REPORT OF AN EXCURSION TO EDMONTON.

SATURDAY, MARCH 28TH, 1914.

BY S. HAZZLEDINE WARREN, F.G.S.,

Director of the Excursion.

THE purpose of this excursion was to continue the examination of the Arctic beds of the Lea Valley, which had been seen by the members of the Association at Ponder's End in 1911. The party, which numbered about fifty, assembled at Angel Road station and proceeded to the pit of the North London Ballast Company. The necessary permission had kindly been granted by the manager, Mr. S. N. Berriman, who showed the members some mammalian remains which had recently been found. The species of larger mammalia occurring here are those characteristic of the Ponder's End stage in the Lea Valley, namely *Elephas primigenius*, *Rhinoceros antiquitatis*, *Equus caballus*, and *Rangifer tarandus*. Bovine remains are extremely rare. The Banded Lemming (*Dicrostonyx henseli*, Hinton) has been found in abundance, and a well-preserved skull of this species was discovered by one of the party, Mr. C. R. Hacon.

The Angel Road section is situated about $1\frac{1}{4}$ miles lower down the valley, but in the same low level terrace of gravel as the Pickett's Lock pit at Ponder's End, which was previously visited. The surface level at Angel Road is 37 ft. above O.D., while the ordinary depth of the drift (except in the deeper holes) is about 18 feet. The disjointed masses of the Arctic bed, which probably once formed a more or less continuous sheet, usually lie at about 20 to 22 ft. above O.D.

Mr. Clement Reid, who is investigating the flora of the deposit, remarked that this group of Arctic, or more accurately sub-Arctic, plant-beds of the Lea Valley were among the most important of their kind. The determination of the plants was unusually difficult owing to the number of unfamiliar forms, many of which had not yet been identified. One of the abundant species had proved to be *Armeria arctica*, a plant characteristic of the Arctic region of North America and only recently discovered as still living in Europe upon the mountains of Scandinavia. Facts of this kind showed the magnitude of the changes which had taken place in the flora of the country since these deposits were formed.

The party then proceeded to Hedge Lane, passing the site of some recently-exposed sections (then closed) at Pymmes Park. These had shown the London Clay at a depth of from 3 to 7 ft. from the surface; the overlying material being chiefly made earth. There had been some trace of the ferruginous base of

the Drift gravel beneath the made earth, so it appeared probable that gravel had once been dug and the pits filled with rubbish. The level is about 49 ft. above O.D., so the surface of the London Clay rises in places up to 46 ft. above O.D.

The direction taken by the party was at right angles to the course of the valley, Pymmes Park is $1\frac{1}{2}$ miles from the present course of the River Lea, but on going a further $\frac{2}{3}$ mile the London Clay surface again plunges down into a deep channel. The deep channel was admirably seen in the pit of the Southgate District Council in Hedge Lane, permission to visit which had been obtained from Mr W. Carpenter, J.P., who explained to the members his experience of the deposit and of the mammalian remains found in it.

The level of the original surface of the ground over the area of the pit was 78 to 80 ft. above O.D., although from 3 to 9 ft. of brick-earth has been removed.

The western part of the pit shows about 18 to 20 ft. of Drift (of which the upper 3 to 6 ft. is brick-earth) resting upon a slightly undulating floor of London Clay. Along a certain line, which appears to be a curved one, although it is roughly north and south, the London Clay floor plunges down into the deep channel. Leaving theories of age and formation on one side, it was clear that the western and shallower part of the pit belonged to the Middle Terrace, while the deposits in the deep channel must be grouped with the Low Terrace although they were made up to the same surface level.

The section was an instructive one as showing the danger of judging by superficial appearances, as the difference between the two deposits was certainly of great importance, and this difference would never have been suspected in pits of even 25 ft. in depth.

There are two deep workings in the channel-deposits, the northern one shows two important plant-beds separated by 10 ft. of gravel. At one spot there is an apparently intermediate plant-bed, but it is possible that it is only a disturbed portion of the lower bed. This middle bed yields leaves of the Arctic willow, *Salix lapponum*, which has not previously been recorded fossil in Britain. Mr. Clement Reid explained that the climatic condition represented by these deposits was similar to that of the Ponder's End deposits, although the assemblage of species was different. It was noteworthy that the flora of the upper and the lower beds was practically identical, which showed that they could not have been separated by any considerable interval of time.

The southern deep working shows only one plant-bed, which may represent the union of the two (or three) plant-beds seen in the northern section. These plant-beds, together with their associated gravels and sands, were deposited upon a sloping bank, and have an easterly dip of original deposition of from 10° to 17° . The upper 20 ft. or so of the gravels of the Low Terrace is much

disturbed by Trailing, and hardly seems to be a truly water-laid deposit. So far as it is stratified at all the stratification is horizontal, and obliquely truncates the buried outcrop of the plant beds along a line of erosion.

The deep southern working showed a splendid vertical face at the time of the excursion, and this was measured by Mr. G. Barrow, Mr. H. Dewey, and the Director. This measurement, with some additions from subsequent levelling, worked out as follows:—

	Thickness in feet.	Level above O.D. in feet.
Original Surface (estimated)	—	79
Brick-earth, removed (estimated thickness)	7	72*
Upper Gravel, disturbed by trailing	20	52
Gravel, obliquely stratified	7	45
Dark Clay (Arctic plant-bed)	4½	40½
Gravel, obliquely stratified	14½	26
London Clay	+	—
Total Thickness of Drift	53	

The northern working is about 3 ft. deeper, but even this does not touch the bottom of the channel, in fact these deep workings are above the water level in the gravel and remain dry without drainage or pumping even in the wettest seasons. Thus the bottom of the channel would appear to be on nearly the same level as the base of the Low Level terrace at Angel Road.

As is usually the case, black seams occur in the gravel, Mr. J. M. V. Money-Kent has kindly furnished the following assay of a sample collected on the excursion:—

" Insoluble (chiefly Silica)	82.5	per cent.
Fe ₂ O ₃	7.65	"
MnO ₂	4.1	"
With traces of Graphite		

The black mineral, therefore, is not pure oxide of manganese but probably a mixture of limonite and pyrolusite."

After leaving the pit Mr. Carpenter exhibited the mammalian remains which have been found and which are preserved in his house, and Mrs. Carpenter very kindly entertained the party to tea. A hearty vote of thanks was returned to Mr. and Mrs. Carpenter for their hospitality.

REFERENCES.

- Geological Survey Map, London District. Sheet 2.
 1889 WHITAKER, W—"Geology of London." Vol. i, p. 450, *Mem. Geol. Surv.*
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* These levels refer to the base of each bed of the deposit.