

REPORT OF AN EXCURSION TO THE NORTH DOWNS, MARDEN PARK.

BY W. WHITAKER, F.R.S., *Director of the Excursion.*

SEPTEMBER 26TH, 1914.

WE walked southward from Woldingham Station, up the dip-slope of the Chalk, by a footpath to the top of the escarpment, whence a good view over the Wealden district was got and the geologic structure was described.

Then, going westward to Chaldon Farm (Tandridge Heath of the old map), we came to where a small outlier of the Blackheath Beds is shown on the map, on the highest ground. These beds of flint-pebbles have been worked for some time (after the geologic map was made) and are still worked in a pit just westward of the house, at a height of nearly 790 ft. Here, as at the Caterham outlier, there are many large angular flints, mostly but little broken, and which clearly have not been carried far, collected together in patches.

Touching the other side of the road just S.S.W. of Chaldon Farm and at a slightly lower level (? about 770 ft.) is a new pit, showing just the same thing, a mass of sandy pebble-beds, with nests of large unrolled flints. These two pits are within the area of the small outlier shown on the map, though the second is at (and perhaps partly over) the edge of it; but those now to be noticed are outside that area, and therefore prove an extension of the Blackheath Beds not before recognised. No one, however, could have shown such extension without this evidence; the loose pebble-beds of course tend to fall down the slope of the escarpment, and, without a section, it is hard to say whether one is dealing with a surface-downwash or with pebbles in place.

One cannot give the exact site of the next pit visited, enough to say that it is a little southward of the last, some way down the wooded slope of the escarpment (Hanging Wood) and at a still lower level than the last, probably below 700 ft. It is a deeper section in like beds, but with the addition that at one place at the top Chalk comes up suddenly, with clayey material next it. This striking irregularity is like that so well seen at Worms Heath; * but the section was by no means so clear, and therefore there was some discussion as to whether the Chalk was in place or in a reconstructed condition.

The walk was then continued along a very irregular route through the wood, ultimately leading the party down the escarpment to the south-west, where there is an old chalk-pit called Nixon's Pit on the six-inch map (Surrey 27), now well wooded, but clearly showing bare Chalk.

* *Proc. Geol. Assoc.*, 1910, vol. xxi, p. 473. and pl. xxxiv.

Emerging from the little wood on to the open land on the east we came at once to the fourth and most interesting pit seen in the Blackheath Beds, which was found by Mr. C. C. Fagg, at about the 600 ft. contour, and not far from the outcrop of the Upper Greensand (above the 500 ft. contour). This is a large pit in the pebble-beds, as before, with many patches of large unrolled flints. At the entrance on the south (that is, at the lowest part) the Chalk was seen below the pebble-beds, which partly filled pipes in the Chalk. At one part, however, there was clayey earth next above the Chalk, partly of a greenish tinge, with some of a pinkish, and somewhat suggestive of the base-bed of the Thanet Sand, though pink earth in this has been noted only in one place in Surrey, and that afar off in a well at Ewell. No green-coated flints, however, were found at the junction, as is the case with undoubted Thanet Sand.

Not only, then, have we a considerable lateral extension of the Blackheath Beds, as compared with what I mapped many years ago, either as a continuation downhill of the beds seen at and near the hill-top, or as a separate mass at a lower level, but we have also what has never before been seen, a downward extension, that is a plunge downward on to what must be Lower Chalk, whereas before the Blackheath Beds have been found on the Chalk no lower than the lower part of the Upper Chalk.

These are the facts. What is the explanation? This question must be answered, as yet, according to taste, and there are objections, perhaps, to all the explanations hitherto evolved.

No one, surely, will suggest that we are dealing wholly with a matter of original deposition, with Eocene beds resting against a sort of Chalk cliff, a thing that has not yet been seen, perhaps not dreamt of.

Or, as a modification of this, can we have the remains of a channel cut in the Chalk and filled with Eocene beds? But this also is a thing unknown, at all events except on a very small scale; nothing of this sort has been seen.

Probably, then, we may leave out original deposition, except perhaps to a very slight extent, and turn our attention to shifting of beds after deposition, a thing that may have come about in various ways.

Are we faced with a fault, throwing the beds down nearly 200 ft. to the south? If so, there ought to be some other signs of it, and I know of none.

How about a landslide? a thing not common in the Chalk, and occurring only where there are specially favourable conditions, as on the Devon coast, westward of Lyme. Landslips generally leave their mark on the surface; but here we have the regular smooth slope of the Chalk, and not the broken ground formed by a slip.

It is a comfort that there is one cause of irregularity in over-

lying beds that is always available in a Chalk-tract ; that is, the irregular dissolving away of chalk and the letting down of whatever beds happen to be above into what are known as pipes. Of course these pipes are likely to be formed where the beds above the Chalk are of a highly permeable nature, as in the case of the Blackheath Beds, and we may be certain that piping has, at all events, largely helped in the letting down of the pebble-beds here, as it has been proved to have done at Caterham and Worms Heath. But the question remains whether this action alone has brought about the remarkable result seen, or whether some other action may have helped. It is not unlikely that the Blackheath Beds were deposited somewhat irregularly on the Chalk, and that such irregular deposition may have here taken the form of a channel or scoop. Of course it is open to anyone to adopt a combination of any two or more of the processes above noted, so that there is plenty of opening for discussion.

There is one point in the composition of the Blackheath Beds here that is worthy of notice, and which goes with the view that the Upper or flinty Chalk has largely suffered from the dissolving action of carbonated water, leaving the practically insoluble flints behind. All the sections above noted agree in showing masses of unrolled flints, and the contrast between these unrolled stones and the thoroughly rolled pebbles is remarkable, especially as there are no passage-forms between the two. It is clear that the origin of the two forms of flint must be distinct ; the unrolled flints must have been derived from the neighbouring chalk by dissolution of the calcareous rock, whilst the pebbles presumably came from a distance, having been subjected to rolling action.

It is at such places as those in question, that is at outliers of the pebble-beds, where these have cut across well over the flinty Chalk, that the unrolled flints occur. Where the Blackheath Beds are separated from the Chalk by Woolwich Beds and Thanet Beds, the pebbles alone occur, or, at all events, there is nothing more than a stray unrolled flint, as far as I can remember.

Finally, the party walked downward to the outcrop of the Gault, the clayey nature of which formation was well in evidence along Tandridge Hill Lane, with a mass of flint-pebbles near the middle of the outcrop, the remains of a former extension of the Blackheath Beds up aloft ; and the rise of the Folkestone Beds (sand) was seen where the lane reaches Rooksnest Park.

Tea was taken at New Oxted, and satisfaction was expressed with the walk and the weather. Mr. Williams acted as Excursion Secretary.

REFERENCES.

- Geological Survey Map, 1-in. scale, Old Series. Sheet 6.
 Ordnance Map, 1-in. scale, New Series. Sheet 286.
 Ordnance Map, 6-in. scale. Surrey, Sheets 27 N.E., 27 S.E.