EXCURSION TO INGATESTONE AND BEGGAR HILL.

SATURDAY, APRIL 7TH, 1906.

Director: A. E. SALTER, D.Sc., F.G.S.

Excursion Secretary: A. H. WILLIAMS.

(*Report by* THE DIRECTOR.)

MEMBERS left Liverpool Street Station at 1.55 p.m., and arrived at Ingatestone at 2.49 p.m., the party now numbering fifteen. The path leading through Stonefield to the Church was taken, and in the churchyard a large sarsen, which formerly formed part of the foundation of the Church, was examined.

The Director pointed out that the name Ing-ate-stone meant the meadow by the stone, and it was thought that a Roman milestone formerly existed here. Many interesting monuments to members of the Petre and Disney families were seen inside the Church. Nearly opposite the Anchor Inn, in the main road, were two large sarsens, one on each side of the entrance to Fryerning Lane, up which the party proceeded to the site of the bore-hole for the new Waterworks, where they were received by J. Dewhirst, Esq., A.M.I.Mech.E., who exhibited plans of the boring, which went down 800 ft., and the shaft 350 ft. Samples of the strata from various depths were exhibited, and members were able to examine the material obtained from below in the adjoining field. Mr. Whitaker, who was present, has very kindly allowed the following notes concerning this boring to be published here:

INGATESTONE WATERWORKS. TRIAL-BORING FOR THE CHELMSFORD RURAL DISTRICT COUNCIL, 1902.

Communicated by Mr. JAMES DEWHIRST, Engineer. (Remarks in these brackets from an account sent by Messrs. LE GRAND and SUTCLIFF, who made the boring). 255 (277) ft. above Ordnance Datum. Highest water-level [? from the Chalk] about 30 ft. above O.D. Lowest nearly 70 ft. below O.D. (Messrs. Le Grand say 200 ft. down). Boring decreases from 18 in. diameter to 6 in.

		Thickness. Feet.		Depth. Feet.	
GRAVEL AND SAND		2		2	
	Sandy loam	4½		6½	
	Blue clay	¾		7¼	
	Sandy loam	12¾		20	
	Blue sandy clay	7		27	
[LONDON CLAY.]	Blue clay and claystones (septaria)	31 (33)		58 (60)	
	Blue clay, small stones, etc. (with water)	32 (22)		90 (82)	
	Blue clay	418	(434)	508	
	Blue clay and shells	8		516	
	Sandy clay (blue. Pebbles at base)	16		532	

		Thickness. Feet.	Depth. Feet
[?Oldhaven Beds and Reading Beds.]	Hard sand and pebbles	2	534
	Hard sand	23½	557½
	Sand and shells	7½	565
	Clay and shells	3	568
	Undescribed	1	569
	Stone	½	569½
	Sand peat [lignite] and clay ...	8½	578
	Sand (green)	9	587
	Green sand and brown clay ...	10	597
[? Thanet Beds.]	Greenish sand and small shells [carried down ?]	49 (50½)	646 (647½)
	Flints	½	646½
[Upper Chalk.]	Chalk and flints	76	722½
	Rubble chalk	7	729½
	Chalk, with a bed of flints at 765 to 766 ft.	70½	800

The great interest of this section is that it shows a much greater thickness of London Clay than has been proved before, and even a greater total thickness than has ever been estimated. This is the more notable as the very topmost beds of that formation are here absent. On the other hand, the Lower London Tertiaries, with a total thickness of 114½ ft., are thinner than one would have expected here. Even if the last two beds classed with the London Clay be removed into this series, still the former will be of much greater thickness than before known.—W. W.

A hearty vote of thanks to Mr. Dewhirst was called for by the President, R. S. Herries, Esq., V.P.G.S., to which Mr. Dewhirst suitably responded.

The road to Fryerning was then resumed, and a few road sections in gravel were pointed out. The constituents appeared to be of local origin only.

On reaching the cross roads the Director pointed out the valley of the Wid, which ran *northward*, thus differing from all the other streams of any considerable size in Essex.

The road to Beggar Hill was then taken, and a large gravel pit on the edge of College Wood visited. Extensive old workings showed that gravel had been dug for many years.

The Director referred to the work of the late Searles V. Wood, Jun., who had devoted a great deal of attention to this kind of deposit, and had placed in the library of the Geological Society a MS. record of his observations, etc., with regard to them. He then stated that in the interpretation of superficial deposits such as that now before them three important factors demanded consideration :—

(*a*) Denudation in its various forms and effects, *e.g.*, general, fluviatile, solution of soluble rocks, etc. Many superficial deposits are simply "relics of denudation."

(*b*) Earth movements, by which lines of drainage may be disturbed and new ones produced. As a result also of (*a*), especially in areas like that visited this afternoon, soil creep, slipping and formation of mud streams may be produced.

(*c*) Climatic changes. At the time of the deposition of a gravel these may be of greater or less intensity than at the present day. The size of the blocks embedded in the gravel gives some evidence for comparison.

The effect produced by (*c*) may be roughly gauged by elimination of all the phenomena which can reasonably be explained by (*a*) and (*b*), and by considering what still requires explanation.

The deposit before them was rather over 300 ft. O.D., and being situated on the top of a hill and on the water-parting between the Wid and the Roding, showed that a vast amount of denudation had taken place since it was deposited.

It consisted of gravel about 15 ft. thick, which contained sandy patches and thin, irregular clayey layers, and was evidently laid down by a stream which once flowed over that spot. The constituents of the gravel were chiefly flint of various kinds, Bunter Quartzites, Quartz (one rough block measuring 10 in. × 11 in × 6 in.), Sarsens, and blocks of Rhyolite, one of which measured 9 in. × 8 in. × 4 in. Similar gravels at corresponding heights, and also characterised by the absence of Jurassic *débris*, Carboniferous Limestone, Basalt, Granite, are found all along the northern slopes of the Lower Thames Valley and to the north and west of the Stevenage and Goring Gaps. An account of these and the Director's views on them can be seen in his paper mentioned below. Filling a slight depression in the gravel near the centre of the pit was about 3 ft. of a strong clay under 1 ft. of subsoil. This was attributed to a small mud stream, and was made up of London Clay in which stones similar to those found in the gravel were mixed up.

The return walk was made through Mill Green Common, to the south of which the President and Mr. Monckton directed the party to some sand pits in which some years ago they had, for the first time in Essex, found casts of marine shells in the Bagshot Beds.

Mr. Monckton has kindly contributed the following note on these sections:—

"There are two small sand-pits in the wood north-east of the Post Office and a little west of Harding's Farm.

"The pit at the higher level of the two showed the following section:

"1. Pebbles of flint, a few sub-angular flints and one or two quartz pebbles in clay, about 1 ft.

"2. Laminated clayey bed, nearly 1 ft.

"3. Bed similar to No. 1, also about 1 ft.

"4. Yellow sand, a little more than 2 ft. exposed.

"The section is 5 ft. deep, and the beds occur in a somewhat irregular manner, and may have slipped to some extent. The

pebbles and bed No. 3 seemed, however, to be below their place. The succession seemed, however, to be as above, and, if that be so, the beds below bed 1 are probably Bagshot Beds.

"The pit at the lower level has been already noticed in our Proceedings; *cf.* H. W. Monckton and R. S. Herries 'On some Bagshot Pebble Beds and Pebble Gravel,' *Proc. Geol. Assoc.*, vol. xi, p. 13, at p. 22. The pit has been worked farther back, and the clay is now in consequence thicker. Less of the underlying sand is exposed than it was in June, 1888.

"The casts of shells which occur in this sand were not abundant, but several were found by members of the party on a small heap of sand at the bottom of the pit."

Similarly disturbed strata were again observed in the excavation for the new reservoir close by. A few minutes were then profitably spent in examining Fryerning Church, and its carved Twelfth Century font, etc.

At the Spread Eagle a welcome tea awaited the party, which, after thanking the Director, returned by the 7.55 p.m. train to London.

REFERENCES.

Geological Survey Map, Sheet 1 (Drift).
1889. WHITAKER, W.—"Geology of London," vol. i, pp. 259, 266, &c.
1889. MONCKTON, H. W., and HERRIES, R. S.—"On Some Bagshot Pebble Beds and Pebble Gravel," *Proc. Geol. Assoc.*, vol. xi, p. 13.
1904. SALTER, A. E.—"On the Superficial Deposits of Central and Southern England," *Proc. Geol. Assoc.*, vol. xix, p. 27, where other references can be seen.

EXCURSION TO LYME REGIS, EASTER, 1906.

FROM APRIL 12TH TO APRIL 17TH.

Directors: HORACE B. WOODWARD, F.R.S., and G. W. YOUNG, F.G.S.

Excursion Secretary: G. W. YOUNG, F.G.S.

April 12th and 13th.

(*Report by* H. B. WOODWARD.)

SEVENTEEN years ago when the Association paid its first visit to Lyme Regis under the guidance of one of the present Directors, it was remarked that "hardly any place in the British Isles is richer in features of geological interest than Lyme Regis." The difficulties of access, and the difficulties (that naturally increase) of procuring the necessary accommodation for a large party, no doubt caused delay in visiting this classic locality, and the earlier visit was described as a "preliminary excursion."

The members then assembled at Lyme Regis on Thursday evening, April 18th, 1889, and departed on Monday morning for