

EXCURSION TO WATFORD AND CROXLEY, LONDON
AND NORTH WESTERN RAILWAY EXTENSION.

SATURDAY, JULY 23RD, 1910.

Directors : H. KIDNER, F.G.S., AND J. H. WOODHEAD, F.G.S.

Excursion Secretary : G. J. ROBERTS.

(*Report by MR. KIDNER.*)

ABOUT twenty members met at Euston and travelled by the 2.20 train to Bushey, where they were joined by members of the Hertfordshire Natural History Society and a few others, making a total of over thirty. The party first visited the Watford Gas Works, where some alluvial deposits resting on gravel were opened up between a new retort-house and the river Colne. From the alluvial beds a number of mammalian bones had been obtained and these were shown in the Board Room. Mr. E. T. Newton had examined the collection, and his report was read, stating that : " These bones are referable to the following forms : part of a human skull and thigh-bone, Ox (*Bos taurus*), Horse (*Equus caballus*), Red Deer (*Cervus elaphus*), Roebuck (*Capreolus caprea*), Sheep (*Ovis aries*), Dog (*Canis familiaris*). " Also some land and freshwater shells were shown by Mr. Charles Oldham, obtained from the Alluvium. A list of these furnished by Mr. Oldham gives the following species of freshwater mollusca : *Limnæa pereger* (Müll.), *L. palustris* (Müll.), *L. truncatula* (Müll.), *L. stagnalis* (Linn.), *Planorbis umbilicatus* Müll., *P. spirorbis* (Linn.), *Bithynia tentaculata* (Linn.), *Valvata piscinalis* (Müll.), *V. cristata* Müll., *Pisidium casertanum* (Poli.), *P. gassiesianum* Dupuy. The beds from which the bones and shells were obtained were next examined, showing in section $3\frac{1}{2}$ ft. of Alluvium resting on gravel, seen to 8 ft., the top of the beds being about 176 ft. above O.D., and 3 or 4 ft. above the level of the Colne, which flows near. The Alluvium in descending order consisted of brown clay, full of shells, 1 ft. ; peaty clay, dark above and black below, 1 ft. 2 in. ; grey marl containing shells, 1 ft. 4 in. Mr. Oldham's shells were all from the upper part.

Concerning the age of the Alluvium, Mr. E. T. Newton says in his report : " None of these remains indicate any great antiquity for the deposit in which they were found. The human bones present no special peculiarity ; and the bovine remains are those of an ordinary ox, and most of them are too large for the
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Neolithic long-faced ox (*Bos longifrons*). Although the deposit may be several hundred years old, it cannot be regarded as Neolithic, and probably does not date so far back as the Roman period." The writer pointed out that the gravel must have been deposited when the land was higher, and the Colne had greater volume than now, its present position being the result of subsidence during Holocene time. The gravel was of late Pleistocene age, the division between it and the Alluvium representing a considerable time-interval. Mr. Whitaker spoke in general agreement, and expressed thanks to Mr. Daniel Hill, who was present, and to the other directors for permission to examine the section. He remarked that sections in Alluvium are not common.

Leaving the Gas Works, the party walked northwards across two fields, and under the railway arch, to Bushey Hall Road. On the left of this road, a little above Bushey Grove Road, the site of a gravel-pit, now obscured, was pointed out, which undoubtedly showed Colne River gravel, about 206 ft. above O.D. Dr. A. E. Salter and the late Mr. Emary visited this pit some years ago with the writer, and they were clearly of the same opinion. The attention of the party was directed to higher gravel (212 to 215 ft. above O.D.), shown where the ground had been cut away for building purposes, between the laundry and Messrs. André and Sleight's printing works, but there was not time for this to be examined. To the west of Bushey Hall is a small wood, and by permission this was entered by a gate at its western end. Towards the right on entering, a pit was seen, showing about 10 ft. of stratified gravel, with piping, which had caused interesting zigzag faulting of the beds of gravel on the right hand. To the left of the path, gravel much disturbed, probably by dissolution of the Chalk, was seen. Near the Ice House, a large pit was visited, showing about 18 ft. of well-stratified gravel, about 220 ft. above O.D. The writer remarked that in a recent map* of the Geological Survey, the gravel seen in the pit where they were standing, and indeed all gravels in the vicinity of Watford, were mapped as Plateau Gravel, their age and mode of origin being left an open question; while the memoir accompanying the map admits that "At this lower level, probably, much of the gravel should be grouped with the later Valley deposits."† Apparently the memoir refers to a pit west of Aldenham and due north of Bushey Hall, near Berrygrove Wood, where the gravel is over 200 ft. above O.D. The writer stated his reasons for regarding the gravel under examination as old Colne River gravel. The gravel is well-stratified, is on one side of the Colne valley, and is closely connected with, and inseparable from, other gravel, at lower levels, sloping continuously down to the

* *Geological Survey*. London District (Drift map), Sheet 1.

† Woodward, H. B., "Geology of the London District," *Mem. Geol. Sur.*, p. 69.

Colne. These lower gravels are undoubtedly Colne River deposits. Reference was made to a paper by Mr. A. Sutton,* in which he suggested that the river Gade may once have flowed through the Oxney Gap, where the North Western Railway now runs; and it was pointed out that if this be admitted, the gap is at too high a level to allow of the gravel in the Bushey Hall grounds having been deposited by the Gade, or by any consequent river flowing in the same direction. The writer was therefore led to the conclusion that the Colne was in existence as a subsequent river when the Bushey Hall gravel was formed, and that the gravel under examination was deposited by that river. Mr. Whitaker and Mr. A. Roechling said they felt some difficulty in accepting the views stated, having regard to gravels at higher levels; and they preferred to suspend judgment. The constituents of the Bushey Hall gravel are chiefly angular and sub-angular flint; flint-pebbles, some red; unworn flints; several varieties of quartzite-pebbles, some liver-coloured; several sandstones; and quartz. Two specimens of Radiolarian chert, one of veined tourmaline quartzite, and one piece of yellowish decomposed igneous rock, possibly rhyolite or rhyolitic ash, were found. Dr. A. E. Salter kindly examined some of these and other specimens.

The party walked across the golf-links to the Five Arches, where gravel (about 180 ft. above O.D.) was seen near the Cobra Works, a few feet from the Colne, 4 or 5 ft. above its present level, and forming a well-marked low terrace. This is doubtless continuous with the gravel seen at the Gas Works, and it is conclusive evidence of the Colne, in its latest phases, having shifted its bed westward immediately north of Watford. Looking across the golf-links, the Bushey Hall gravels were seen to form a higher terrace. Next to flint material, quartzites are most in evidence at the Five Arches, one specimen of palæozoic chert, but nothing igneous, being found. The walk was continued alongside and over the Colne to High Street station, where the party was joined by Mr. J. H. Woodhead, of the Engineer's Office, Euston. At the end of the new bridge, near Benskin's Brewery, on the north side of the railway, gravel (about 207 ft. O.D.) was shown, which the writer said he regarded as Colne River gravel. Its constituents were similar to those of the gravels previously seen, there being several varieties of quartzite, some liver-coloured, several sandstones, and some quartz. One specimen of tourmaline-breccia was found. Attention was called to the fact that immediately below Watford the Colne has no gravel on its left or south side; the gravels are all on the right or north side; and it was suggested that these gravels support the inference that the river once crossed from the

* Sutton, A., "The River System of West Hertfordshire," *Trans. Heris. Nat. Hist. Soc.*, vol. xiii, pt. 1, 1907.

Bushey Hall grounds to High Street station, and continued its course near the Workhouse, and onward towards the Croxley gravels, which may have been deposited by the Gade at its junction with the Colne.

Below Watford the Colne has shifted its bed to the south. At High Street station the gravel was seen to rest on Chalk. On the north-west side of the cutting between High Street station and Wiggenhall Road, gravel was seen on Chalk near the station; but towards Wiggenhall Road the Chalk disappeared, and only gravel was seen. This gradual slope of gravel towards the Colne was pointed out as evidence of the river having cut its way southwards down to its present level. At Wiggenhall Road, excavations for foundations of the new bridge had shown 12 ft. of gravel, 188 ft. above O.D., and about 18 ft. above the present level of the river; but this could not be seen at the time. Near the sewerage works, where the railway crosses a small branch of the river, Mr. Woodhead gave an account of the engineering work in progress; and showed the party an excavation which was open, and afforded evidence of at least 12 ft. of gravel below the present level of the river.

Between Pest House Lane and Holywell, in excavating for foundations of two bridges, alternating beds of gravel and peat had been found beneath the river. Mr. E. H. Townsend, Resident Engineer of the L. & N.W.R., had supplied the following particulars as approximately correct. In descending order the beds were: gravel 2 ft., peat $2\frac{1}{2}$ ft., gravel $1\frac{1}{2}$ ft., peat 9 in., gravel 3 ft., total $9\frac{3}{4}$ ft. The peat, which the writer had seen, was characteristic brown and black vegetable matter; but it had all been removed before the day of the excursion. The vegetable acids of the peat had de-oxidised the brown surface of the gravel, giving it a whitish or pale grey appearance. The gravel was mostly of sub-angular flint, with a few flint, quartzite, and quartz pebbles. In the peat were found antlers of red deer, and limb-bones of the horse; the antlers being from the lower 9 in. bed of peat. These were identified by Mr. Newton. The party walked through an unfinished cutting in *Cor-anguinum* Chalk, observing interesting cases of piping, and across the valley of the Gade to Cassio Bridge.

Attention was called to a peaty deposit at or a little below the surface of the Gade Valley. Excavations for new bridges over the Gade and the canal were seen to be in progress; and Mr. Woodhead explained that immediately east of the Gade, between the river and a narrow channel, about 138 yards south of Cassio Bridge, peat and gravel had been found below the river. He has since furnished the following particulars as being approximately correct at that place: Top soil 3 ft., peat 1 ft., gravel mixed with chalk $3\frac{1}{2}$ ft., clean gravel 9 ft., soft chalk 27 ft., with hard

chalk below. The Gade at Cassio Bridge is 172·71 ft. above O.D., and the peat and gravels are below that level.

The afternoon was delightfully fine, and tea on the lawn at the Swiss Cottage in Cassiobury Park was much enjoyed. The usual vote of thanks to the Directors was proposed by Mr. Whitaker, seconded by Mr. Chas. Oldham. After tea, a pleasant walk was taken over the West Herts golf-links, and across Cassiobury Park to Watford Junction in time for the 7.53 train for Euston.

REFERENCES.

- Geological Survey Map (Drift), London District, Sheet 1.
 WOODWARD, H. B.—"Geology of the London District." *Mem. Geol. Survey*, and works therein cited.
 LONES, T. E.—"Some Fossiliferous Post-Tertiary Beds exposed at the Gas Works, Watford." *Trans. Herts. Nat. Hist. Soc.*, vol. xii, part 1, p. 17.

EXCURSION TO HEDGERLEY AND BURNHAM BEECHES.

SATURDAY, SEPTEMBER 3RD, 1910.

Director : LLEWELLYN TREACHER, F.G.S.

Excursion Secretary : DOUGLAS LEIGHTON.

(*Report by THE DIRECTOR.*)

ARRIVING at Gerrard's Cross station about 1.30 p.m. the party of eighteen members walked westward to Bulstrode Park, which was entered by the footpath gate near the third milestone on the main road from Beaconsfield to Uxbridge. A descent was at once made into a small valley across which a new carriage drive was in process of construction. For this purpose several pits were open at intervals, thus affording facilities for observing the nature of the underlying rocks. On the east side of the valley a few feet of stiff purple clay was noticed overlying the Chalk and covered with a thick deposit of gravel. Such Chalk as could be seen was very firm and fine-grained and contained few fossils. The flints were large and solid and probably denote the upper part of the *M. cor-anguinum* zone.

At the bottom of the valley about 10 ft. of gravel was exposed without reaching the Chalk. The upper half was quite unstratified, but the lower was distinctly bedded. Many large