

the chalk ridge which bears the avenue in Farnham Park. Mr. Whitaker's well-known section ("Geology of London Basin," p. 376) was apparently taken along one of the water-courses, and so gives the chalk ridge too great a prominence.

Owing to want of time it was found impossible to visit the swallow-hole in Clay-pit Gully, but about a dozen of the more energetic members accompanied the Director in a hasty walk in order to observe its exceptional position and note the absorption of the avenue ridge into the main mass of the escarpment, which is here capped by Tertiary Clays, by the dying away of the short strike valley that has been excavated in the park between the Chalk and the Tertiaries.

## REFERENCES.

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## EXCURSION TO HAYES AND KESTON.

SATURDAY, JUNE 27TH, 1908.

*Directors* : G. E. DIBLEY, F.G.S., and A. S. KENNARD, F.G.S.

*Excursion Secretary* : A. H. WILLIAMS.

(*Report by THE DIRECTORS.*)

THE members of the Association were joined at Hayes Station by some members of the Croydon Natural History Society.

Leaving the station the party proceeded to Price's gravel pit, where an excellent section of the low-lying valley gravels was seen. Mr. Kennard pointed out that gravels are to be found in all the valleys running up into the North Downs. The deposit was a mass of flint gravel, some of which had been derived from the adjacent Tertiary Beds, whilst the bulk of the material had probably been derived from older Drifts. There was considerable difference of opinion as to the origin of these gravels. Many years ago Darwin, who had studied similar gravels in the neighbourhood of Downe, suggested that they were of glacial origin. His letter is quoted by Prof. James Geikie in "Prehistoric Europe," and his suggestion was that

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during the Glacial period the valleys and the higher ground were covered with snow, and that as the snow melted during the summer, torrents were formed which carried the loose material from the surface of the higher grounds to the bottoms of the valleys, the finer material being entirely swept away whilst the heavier material remained.

The objection to this theory is that it postulates that the valleys were excavated before the Glacial Period, and therefore, that such deposits as the brick-earth at Erith and Crayford and all the higher terraces of the Thames would be pre-glacial, a conclusion which is not generally accepted. Mr. Kennard was of opinion that nearly all the dry chalk valleys of the North Downs had been excavated for the most part by subterranean erosion and that these valley gravels were the result of this action, the material being gradually let down as the underground Chalk was dissolved away, and he noted that in the Chalk area the gravels consisted for the most part of unrolled Chalk flints. Contemporary fossils are rare, but Dr. Male had obtained fragments of reindeer antlers from this pit, whilst other collectors had found *Elephas primigenius*, *Equus caballus* and *Rhinoceros antiquitatis*. It was noteworthy that these osseous remains are always found at the base of the gravel. After leaving the pit the party proceeded to Wickham Common, where the magnificent but little known pollard oaks were pointed out, one of which is known as "Millais' Oak," from the fact that it formed the subject of one of his pictures.

On reaching the summit of the escarpment a well-marked barrow was noted and the party then proceeded to Baston Manor, where by the kindness of Mrs. Torrens, the famous rock garden was inspected, a welcome interlude to many of the party. After passing a hearty vote of thanks to Mrs. Torrens, the party proceeded to Keston, passing on the way a small section of the Oldhaven Beds. Here Mr. Kennard pointed out the principal geological points of interest to be seen in the wide stretch of country. At Keston the party divided, one part accompanying Mr. Kennard to Keston Common, visiting on the way the famous Keston bog, from which Darwin obtained the *Drosera rotundifolia* for the experiments mentioned in "Insectivorous Plants," whilst the remainder accompanied Mr. Dibley down the escarpment at the back of "The Fox," to the overgrown pit known as "Fox Hill pit." This pit had been visited in the autumn of 1907 by Mr. Dibley, who was bent on following up the track of the *Uintacrinus*-zone discovered by him in the spring of that year at Orpington. After careful and prolonged searching, labour was rewarded by finding that the southern end of this almost hidden exposure was situated in the *M. coranguinum*-zone, while immediately to the northern end under the beech trees the chalk is of a different lithological character,

very similar to that at Orpington. Daylight waning, several blocks were taken home and the result of a subsequent examination revealed the presence of ossicles of *Uintacrinus*. On this occasion time did not permit of a long examination: however, evidence was produced which proved the horizon. One of the members found a fragment of *Actinocamax verus*, this being the first discovered at this spot and the third from this locality, Mr. R. Brydone having secured a specimen many years ago from Leaves Green pit, and the writer another in the spring of this year.

The party united at Keston Village, and after partaking of tea, the members proceeded across Keston Common to the Warbank. Here Mr. Kennard noted the numerous geological points of interest to be seen, and a vote of thanks was accorded to the Directors. The party then again divided, one part accompanying Mr. Kennard to Keston Church, after which a detour was made through Holwood Park, and the return journey to Hayes Station was across Keston and Hayes Commons.

The other members proceeded to Leaves Green pit, which is situated in the *M. cor-anginum*-zone. The fauna here is identical with that of the Gravesend area, which is very interesting from the fact that while in the area just mentioned the next zone has been eroded, here recent discoveries have proved the existence of the *Uintacrinus*-zone and Mr. Dibley has this summer also found the junction of the *Marsupites* and *Uintacrinus*-zone in Holwood Park. Time did not allow of visiting this last section, but it is worthy of note that the *Marsupites*-zone is exposed in small sections close to Wickham Church. Several members were well rewarded for diligently searching the flints at Leaves Green, one nodule being rich in spines of *Cidaris clavigera*.

A specially interesting feature here is the character of many of the flints, which reveal a peculiar concentric chalcedonic layer on the fractured surfaces, which is also to be seen to have penetrated slight fissure-like markings where the flint has been broken, and is due to subsequent deposition.

After leaving the pit the members had a very pleasant walk, Hayes Station being reached about 8.20 p.m.

#### REFERENCES.

- Geological Survey Map, Sheet 6 (Drift Edition).  
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