

to Long Crendon, where they were rewarded by a remarkable exposure, where four formations were displayed in about 12 feet of strata. In the quarry by the lower mill the top is seen to be Gault, though fossils are scarce. Then followed about 2 feet of the irregular ferruginous sandstone with which members had previously made acquaintance, representing all that is here left of the Shotover Sands. This lay on about 3 feet of well bedded limestones and marls of fine grain, in which it was easy to find a band full of *Cyprids* and scales and spines of fish, showing these to be the "Purbeck" beds of this district, while the base of the quarry was worked for the massive Portland limestone with *Trigonia gibbosa*.

On the descent of the hill towards Thame, some few of the party were able to notice the great changes which may occur locally in the base of the Portland; for here, instead of the fossiliferous beds seen on the west of Brill, about 20 feet of pure yellow sand are seen, while the Hartwell Clay is worked in the brick-yard at the base.

The party arrived at Thame in ample time for tea and the 7.5 p.m. train.

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Geological Survey Map, Sheet 45 S.E.

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EXCURSION TO FARNHAM.

SATURDAY, 13TH MAY, 1893.

Directors: H. W. MONCKTON, F.L.S., F.G.S., and H. A. MANGLES, F.G.S.

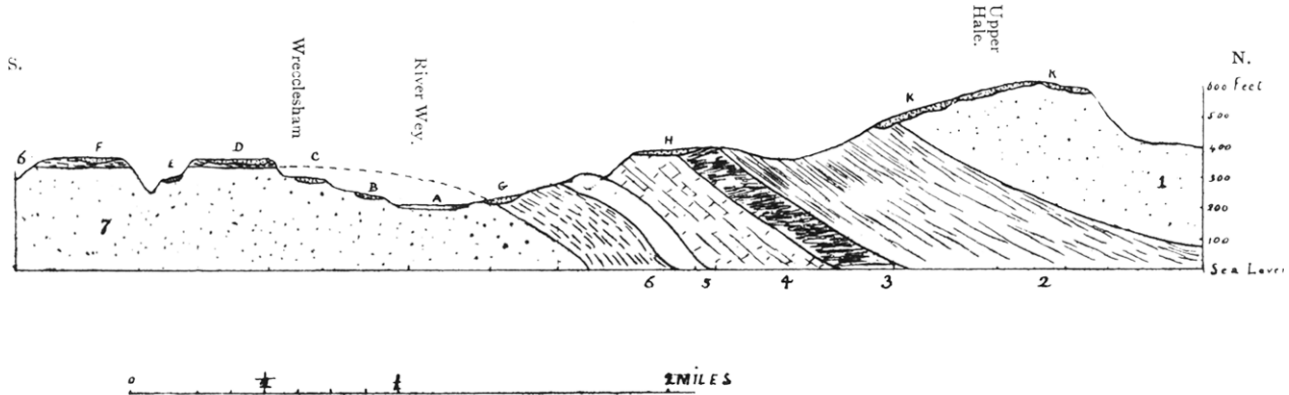
(*Report by THE DIRECTORS.*)

THE party assembled at Farnham Station, and, by the kind permission of the railway authorities, and accompanied by the Stationmaster, Mr. Sumpster, they walked along the railway for about three-quarters of a mile to the west, and inspected a large sand and gravel pit worked by the railway company.

The gravel, some 10 feet thick, forms part of a somewhat irregular terrace about 250 feet above sea level. (B, fig. 1.)

JULY, 1893.]

FIG. 1.—SECTION THROUGH UPPER HALE AND WRECCLESHAM A LITTLE WEST OF FARNHAM.—*H. W. Monckton.*



A. Alluvium of the River Wey. B to H. Various patches of gravel. K. The high level gravel of Upper Hale and Cæsar's Camp, Aldershot.

1. Bagshot Beds. 2. London Clay. 3. Reading Beds. 4. Chalk. 5. Upper Greensand.
6. Gault. 7. Lower Greensand.

It rests upon the Folkestone Beds of the Lower Greensand, in which there is a very fine section, showing sand, beautifully false-bedded, with a little ironstone here and there. At one place near the top of the section the false-bedded sands are coloured green, but as a rule they are of various shades of buff, yellow, and orange. The sand is mostly coarse quartzose, and sometimes the grains are large enough to be called small pebbles. In this sand Mr. Leighton found a number of small fragments of shells, not, however, sufficiently well preserved for determination.*

There is not much ironstone in the sand here, and in this area it seems to be most abundant in the lower part of the Folkestone Beds.

Leaving this pit, the party walked to the village of Wrecclesham (or Wracklesham), and stopped for a few minutes at a small section a little north of the church, showing gravel resting on Folkestone Beds. The gravel is composed of flints, flint pebbles, chert, and small quartz, and is part of the terrace marked C in Fig. 1. Its level is about 300 feet above the sea, and 50 feet above the terrace B. At Wrecclesham it is thin, but it thickens to the north-east, and is over 12 feet thick at a gravel pit a little south of Farnham Station. The gravel of the two terraces B and C is mapped as one patch on the Geological Survey Map.

A section close to Wrecclesham Church was next visited, which gave rise to some discussion. It is described by Mr. Drew at p. 142 of Topley's "Weald," and the beds now shown are:—

- | | |
|--|-------------|
| 7. Clay. | |
| 6. Greenish sand and quartz grit with small quartz pebbles
and scattered phosphatic nodules | 1 ft. 2 in. |
| 5. Clayey, gritty sands, few nodules | 2 ft. 3 in. |
| 4. An ironsand layer | 0 ft. 1 in. |
| 3. Yellow sand | 1 foot. |
| 2. Yellow sand with phosphatic nodules and fossils | 1 foot. |
| 1. Yellow sand. | |

No. 7 is either Gault or reconstructed Gault. No. 1, according to Mr. Drew, is $4\frac{1}{2}$ feet thick, and is underlain by 4 inches of phosphatic nodules.

The following fossils were found in Bed 2:—

<i>Nautilus</i> (a fragment)	<i>Natica</i> sp.
<i>Ammonites Beudantii</i> , Brong.	<i>Pecten orbicularis</i> , Sow.
<i>Ammonites interruptus</i> , D'Orb.	<i>Pecten quinquecostatus</i> , Sow.

Now the question arises whether we should look upon the Beds 1 to 6 in the above section as the bottom bed of the Gault (zone of *A. interruptus*), or as the top bed of the Lower Greensand (zone of *A. mammillaris*). Mr. Drew observes: "In the

* Many of the fragments collected are only race, but undoubted shell fragments do occur, also some pieces of shell partly converted into race. An *Ostrea* can be recognised; there are also some tubular bodies which may be *Serpula*, but it is not quite certain whether they are organic at all.—T. LEIGHTON.

neighbourhood of Farnham the top bed of sand [of the Folkestone Beds] contains nodules of phosphate of lime, like nodules occur in the Gault just above; and, indeed, it is possible that both beds belong to the Gault, but the lowest is certainly in sand." (*Weald*, p. 141.)

The Gault clay was seen in a brickyard at the top of the hill above Wrecclesham, and a large fragment of shell was given to one of the party by a workman, and was said to have come from the bottom of the clay. Mr. Monckton thought that it probably came from a bed nearly answering to Bed 6 in the Wrecclesham Section, for the shell is filled with coarse sand similar to that of Bed 6. He thought it was almost certainly a fragment of *Exogyra sinuata*, Sow. and afforded evidence that the sand is really Lower Greensand, for that shell does not occur in the Gault, so far as he was aware. The other fossils occur both in the basement bed of the Gault and in the Lower Greensand.

In the section near Dorking, which the Association visited on July 9th, 1892 (see *ante*, p. 9), the bed with phosphatic nodules and *Ammonites interruptus* was seen resting on yellow and crimson sands, fairly evenly bedded; and in the brickfield on the east of the railway between Merstham and Red Hill, which was visited on May 21st, 1887,* the section was

Gault.—3. Very coarse quartz sand with much glauconite of a dark greenish grey colour.

2. Line of small phosphatic nodules.

Folkestone Beds.—1. Coarse yellow quartz sand.

Unfortunately none of these sections show the whole series from the Gault clay into the false-bedded sands of the Folkestone Beds; and perhaps at present it is safest to treat the sand with phosphatic nodules rather as the top of the Lower Greensand than as the base of the Gault.

Resting upon the Gault clay at the brickyard above Wrecclesham there was seen to be a gravel of irregular thickness. It forms a portion of the long sheet of gravel which caps a plateau running in a N.E. and S.W. direction parallel to the terraces B and C already described. It is marked D in fig. 1, and its level is from 360 to 380 feet above the sea. In places it is 25 feet thick, and it is nearly always well stratified near the bottom, and frequently quite unstratified near the top. The well-stratified part is nearly always seen to be more sandy than that which is unstratified. The gravel is mainly flint from the Chalk; but there are also flint pebbles from the Eocene pebble-beds, ironstone pebbles from the Folkestone Beds, some chert from the Hythe Beds, and some small quartz. The party walked along the top of this plateau, or ridge, and inspected a number of good sections.

Mr. Mangles informed the party that a considerable number

* *Proc. Geol. Assoc.*, vol. x, p. 156.

of flint implements have been obtained from this gravel. The majority are found near the bottom of the gravel, a foot or two above the Folkestone sand, but they range upwards to within three feet of the surface. Some have been actually picked up on the surface of the soil, but it is not improbable that they have been unearthed in opening the pits. Two of the largest pits have been worked out, and a move has now been made to a new pit on the east side of the Frensham road.

Before leaving the north face of the ridge, Mr. Monckton gave an address on the general geology of the district as seen northwards from that spot (see fig. 2). Mr. Mangles followed with a short account of Farnham Hundred, of the original fortress of Farnham Castle, of the visits of Queen Elizabeth to it, and of the part it played in the Civil Wars. Mr. Mangles also described the trade of the town since the beginning of the sixteenth century.

The party then walked to Waverley Abbey woods and halted under the trees for lunch.

After lunch the party, by the kind permission of Mrs. Anderson of Waverley Abbey, walked through the woods to the ruins, passing on the way a small gravel pit in a low-lying gravel, composed mainly of flints and of ironstone from the Folkestone Beds.

A short history of the Abbey (which dates from 1128 A.D.), was given by Mr. Mangles, and the details of the ruins were pointed out by the Rev. W. H. Edge, vicar of Tilford, after which the party crossed the river Wey and ascended Crooksbury Hill (534 feet). Mr. Mangles mentioned that a well at some cottages at the north foot of the hill had passed through 175 feet of the Folkestone Beds and entered a greenish calcareous stone of which some specimens were exhibited, all agreeing that they were Bargate Stone.

There is no section at the top of Crooksbury but several flints were seen on the surface and no doubt the hill which is formed of Folkestone Beds is capped by a small patch of gravel. Mr. Mangles remarked that this hill is called "Richard's Hulle," in Henry de Blois' grant of A.D. 1250.

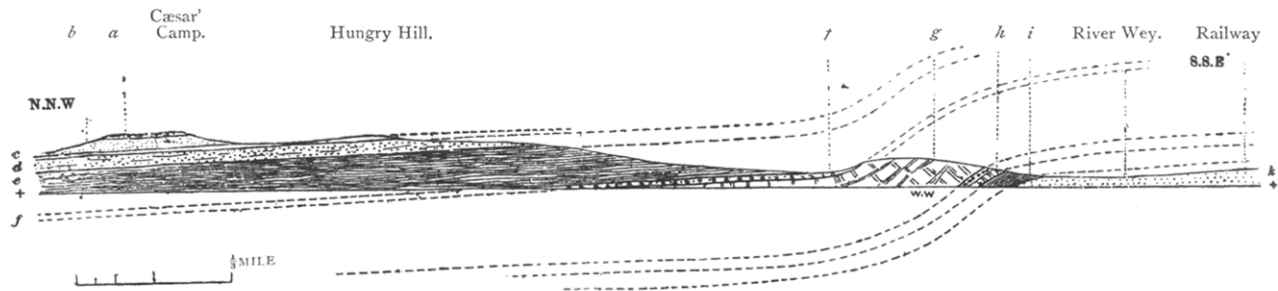
The party then walked to Littleworth Cross, the residence of Mr. Mangles, and found an extremely interesting exhibition of flint implements set out on the terrace. The following are the details:

A series of flint implements from the Farnham gravels exhibited by Mr. Mangles.

- (1) Implements from the gravel marked B in Fig. 1. These are without exception very much water-worn.
- (2) Implements from gravel marked D in Fig. 1. These were arranged, as far as possible, according to the types as classified by Sir John Evans,* and included—

* "The Ancient Stone Implements . . . of Great Britain," London, 1872.

FIG. 2.—SECTION FROM CÆSAR'S CAMP, NEAR ALDERSHOT, BY FARNHAM PARK TO THE SOUTH-EASTERN RAILWAY NEAR FARNHAM STATION.—*W. Whitaker.*



Scale, horizontal and vertical : 2-4 in. = 1 mile.

(Reduced from the Geological Survey Memoir.)

+ Sea-level (approximate.)

- | | | |
|---|-------------------------|---|
| <i>a.</i> Gravel. | <i>e.</i> London Clay. | <i>h.</i> Upper Greensand. { Greensand. |
| <i>b.</i> Upper Bagshot Beds (sand). | <i>f.</i> Reading Beds. | { Malm Rock. |
| <i>c.</i> Bracklesham Beds (more clayey). | <i>g.</i> Chalk. | <i>i.</i> Gault, |
| <i>d.</i> Lower Bagshot Beds (sand). | | <i>k.</i> Lower Greensand. |

The broken lines above show the former continuation of the beds southward, and those below their present continuation underground northward.

- (a) Pointed implements which may be described as acutely pointed, tongue-shaped, kite-like, ovate, ovate lanceolate, and sub-triangular; also a couple of thick-backed, single-edged implements, which appear to have served as knives or choppers of the roughest kind.
 - (b) Sharp rimmed implements. These may be described as ovate, oval, almond shaped, heart shaped, sub-triangular, and lunate or perch-backed.
 - (c) Borers.
- (3) Neolithic implements (Celts and arrow-heads), from the neighbourhood of Farnham and the downs of East Hants.
 - (4) Two Palæolithic (?) implements from the drift in Griqualand, South Africa—almost identical in shape with the sharp rimmed implements of Farnham.
 - (5) A specimen block of breccia of sub-angular flint in a very hard siliceous sandy cement, some quantity of which has been dug up one or two feet below the surface in trenching land at the south-east foot of Crooksbury Hill.
 - (6) Corals from the Lower Greensand at the south foot of Crooksbury Hill. Mr. C. J. A. Mejer observed that they resembled corals from the Bargate Stone horizon.

A series of flint implements from Farnham and one from Frimley, some of which are described and figured in the collections of the Surrey Archæological Society, exhibited by Mr. Frank Lasham.

A series of palæolithic implements from Farnham, exhibited by Mr. S. C. Hincks.

After the specimens had been examined the party adjourned to a tent where an excellent repast was provided by Mr. Mangles, to which full justice was done, and afterwards Mr. Mangles' beautiful garden was explored and a visit paid to the rhododendron house, where a collection of Himalayan and other rhododendrons was seen. Unfortunately it was too late in the season to see more than a very few of the species in blossom.

In the course of the day there was much discussion as to the age and origin of the various gravels. Mr. Monckton believed they were all river gravels, and stated that in the gravel F, which there was not time to visit, the proportion of chert from the Hythe beds is larger than in the gravels B C D, though the level was much the same as that of the implementiferous gravel D. The gravels B C D, he thought, were probably due to a river flowing from the south-west. The gravel E was a small terrace formed during the cutting out of the small brook which runs across Farnham Common, and the materials were probably derived mainly from gravels D and F.

Gravel G is an old river Wey gravel.

Gravel H is a patch not mapped, on the top of a hill half a mile west of Farnham Castle, and its composition seems to show its derivation from gravel K.

K is the gravel of Upper Hale, Hungry Hill and Cæsar's Camp, Aldershot, which has been described.*

In many cases patches of these gravels seem to have slipped down hill or been lowered in level since their deposition, and this is probably largely due to underground waste, as recently described by our President.†

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* *Quart. Journ. Geol. Soc.*, vol. xlviii. p. 30 (1892)

† *Natural Science*, vol. ii., no. 12 (Feb. 1893), p. 124.