EXCURSION TO GRAYS.

SATURDAY, APRIL 15TH, 1916,

REPORT BY G. E. DIBLEY, F.G.S., AND A. S. KENNARD, F.G.S.,

Directors of the Excursion.

THE party left Fenchurch Street Station by the 1.15 train, and on arriving at Grays proceeded to the Wouldham Cement Company's quarry. Here in the tramway cutting is seen a fine section of the Middle Terrace deposits of the Thames, banked against a buried cliff of Chalk. Mr. Kennard pointed out that this section was very similar to the one seen on a previous excursion to Crayford. In his opinion these deposits, which were formerly considered as post-glacial and more recently as inter-glacial, were really of pre-glacial age, judging from palæontological evidence. It was often asserted that the presence of rocks foreign to the district in these deposits indicated that they were later than the boulder-clay. But it had yet to be proved that these foreign rocks were derived from the boulder-clay, and it was probable that they had come from much older gravel spreads. One thing was certain, and this was verified by the members, that foreign rocks were far less abundant in the Grays deposits than they were on the south side of the Thames, though boulder-clay *in situ* was much nearer the Grays beds.

Mr. Kennard pointed out the place, close to the base of the old buried cliff, where some years previously he had obtained a number of "Levallois" flakes, some of which he exhibited, and a number of examples were obtained by members of the party. The high Terrace of the Thames was also well exposed in this pit, but although a careful search was made no implements were obtained, but the Rev. C. E. Smith, of Chadwell St. Mary, exhibited to the members a number of implements of Chelles and late Chelles age, which he had obtained from a pit in the neighbourhood.

[A. S. K.]

Just before reaching Purfleet Station the outcrop of the Chalk was reached, and the old disused part of the former workings constituted the picturesque portion of the scenery in the vicinity of the station, where vegetation, backed by the white cliffs, capped by a fragment of Thanet Sands, is especially noticeable.

From Purfleet to West Thurrock the Chalk is again concealed by alluvium.

At Grays, on the north side of the road, where the Chalk is worked extensively for conversion into whiting and cement, the quarries are capped by Thanet Sand and Thames Gravel (see the

above section of the Report by Mr. Kennard). Upon entering the Chalk cutting the Director drew attention to the lithological features, also the dip of the beds, which here coincide with that on the southern side of the Thames. From the edge of the Tertiary escarpments in the west of Kent the Chalk has been eroded, on the whole, evenly to east of Gravesend. The *Marsupite* zone and *Uintacrinus* band are not met with east of Orpington and Farnborough, and as the fauna is identical over the whole of this area south-east of the above localities, it is safe to assume that the beds are fairly horizontal, as is proved by the very slight dip in this area.

At Grays, and on the opposite side of the Thames, beds of nodular flint and long bands of tabular flints are prominent; occasionally oblique fissures are distinctly seen filled with tabular flints. One band in particular was observed exhibiting a flexure at a different angle to a contiguous oblique fissure. This flexure consisted of much-crushed and iron-stained tabular flints dipping inwards to the western face of the chalk at an angle of about 60°. Three years ago much more of this flexure was visible; fortunately a portion remained available for inspection.

The fauna is that characteristic of the top part of the *Micraster cor-anguinum* zone. *Parasmilia*, *Echinocorys*, *Micraster*, *Epiaster*, and *Conulus* are abundant, also the more common forms of Brachiopoda. *Ostrea* and *Spondylus* are fairly represented. *Pecten nitidus* (= *cretosus*) is also met with, and at the Tunnel quarry the Director has seen a fine specimen of *P. mantellianus* (d'Orb) and many erratics.

A fine example of *Inoceramus corrugatus* (Woods) *sp. nov.* was accidentally discovered at the Wouldham Cement Company's Quarry. The Director also exhibited photographs of a fine block of associated teeth of a very large individual of *Ptychodus polygyrus* (Ag.) of high zonal form, obtained from the quarry since the publication of his paper in 1911 (see References); he also exhibited one of these very large teeth, the root of which was embedded in flints, as are most of the teeth in one large nodule.

Teeth of *Lamna*, *Oxyrrhina*, and *Notidanus* are occasionally found. After examining the Drift deposits the party adjourned to the Queen's Hotel for tea, where the usual votes of thanks were accorded to the Directors.

After tea a small party accompanied the Director to the Gray's Cement Quarry, from which very fine remains of *Inoceramus undulato-plicatus* var. *digitatus* (Schluter) have been obtained by him, also an unusually fine example of *Phare-trospongia strahani*; on this occasion a large example of an undescribed form of *Inoceramus* was obtained.

The party returned from Grays at 7.21.

[G. E. D.]

REFERENCES.

- Map, Geological Survey. Sheets 1 S.W. and 1 S.E.
 1905. HINTON, M. A. C., and KENNARD, A. S.—“Relative Ages of the Stone Implements of the Lower Thames Valley.” *Proc. Geol. Assoc.*, vol. xix, p. 76.
 1909. WOODWARD, H. B.—“Geology of the London District.” *Mem. Geol. Surv.*
 1910. HINTON, M. A. C., and KENNARD, A. S.—“Excursion to Grays Thurrock.” *Proc. Geol. Assoc.*, vol. xxi, p. 474.
 1911. DIBLEY, G. E.—“On the teeth of *Ptychodus* and their distribution in the English chalk.” *Quart. Journ. Geol. Soc.*, vol. lxvii, p. 263.

EXCURSION TO GORING AND STREATLEY.

APRIL 29TH, 1916.

REPORT BY C. P. CHATWIN AND T. H. WITHERS, *Directors of the Excursion.*

FAVoured with serene weather, the party and the Directors met at Goring Station at 12.34 p.m., and proceeded northwards to Cleeve, where the quarry in the river-side grounds of “Cleeve-mede” was open to them by the kindness of Mr. Marsland A. Bennett. Before pointing out the features of this quarry, the Directors mentioned briefly the various horizons of the Chalk that would be seen during the day, and stated that the Chalk Rock was the chief object of the visit, on account of its fine development in this district. In the Cleeve-mede quarry, the exposure is of Chalk of the zone of *Rhynchonella cuvieri*, and although the face of the section is now heavily talused and much overgrown, examples of typical fossils were soon obtained.

On White Hill, to which the party went after leaving Cleeve-mede, Chalk of the succeeding zones (*Terebratulina* and *Holaster planus*) was seen in three roadside exposures. In the lowest one on the hill, from which *Terebratulina* was collected, was a conspicuous marl-band; the Directors commented on the notable persistence, in this part of the country, of this band and of another which occurred in the same zone. The Chalk Rock, an extremely hard, cream-coloured crystalline band about 6 ft. thick, containing green-coated nodules, was seen in the adjacent exposure; and farther up the hill the upper part of the *H. planus* zone was seen in the third cutting. After making brief observations on the peculiarities of the fauna of the Chalk Rock, the Directors pointed out that the highest cutting here was a fresh exposure, which showed the “Top-Rock”—a lithological development that characterised the upper limit of the *H. planus* zone in this part