

EXCURSION TO THE RIVER-TERRACES NEAR
CRAYFORD.

MARCH 25TH, 1916.

REPORT BY R. H. CHANDLER AND A. L. LEACH, F.G.S.,
Directors of the Excursion.

THIS excursion was planned to include an examination of two groups of deposits associated with river-terraces near Crayford, viz., (1) the gravels of the High Terrace as seen on Dartford Heath, and (2) the gravels with overlying loams (commonly termed the Crayford brick-earths) which form a later terrace of river deposits at a much lower base level.

From Crayford Station the party went to the high ground above the railway. From a convenient view-point the local topography was examined and the positions of two gravel-spreads were indicated—one to the south joining Dartford Heath, another seen north of the River Cray in newly-opened pits. The many points of similarity between these two gravels, in base-level, sedimentary character and constituents, suggest that they were originally combined in one sheet of river-drift deposited during the High Terrace stage, at the confluence of the rivers Cray, Darent and Thames. The separation of these gravel patches was brought about by the excavation of the valley of the River Cray to a new base-level, considerably, probably 100 ft. at least, below its base-level during the High Terrace stage. By this process of erosion the gravels of the earlier stage were left as well-marked terraces on the flanks of the river valley.

In order to make a profitable comparison with certain new sections to be visited later in the afternoon, on the north side of the Cray, the party walked to the northern edge of Wansunt Pit, (Dartford Heath). The gravel here has many times been examined by the Association, and its essential features—base level, constituents and thickness—have been recorded (see References). It is unnecessary to repeat the details previously given, and on the occasion of the excursion only a general view of the pit was attempted.

Some discussion arose as to the relation of the gravel to the glacial deposits of the eastern counties. The view, hitherto very widely accepted, that many of the non-local rocks, sedimentary and igneous, which are notable constituents of this gravel, had been derived from glacial deposits, has recently been challenged. The Directors emphasised the fact that these constituents include numerous true erratics from localities far outside the Thames Basin, and claimed that in any endeavour to fix the geological age of these deposits all the data should be considered—the

levels of the base, the sedimentary character and constituents of the gravels, their palæontology and archæology. At present the lithology and palæontology of these gravels appear to be in conflict, and a clear proof of the pre- or post-glacial age of the deposits remains to be discovered.

From Wansunt Pit the party walked through Crayford to the new sections at Iron Mill Lane, on the high ground north of the river and about 500 yards east of Crayford Church. Here about 12 ft. of sandy gravel, slightly false-bedded, was seen to rest on Thanet Sand, the base level of the gravel being between 90 and 100 ft. O.D.

Some time was spent in examining the constituents, and amongst the non-local materials were found pebbles of quartz, Lower Greensand chert, sarsen, Bunter quartzites, and light-coloured sandstones. The varied igneous rocks and cherts of

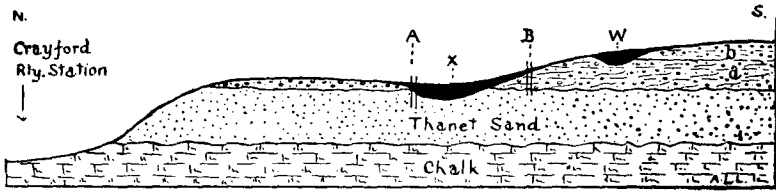


FIG. 4.—SECTION FROM CRAYFORD STATION TO DARTFORD HEATH, SHOWING THE POSITION OF THE DARTFORD HEATH GRAVEL (*a* and *b*).

Length of section about 700 yards. Vertical scale about three times the horizontal.

common occurrence in the Wansunt Pit have not yet been collected here, but the quantity of clean gravel exposed is as yet small. From this pit the party could see, across the intervening valley of the River Cray, the corresponding terrace of Dartford Heath which had just been visited. The view afforded a very unusual demonstration of the effects of deposition and erosion, the former process having produced the great spread of river-gravel, while the latter had carved out the valley and developed the shelf-like terraces on both sides of the river.

This completed the examination of the river-drift of the High Terrace stage (Fig. 4 *a* and *b*). The rest of the afternoon was spent in studying the deposits associated with the Crayford brick-earths as shown in Fig. 5.

In this diagram, which was constructed from measured sections observed in 1913, each vertical line shows the actual section in a particular pit. It is drawn from west to east, from the high ground as far as the margin of the alluvium, and thence from south to north in order to reach the present channel of the Thames. Below the alluvium and peat beds lies an unknown

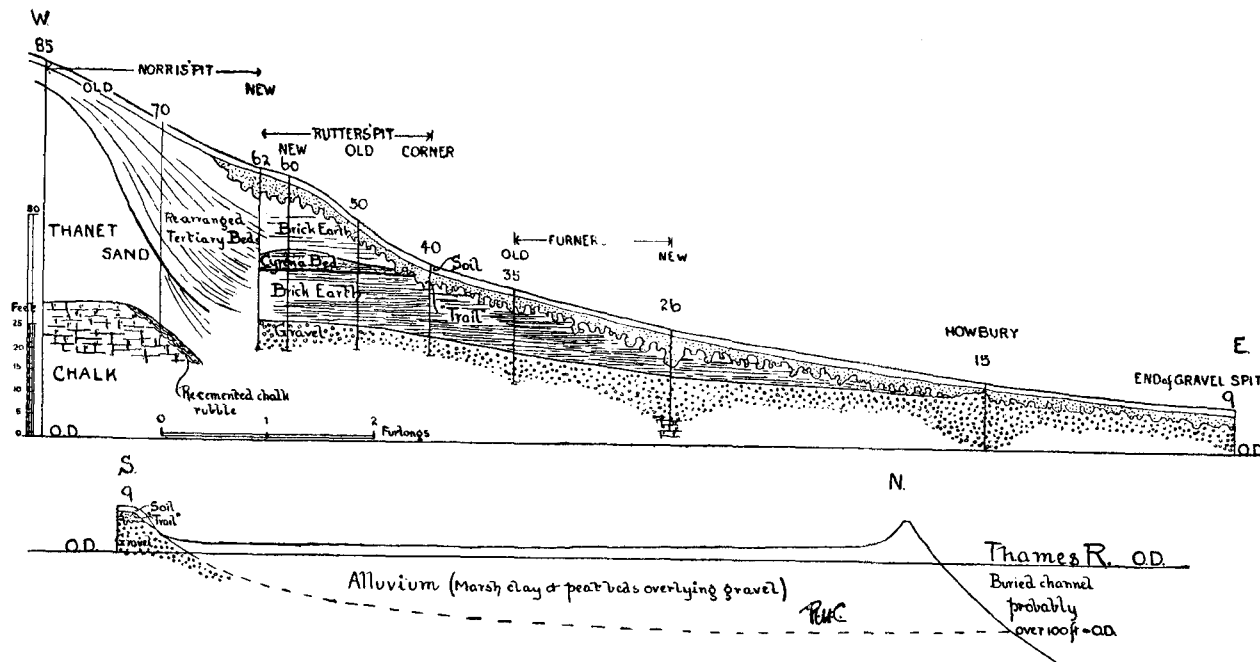


FIG. 5.—SCALE DIAGRAM CONSTRUCTED FROM ACTUAL SECTIONS IN THE CRAYFORD BRICK-EARTH AND GRAVEL PITS (1913).—
R. H. Chandler,

The surface levels at each pit are given by the figures above the vertical lines.

thickness of gravel, extending down to the "Buried Channel" of the Thames, probably about 100 ft. below Ordnance Datum.*

From Iron Mill Lane Pit the party walked through Stoneham's Pit (the pit from which most of the mammal bones were obtained in the early days of the study of Pleistocene Geology), and observed the High Terrace gravel at a base level of about 90 ft. O.D. Below this, and sweeping up to its base, was seen the brick-earth of the Middle Terrace. A comparable section is shown in Fig. 5 (extreme left), where the brick-earth and re-arranged Tertiary Beds reach up to 85 ft. O.D. The base of the High Terrace would be a few feet above where the section begins at 85 ft. O.D. In one corner of this pit Spurrell discovered a palæolithic working floor in 1880†.

In Furner's Pit‡ the lower brick-earth was seen underlying well-contorted "Trail" and overlying sandy basal gravel (the latter resting on the Chalk).

A characteristic flake was found by Mr. A. S. Kennard, but, generally speaking, Furner's Pit does not yield implements. Norris' Pit was next seen, and the section in Fig. 5 studied. Whilst here the typical Le Moustier implement and core from the Crayford brick-earth were exhibited.§

Mention was made of some contiguous flakes found by the Directors some years ago, which prove the existence of a working floor in this locality.

The "Corbicula Bed," which divides the upper from the lower brick-earth, was examined, and the Tertiary sands and clays were seen to be mixed up and gradually passing into the commercial "brick-earth." Below the latter was the re-cemented chalk rubble against which the brick-earth rests.

Some of the party also visited a pit showing the basal gravel at Anchor Bay (Erith).

Thus, with the exception of the alluvium, all the exposures (or comparable ones) shown on Fig. 5 were examined, and the important fact was demonstrated that the gravel which underlies the Crayford brick-earths extends beyond the lower boundary of these loams to the margin of the alluvium. The relation of the brick-earths and their basement gravel to the gravels in the "Buried Channel" is not shown in any section known to the Directors.

For details of the thicknesses, constituents and levels of the two groups of deposits examined during the afternoon, viz., the

* R. H. Chandler and A. L. Leach, "Report of an Excursion to the Lower Tertiary Section and Pleistocene River-Drifts near Erith." *Proc. Geol. Assoc.*, vol. xxiii, p. 183 (1912).

† F. C. J. Spurrell: "On the Discovery of the Place where Palæolithic Implements were made at Crayford." *Quart. Journ. Geol. Soc.*, vol. xxxvi, p. 544 (1880).

‡ The "old" pit of fig. 5. Since the section was drawn the "New" working has been abandoned and the "old" working re-opened.

§ Illustrations of the implements and cores, with a brief description, are being published in the forthcoming *Proceedings of the Prehistoric Society of East Anglia*, vol. ii, part 2.

gravels of Dartford Heath, and the gravels and loams of the lower or Crayford stage, the papers mentioned under 1912 and 1914 should be consulted.

REFERENCES.

- Geological Map, London District (Drift). Sheet 4. 1s. 6d.
Ordnance Map.
1905. HINTON, M. A. C., and KENNARD, A. S.—“The Relative Ages of the Stone Implements of the Lower Thames Valley.” *Proc. Geol. Assoc.*, vol. xix, p. 76.
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1909. WOODWARD, H. B.—“The Geology of the London District.” *Mem. Geol. Survey.*
1912. CHANDLER, R. H., and LEACH, A. L.—“On the Dartford Heath Gravel and on a Palæolithic Implement Factory.” *Proc. Geol. Assoc.*, vol. xxiii, p. 102.
1914. CHANDLER, R. H. “The Pleistocene Deposits of Crayford.” *Proc. Geol. Assoc.*, vol. xxv, p. 61.

NOTE.—In these papers and reports references are given to numerous older accounts of the deposits near Crayford and Erith.

ANCIENT TYPES OF VEGETATION.

A DEMONSTRATION AT KEW GARDENS, APRIL 8TH, 1916.

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OWING to the large number of members who attended the demonstration it was found inadvisable to go through the houses, and the original programme was therefore modified, attention being chiefly directed to the more ancient types of Gymnosperms and Angiosperms growing in the open.

The party assembled at the main (Kew Green) gate and walked towards the Palm House and thence to the Pinetum, finishing at the Temperate House. As the gardens are only to a limited extent laid out in a systematic manner, it was not possible to deal with the different tribes and genera consecutively, and in pointing out the following types it was frequently necessary to refer to some plants seen earlier or to some to be seen later. The plants most interesting from a palæontological standpoint were commented upon as follows :—

Taxodium distichum—Examples near the Ferneries showed the deciduous character, rather unusual in the coniferæ, the only other common example being the larch. The Kew specimens (including those near the lake and water-lily pond) do not show the interesting breathing roots or pneumatophores, but these are well seen in trees at Syon House. The plant inhabits the swampy districts of the southern United States, and its usual