fault of the South Staffordshire Coalfield, which brings up the Bunter Pebble Beds on the west to the horizon of the Waterstones on the east (see section). The members, by kind permission of Mr. Sugden, walked through the lovely scenery of the Park, founded on Pebble Beds, to the camp, which gives an extensive prospect over the northern portion of the South Staffordshire Coalfield. A second branch of the eastern boundary fault of the coalfield skirts the eastern side of the camp, bringing up the Coal Measures on the west into contact with the Pebble Beds of the east (see section). Looking out over Beaudesert Old Park, now converted into a flourishing coalfield, Profs. Lapworth and Watts pointed out the general structure of this part of the coalfield, drawing especial attention to the work of Jukes in establishing the fact that the Thick Coal of the southern part of the coalfield is split up into several seams, separated by hundreds of feet of measures in the northern part. Many of these seams are being worked in the collieries about Beaudesert, Rawnsley, Hednesford, and Cannock.

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