One of the party was fortunate enough to find a fine lump of allophane (a hydro-silicate of alumina) in the position indicated.

It was not easy to ascend higher in this pit than the lower beds of the Thanet Sand, so after spending some time in collecting Upper Chalk fossils, the party departed in an easterly direction and entered another pit a few yards away, in the side of the hill which stands out like a promontory between the Charlton pit just visited and the new recreation ground for Woolwich known as Maryon Park. In the western flank of this hill, which juts out to the north, the uppermost beds of the Chalk and the Thanet Sand are well shown, and the Woolwich Beds and Blackheath Pebble Beds are almost equally well exhibited on the eastern flank, which looks upon Maryon Park. On the top of the hill is the fragment of an old camp—not Roman, Mr. Spurrell remarked, but British, though called Roman on the new ordnance map. The greater portion once occupied the hill which stood where, owing to the removal of the Chalk and Thanet Sand, there is now a hollow transformed into a recreation ground. From the top of the hill we had a magnificent view. Southward it was bounded by Shooter's Hill and the well-wooded land about Old Charlton. On the north-east appeared the Essex Hills at Havering-atte-Bower and around Brentwood, and still further eastward arose the outlier of Bagshot Sand capped by gravel, known as Langdon or Laindon Hill.

REFERENCES.

Geological Survey Map, Sheet 1, S.W. (Drift Edition).
New Ordnance Survey Map, Sheet 271.

1889. WHITAKER, W. — "Geology of London." *Mem. Geol. Survey*.
See also "Record of Excursions," pp. 1-7.

EXCURSION TO BRIGSTOCK AND GEDDINGTON.

SATURDAY, APRIL 27TH, 1895.

Directors : BEEBY THOMPSON, F.C.S., F.G.S., and W. D. CRICK, F.G.S.

(*Report by* BEEBY THOMPSON.)

The members arrived at Corby (Weldon Station) about 11 o'clock, and proceeded to examine a section of Upper Lias Clay, newly opened by the Weldon and Corby Brick Company. Owing to the recent heavy rains very little could be done here, but a few fossils were obtained, including *Ammonites bifrons*, *Myacites donaciforme*, *Inoceramus*, etc. The clay is micaceous, and has a capping of Northampton Sand, though the junction between the two formations is most irregular owing to slipping.

JULY, 1895.]

Within a hundred yards of the above is a long working face of the ironstone beds of the Northampton Sand; the ironstone being capped by the white sands of the Lower Estuarine beds, with abundant vertical plant markings, and above this again some ruddy sands and rubbly beds (Lincolnshire Oolite?). Very little time, however, could be spared here.

A walk of about four miles brought the party to Brigstock Mill. The chief object of the excursion was to examine a section of Lincolnshire Oolite at this place, in which land and freshwater shells of species now living had been found by Mr. Albert Wallis, of Brigstock. (The description of section, and discussion, appears later on in this Report.)

The next section visited was one on the east side of Stanion, Lord Cardigan's pits, where the Lincolnshire Oolite was formerly extensively quarried.

The visit to Little Oakley was omitted for lack of time, so that the next stoppage was made at Geddington, to examine the "Eleanor Cross" there. A short stay was made at a quarry in the Lincolnshire Oolite just outside Geddington, on the road to Kettering, and a number of characteristic fossils were obtained.

Kettering Station was reached in time for the 4.30 return train to London.

A paper has already appeared in *The Geological Magazine* for May, describing the Brigstock Mill section, and reprints in advance were, through the courtesy of the editor, Dr. Henry Woodward, available for members on the day of the excursion. The following particulars are, to some extent, a repetition of the contents of that paper:

DESCRIPTION OF BRIGSTOCK SECTION.

By BEEBY THOMPSON.

(Compare with Plate and Description by MR. ALBERT WALLIS.)

1. Soil, Boulder Clay, and Gravel, not very distinctly separable the one from the other, or from the bed next below, but all three containing pebbles, fragments of flint, and chalk. Thickness very variable.

2. Confused layer; Boulder Clay, gravel, fine sand, and shelly oolite very much mixed up, and the junction with the purer Oolitic beds below very irregular. Thickness may reach four feet in places.

3. Disturbed Oolite, consisting largely of small shells or fragments of such, a good proportion being gasteropods, mostly water-worn or encrusted with carbonate of lime, so that all trace of finer ornamentation is lost, many only internal casts. In places it takes the character of a fine, calcareous sand.

It also contains quartzite pebbles and flints, etc., irregularly and sparsely distributed, and is the part in which the land and freshwater shells were found.

4. Oolite similar to No. 3, except that it is harder, more compact, and contains nothing exceptional. Nodular or hummocky masses of this bed rise in places into the softer zone above.

The combined thickness of parts 3 and 4 of the section is as variable as the Clay and Soil, etc., above them, but in the deepest part reaches 9 or 10 feet.

Here and there in the section "gullies" or "pipes" occur, filled in with Boulder Clay and stones; they begin in the confused layer, No. 2, and mostly reach below the present working (see plate).

The land and freshwater shells found in the shelly Oolite, No. 3, included the following species :

Succinea putris.

Cochlicopa lubrica.

Helix pulchella.

Helix nemoralis (or *arbustorum*).

Pupa marginata.

Pisidium pusillum.

Some of the specimens were rather poor, and all thin and fragile; but there can be no doubt as to the identification, for the least satisfactory ones have passed through the hands of both Mr. Lionel E. Adams, B.A., of Northampton, and Mr. J. W. Taylor, of Leeds.

The following additional particulars with regard to the section are important in connection with any theory attempting to explain the occurrence of the above-named shells in the Oolitic beds :

- (a) The shells were found *only* in that part of the section numbered 3, but at several places and at variable depths (see plate).
- (b) The best preserved shells were imbedded in a clay matrix when found.
- (c) Minute fragments of shell can almost always be found by picking out portions of the soft sandy layers of No. 3, indicating a destruction of many specimens compared with the few preserved.
- (d) None of the shells, even in a fragmentary condition, have been found in, or in any way connected with, the "pipes," although these have been carefully searched.
- (e) The whole of the Oolitic matter as far down as the harder and hummocky masses of No. 4, has evidently been disturbed and re-arranged, for it is quite easy to find in it flints and pebbles (Bunter ?) from the "drift," as far down as, but no farther than, the shells have been found.

The explanation given in *The Geological Magazine* for May, by the author of this Report, was about as follows: The land and freshwater shells were embedded in the clayey soil or sub-soil of some district near, in pre-glacial times, and on the first advance of the ice sheet they were moved *en masse* with portions of the underlying rock, and constituted a part of the earliest Boulder Clay of the district, of which scarcely a trace in its original form now remains. During the succeeding so-called inter-glacial period, the rapid melting of the ice produced strong currents of water which washed away most of the argillaceous matter of this early Boulder Clay, and even bared, and, in places where the material was not very coherent, disturbed the underlying rock, re-depositing its material along with the coarser material of the Boulder Clay itself. During all this, some of the masses of clay escaped total destruction, and, greatly diminished in size, got buried with the drift and disturbed calcareous beds, and with the clay the shells in it; shells not so protected during the inter-glacial period were naturally broken into fragments at the same time that the fossils in the Oolitic beds were being water-worn (see No. 3 of Section and c).

The upper part of the section (1), represents the upper Boulder Clay, so very common in Northamptonshire, and the disturbance connected with the advance of the second ice sheet seems to have extended downward to the base of No. 2 of the section.

A discussion took place at the Brigstock section itself after examining the shells that had been found and the positions in which they were found. A brief summary of the objections then and afterwards urged against the theory stated above is given below, together with the replies thereto by the author of the theory:

1. One member insisted that the shells could not be as old as the theory involved because no shells of the species named had been recorded from pre-glacial beds; also they were very mutable forms, and so it was improbable they could be so old.

This objection falls to the ground, because the species recorded, excepting *Helix nemoralis* and *Pisidium pusillum*, are found in the Crag beds, and these two occur in the Forest Bed, and all have been recorded from the Pleistocene Gravels. There is, therefore, no *à priori* reason why they should not occur beneath the Boulder Clay.

2. Other members were not satisfied that the material described as Boulder Clay was such.

So far as I can see, the only alternative to calling it *Boulder Clay* is to describe it as *Clay containing Boulders*; but since the boulders are of just the same character as are to be met with in unquestioned Boulder Clay of the district, and the district is mostly covered with Boulder Clay, so much so indeed that it is the rule to find it and the exception not to, and that no specific reason has been urged why

this should be regarded as abnormal, I do not yet consider it necessary to modify the original description.

In connection with the subject I would refer those who are doubtful about the Boulder Clay to the perfectly independent description of the section appended to the plate, by Mr. Albert Wallis, a resident of Brigstock ; also to pages 149 and 150, and the first paragraph of page 191 of Judd's *Geology of Rutland*.* I quote the most pertinent paragraph on page 149 : " Between the Harper and Willow brooks the Jurassic strata are again wholly concealed by the thick masses of Boulder Clay. On the outer escarpment, however, at Stoke Albany, Wilbarston, Cottingham, and Rockingham, the beds of the Lincolnshire Oolite are exposed by denudation below the great superficial accumulations. They are also equally well seen along the sides of the valleys formed by the Willow Brook and its tributaries, as about Corby, Weldon, Dene, Bulwick, Blatherwycke, etc."

3. A suggestion was made that, supposing the material described as " Boulder Clay " or " Drift " were such, it might not be *in situ*, but have slipped or been washed down from higher ground near.

I cannot admit this as at all probable, for the situation of the Brigstock section is such that the ground dips away from it in three directions, and in the only direction from which slipped material could have come the ground has a very gentle inclination, a gradient *much less* than the angle of repose of any clay with which I am acquainted.

EXCURSION TO HANWELL, DAWLEY, AND WEST DRAYTON.

SATURDAY, 4TH MAY, 1895.

Director: J. ALLEN BROWN, F.G.S.

(*Report by the DIRECTOR.*)

This excursion was arranged to facilitate the examination of the two forms of river Drift and other deposits referred to in the paper read by the Director at the meeting of the Association the previous evening.

* "The Geology of Rutland and parts of Lincoln, Leicester, Northampton, Huntingdon and Cambridge." By John W. Judd, F.G.S. 1875. *Memoirs of the Geological Survey.*
JULY, 1895.]