EXCURSION TO SOLE STREET, HOLLY HILL AND WEST MALLING.

SATURDAY, JUNE 17TH, 1922.

REPORT BY C. E. N. BROMEHEAD, B.A., F.G.S., AND S. PRIEST, F.G.S., *Directors of the Excursion.*

FROM Sole Street Station the footpath was followed south of the railway, eastwards to the Cock Inn. Much Eocene debris was noticed either on the field-surface or in walls, etc., including (a) Bull Head flints, (b) iron conglomerate and small sarsens from the Woolwich, (c) pudding-stone from the Blackheath. Attention was drawn to the worked flakes near the Bull Head waste and it was stated that the best finds* from the district were an arrow-head from Bowling Alley, round-ended scrapers from Hatch Hill and Buckland, and flakes from Court Farm and Little Buckland; the specimens appeared to indicate an early neolithic culture.

The small Eocene outlier of Cobhambury Hill was pointed out, where the Woolwich Bottom Bed was separated from the Chalk by not more than 20 feet of Thanet Sand. There is no Chalk hereabouts higher than the *coranguinum* zone,† but an interesting find by Mr. Priest was a flint-cast of *Ammonites* (*Hoplites*) *leptophyllus*. The large sarsens at Lower Luddesdown have been brought from Coldrum.

Immediately south of the farm a small exposure of Chalk belonging to the base of the *planus* zone was noticed; this Chalk is hard and nodular ("Chalk Rock") and frequently yields fossils, mostly hollow casts, indicative of the *reussianum* band. Differential denudation has here produced the long and prominent Cutter Ridge, capped by Chalk Rock, which was crossed on the way to Wrangling Lane. Proceeding along the lane the typical features of the dry chalk valley, with the Chalk Rock outcrop near the bottom, were pointed out; the path through Punish Wood to the top of the hill was taken and the Holly Hill outlier (642 O.D.) was reached. This outlier consists essentially of typical Blackheath Pebble Beds; there was no good open section, but the comparatively bare ground and numerous uprooted trees afforded ample evidence of the nature of the stratum. From the summit of the hill a fine view west and north over the dissected dip-slope and east over the Medway Valley was enjoyed.

The outlier is interesting from several points of view. In the first place it appears to rest on Chalk of the *coranguinum* zone; at any rate, evidence of the *cortestudinarium* zone has

* Now placed in Dartford Museum.

† See Dibley, G. E., *Proc. Geol. Assoc.*, vol. xxix., 1918, p. 78.

been obtained in the road-cutting below, not much above 500 O.D. Further west the plane on which the Eocene outliers and the Clay-with-flints rest leaves only some roft. of *planus* Chalk present at the escarpment. A change of dip bringing in higher beds of Chalk is first observable north of Coldrum; the presence of Blackheath Beds at Holly Hill shows that the folding, which produced the Medway syncline, was in part, at any rate, pre-Tertiary. Again, the Blackheath outliers of Knockmill, Fairseat (a small patch beside the road to Stanstead) and Holly Hill rest practically on the Chalk, though traces of Woolwich Beds, apparently in hollows only, occur at the last and were seen by the party. Farther north, at Ash, Ridley, Meopham and Camer, the Woolwich Beds rested on Chalk, no Thanet Sand being present except in pipes at Meopham and Harvel. Farther north again, the Thanet comes on, though only 20 ft. is present at Cobhambury, as mentioned above. It seems evident, therefore, that there is a successive overlap southwards of the Thanet by the Woolwich and the Woolwich by the Blackheath as the North Downs are approached, the well-known "ravinement" or scooping down of the Blackheath, not being sufficient to account for all the facts. Again, the distribution of the Blackheath Beds is interesting. There is a typical development here and due north in the Shorne outlier. Between these and the type area is the Swanscombe outlier, in which the beds are so attenuated that they have only recently been detected by Messrs. Priest and Stamp,* while on the western flank of Swanscombe Hill the Blackheath Beds had not yet been proved. As a wild speculation, which it might amuse the members to discuss, it was suggested that the lines of drainage represented by the present Chalk gaps, one of which had just been shown to occupy a pre-Tertiary syncline, were already in existence in Blackheath times; where this drainage from the Central Wealden area supplied abundant flints, the marine pebble beds were developed in force, their poor development at Swanscombe being due to lack of material.

Between Holly Hill House and the North Lodge, where there is a fine view over the Medway, the Halling Chalk pits were visible and the junction between Middle and Lower Chalk, marked by the Melbourn Rock immediately overlying the soft Belemnite Marl, could be detected in the face at a distance of a mile and a half. By the pond at the west side of the road the bleaching and rotting of the flint pebbles, best seen at Knockmill, is noticeable; the distribution of blocks of pudding-stone with siliceous cement suggests that the cement is derived from the rotting of the pebbles by removal and re-deposition of colloidal silica, but the chemical process involved remains a mystery.

* *Proc. Geol. Assoc.*, vol. **xxxi.**, 1920, p. 193.

Special attention was drawn to the various plant-associations. Along the Chalk valleys the slopes are clothed with yew, beech, and whitebeam as dominant masses, dogwood, spindle, wayfaring tree, privet, hedge maple, and elder crowding in, and clematis scrambling wherever possible. As the Eocene outlier is approached, thin loamy downwashes make possible a greater variety of plant life. On the sandy pebble beds of Holly Hill the larches, now mostly cut down, made a landmark conspicuous for many miles around, and birch, rhododendron, foxglove, and bracken luxuriate. The margin of the outlier where the party crossed it is indicated by the oncoming of such Chalk-loving plants as silver-weed, salad-burnet, bladder-campion, rock rose, and birdsfoot trefoil. When the Gault belt was reached at the foot of the scarp an entirely new flora was found, of which oaks, rushes and water-buttercup were conspicuous.

Crossing to "Sixteen Acre," the edge of the scarp was reached, the extensive view over the Gault vale and the Greensand hills to the south contrasting with that over the Chalk dip-slope from the summit of Holly Hill. On the descent from South Lodge towards Stangate the chalk cutting was noticed. Fossils collected by Mr. Bromhead and examined by Mr. Chatwin indicated *correstudinarium* zone near the top. In the large pit some 10 ft. of *planus* Chalk is present over the *gracilis* zone of the Middle Chalk; the former was not detected by Osborne White,* probably because it was difficult of access. The Middle Chalk here contains thin bands of marl which betray the presence of small dislocations; these are more of the nature of landslips than faults, though some slickensided surfaces occur. The smaller and lower pit, mainly in the *cuvieri* zone, was too much overgrown to be visited. Just north of Stangate the Gault comes on; there appears to be in this district a gradual passage through Chalk Marl to Gault Clay, with no recognizable Upper Greensand, making it difficult to draw a boundary line; the lower limits of clematis and Canterbury bell were found useful in mapping. From the road just north of Walnut Tree Farm a good idea of the mouth of the Medway Gap was obtained, and the second dip-slope and scarp of the Lower Chalk, due to the presence of the hard Melbourn Rock, was pointed out.

At Parson's Corner the deep road cutting shows Gault and Folkestone Beds. The former is not well exposed, but the glauconitic basement bed full of phosphatic nodules can be seen; fossils stated by Mr. Pringle to indicate the presence of both *mammillatum* and *interruptus* zones have been collected, and a few poor specimens were obtained by the members. The Folkestone Beds, of which some 20 ft. in all is exposed, also yield fossils, mostly fragmentary, large oysters and felted masses

* Appendix on the Chalk in "Ightham, a Story of a Kentish Village," F. J. Bennett, *Homeland Assoc.*

of small echinoderm spines being noticeable. Some of the beds show strong current-bedding, while others above them are highly glauconitic and in some cases silicified. The coincidence of silicification with abundant glauconite, which forms the well-known Ightham Stone, has not been seen here. The apparent dip is 5° north.

From Birling the party turned down Master's Lane and so by the footpath across Leybourne Park and through Leybourne Wood to West Malling, an exposure of Hythe Beds with chert on the southern edge of the wood being visited.

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