consisting of a bed of the Upper Chalk with flints. Ditchling Beacon is 814 feet above sea level, and as it is the highest point in the Sussex Downs, it affords a magnificent view on all sides. The Southern Valley of the Weald crossed during the day was looked over to the north, while to the south the view extended across the Downs and far out to sea. A route due west along the summit of the Downs was now taken, and a descent made near Coombe Down, when a visit was paid to the new waterworks, where a deep well has been sunk through the Lower Chalk. Passing through Keymer village, at which a section of the Folkestone Beds was seen, the party hastened to Hassock's Station for the return journey to London.

EXCURSION TO RICKMANSWORTH.

SATURDAY, JUNE 17TH, 1882.

Directors: WILLIAM WHITAKER, Esq., B.A., F.G.S., and JOHN HOPKINSON, Esq., F.L.S., F.G.S.

(*Report by THE DIRECTORS.*)

The Harefield Chalkpits, close to the river Colne below Rickmansworth, expose as fine sections of the Upper Chalk as any to be met with on the northern side of the London Basin, and nowhere can better examples of "pipes" in the Chalk be seen than in one of these pits, while the absence of any vestige of a pipe in the other affords an instructive lesson in physical geology. But scant notice, however, of these sections has hitherto been taken.

To examine these pits, and also sections of the Tertiary beds at Woodcock Hill, the members of the Association assembled at three o'clock at Rickmansworth station, where they were met by members of the Hertfordshire Natural History Society, the united party numbering between forty and fifty.

After leaving the station the first place visited was an old chalk-pit on Stocker's Farm, of such little interest that it merely elicited from Mr. Whitaker the observation, "Ladies and gentlemen, this is a chalkpit."

Proceeding down the valley of the Colne, a short walk along the towing-path of the canal brought the party to the first of the large chalkpits to be visited, on the left bank of the river. The Upper Chalk here is bare, and of a pure white, the clayey beds which

come on just above having thrown off the water falling upon them, thus preventing it from percolating into the chalk and giving rise to pipes.

The next pit, a field's length farther south, by the old "Copper Mills," which have long ceased working, was soon reached, and formed the principal point of interest. Here the whole section of the chalk, which presents an almost vertical cliff from 90 to 100 feet high, is irregularly capped by gravel, from which pipes, often of most fantastic shape, and of roughly cylindrical form, extend downwards to distances varying usually from 30 to 70 feet. A mass of white chalk, of such a height and extent as, but for these pipes, would here have been exposed, would have had a most dazzling appearance; but the whiteness of the chalk is subdued by the darker colour of the pipes, which appear to occupy almost as much space on the surface of the vertical sides of the pit as the chalk itself.

Here Mr. Whitaker, mounting a tilted truck, explained the mode of origin of these pipes. They were, he said, holes or hollows in the chalk filled in by gravel or sand from the beds above. In old books they were sometimes stated to have been formed by sea-action, but such was not the case. They were caused by rain, which, in passing through air, absorbed carbonic acid, a gas which, in solution, had the power of dissolving the hardest limestone. The water, charged with carbonic acid gas, sunk down through some line of weakness in the chalk, along which it gradually dissolved the rock, until at last the overlying gravel and sand sank into the cavity thus formed. Here and there a mass of gravel was to be seen, which appeared to be unconnected with the pipe immediately above it, this appearance being due to the chalk not always having been worn away in a vertical line, so that the connecting link of the pipe was not to be seen; and this was the explanation of the apparently isolated masses of gravel frequently seen in the chalk. Where there was a mass of Tertiary clay on the chalk, there were generally no pipes, for the clay being impermeable prevented water from getting through into the chalk; whereas water percolated through gravel, forming these pipes, in which might frequently be seen angular chalk-flints, not worn at all, and nearly in the position they occupied before the chalk in which they were embedded was dissolved away. The gravel here, Mr. Whitaker stated, forms part of a high terrace that occurs over

the plateau above the pits, hiding the junction of the old Tertiary beds and the chalk, and it is supposed to be of Glacial age, because it is like other gravels near which run under the Boulder Clay; for such detached masses of gravel were presumed to be of the same age as the larger masses, of which they seemed to be outliers.

After a pleasant walk across the fields the party arrived at the Woodcock Hill Kiln. Here the section exposed was found to be better than when noted by the Geological Survey some years ago, the beds now seen in the upper pit being as follows:—

Clayey gravel, resting in hollows in the bed below.

Basement-bed of the London Clay.	{	Brown and grey sandy clay, with a ferruginous bed in which a cast of <i>Panopæa</i> was found. ? 5 feet.
	{	Line of flint-pebbles.
Reading Beds.	{	Brown loam, about 3 feet.
		Mottled plastic clays, thick.

A lower small pit showed about ten feet of brown sand, with clay above, and some apparently in it. This sand also belongs to the Reading Beds, and must dip under the mottled clays. The surface of the sand was very hard from exposure. The gravel is apparently part of the same bed as that on the top of the chalk near Harefield. This section presents a rather unusual feature in a pebble-bed in the midst of the basement-bed of the London Clay, and none at the bottom. The mottled clays below, Mr. Whitaker stated, were unfossiliferous, there being nothing like them at Woolwich, &c., where the Woolwich beds contain many kinds of fossils.

In crossing the fields from Woodcock Hill to Rickmansworth, on the summit of a hill from which was obtained an extensive view, embracing the valleys of the Colne, Chess, and Gade, a bed of pebbly gravel was examined. This, Mr. Whitaker said, must be as old as Middle Glacial, and might be older than Glacial, and he pointed out the difficulty, and sometimes the impossibility, of definitely fixing the age of such isolated masses of gravel. We have here the usual features of a gravel-capped hill—a flat top and a steep slope. The stones are nearly all water-worn, not angular, mostly of flint, but some of quartz.

From Rickmansworth station the train was taken to Watford, Dr. A. T. Brett having kindly invited the party to tea at his residence, Watford House. Refreshments were served under a large tree on the lawn, after which votes of thanks to Dr. Brett and to the Directors were proposed and heartily responded to.