

## ORDINARY MEETING.

FRIDAY, MAY 3RD, 1889.

T. V. HOLMES, Esq., F.G.S., President, in the Chair.

The donations to the Library since the previous meeting were announced, and the thanks of the Association accorded to the various donors.

The following gentlemen were elected Members of the Association :—J. J. Foster ; W. G. Ridewood, B.Sc. ; C. J. Smith.

The following papers were then read :—‘ Note on a Chelonian Humerus from the Middle Eocene of Bracklesham,’ by R. LYDEKKER, B.A., F.G.S., etc.

‘ On Rocks from The Saas-Thal and Geneva,’ by Capt. MARSHALL HALL, F.G.S., F.C.S., etc.

‘ Geology before 1800,’ by E. LITCHFIELD.

Specimens were exhibited by Captain MARSHALL HALL and by Mr. LYDEKKER in illustration of their respective papers.

## EXCURSION TO BOXMOOR AND NASH MILLS.

SATURDAY, 18TH MAY, 1889.

(In conjunction with the Hertfordshire Natural History Society).

*Directors :*

JOHN HOPKINSON, F.L.S., F.G.S., and JOHN MORISON, M.D., F.G.S.

*(Report by MR. HOPKINSON.)*

The Tertiary beds of the London Basin are traversed along the London and North Western Railway as far as Bushey Station, where the Upper Chalk first appears from under the Woolwich and Reading Beds which are seen in the Bushey cutting, and a chalk-pit on the right of the line, just beyond the station, shows the characteristic layers of flints. After crossing the valley of the Colne, and passing through the Watford tunnel, the line runs along the valley of the Gade as far as Two Waters, where the Gade receives its tributary the Bulborne, half-a-mile from Boxmoor Station.

The Members of the two Societies assembled at this station in the afternoon, and visited first a large chalk-pit excavated in the side of the hill called Rough Down, west of and facing the

line. Near the top of the pit there is a bed of hard cream-coloured chalk, known as the Chalk Rock, which is usually considered to form the top bed of the Middle Chalk.

After a few introductory remarks had been made by Mr. Hopkinson, a paper on the Chalk Rock was read by Dr. Morison, which is here slightly condensed.

"The Chalk Rock, which lies at the top of the Middle Chalk, is a cream-coloured, rather rubbly limestone, jointed at right angles to the plane of bedding, breaking with a more or less conchoidal fracture, and weathering on exposure to the air. The upper surface is well defined, but the lower shades off gradually into the soft chalk beneath. It contains numerous grains of glauconite, and irregularly-shaped nodules slightly phosphatic and coloured green outside by glauconite; and it also has irregularly-cylindrical branching cavities filled in many cases by a ferruginous sandy clay or containing nodules of iron-pyrites. It varies in thickness from a few inches to 10 feet; but here it is only 18 inches thick. In some places there are two bands a few feet apart. It is the lower, or principal band which contains the green-coated nodules and characteristic fossils. It does not contain flints, but I once found a quartzite pebble in it. It is the Chalk Rock which, resisting denudation more than the softer chalk, protects the slope of the Chalk escarpment to the north of us, and assists in forming the outline of the Chiltern Hills. Its fauna is peculiar, being notable for the number and variety of the Gastropoda; the Cephalopoda also are tolerably abundant; and the sponges are very numerous and varied. Through the courtesy of Mr. Whitaker I am enabled to state that the Chalk Rock differs materially in its chemical composition from ordinary soft chalk, containing more than twice as much magnesium-carbonate, nearly twice as much silica, more than three times as much sulphuric acid in the form mainly of sulphate of calcium, and a relatively very large amount (0·6 to 0·7 per cent.) of phosphoric acid in the form of phosphates. Examined microscopically, the Chalk Rock is seen to contain a number of small crystals; indeed I think its hardness is mainly due to its crystals of calcium-carbonate, in fact to the conversion of the soft chalk into a crystalline limestone; sometimes, indeed, large crystals of calcite are formed. Opinions differ much as to the depth of the sea in which the Chalk generally was

laid down, but the Chalk Rock must have been deposited in a comparatively shallow sea, a considerable elevation of the sea-bottom taking place before its deposition. Its very numerous and varied fossils show this, and especially the remarkable abundance of Gastropoda, which usually inhabit a shallow sea not far from land."

After a few fossils had been found, the pit was left for the brick-fields at Bennet's End, the route taken being by Two Waters and across the fields. These brick-fields are at a considerable height on the opposite side of the valley to Rough Down. They are on an outlier of the London Clay and Reading Beds, through which a fault runs nearly north and south, the Chalk abutting against the basement-bed of the London Clay. This is not clearly seen now, the beds not being worked in proximity to the fault, but the following section by Mr. Whitaker, reproduced from his 'Geology of London' (p. 209), by permission of the Director-General of the Geological Survey, shows what was to be seen in 1861:—

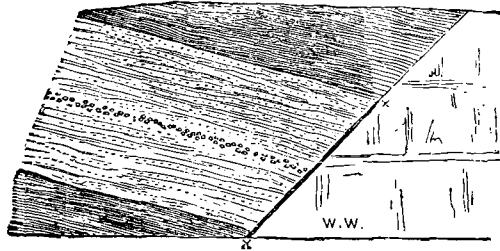


FIG. 1.—Diagram-Section of a Pit near Bennet's End.

- |   |   |               |   |   |   |  |
|---|---|---------------|---|---|---|--|
| LONDON CLAY.  | { | Basement Bed. | { | a Roughly laminated brown clay, from 0 to about 6 feet. | } |  |
|   |   |               |   | b Brown loam, over 6 feet                               |   |  |
|   |   |               |   | c Flint pebbles and oyster shells, about 6 inches       |   |  |
|   |   |               |   | d Brown loam, like b, 5½ feet                           |   |  |
| about 12 feet.  |   |               |   |   |   |  |
| e Bluish-grey plastic clay of the Reading Beds, holding water.  |   |               |   |   |   |  |
| f Chalk, abutting against the basement-bed of the London Clay.  |   |               |   |   |   |  |
| xx Line of clay along the fault. (The right-hand part of the section, lightly engraved, not actually seen.) |   |               |   |   |   |  |

The basement-bed of the London Clay has here yielded many fossils, a list of which is given on pages 264 and 265 of Mr.

Whitaker's Memoir. In the higher and more northerly part of these brick-fields a bed of brick-earth is now largely worked.

The route was now down the hill to the south into the valley of the Gade again, and as a rather longer time had been taken over the walk than had been anticipated, the party crossed the fields direct to Nash Mills, the residence of Dr. John Evans, F.R.S., Pres. S.A., who had very kindly invited both Societies to "tea and flint-implements." While "tea" included other refreshments, most welcome after the five miles' walk on a bright sunshiny afternoon, it was found that "flint-implements" implied a collection of antiquarian treasures which, for interest, rarity, and serial completeness in many of the departments represented, is without equal, even in any public museum.

The following are the principal objects which were exhibited:—In the Library: Palæolithic or River-drift implements from England, France, Spain, India, and Africa; Greek, Roman, Saxon, and Merovingian glass; Rhodian and Damascus ware. In the Inner Library: Neolithic or surface implements, and those of modern savages from various parts of the world; bronze antiquities of various countries; Venetian and other glass, ancient pottery, etc.; arms and implements of modern savages. In the Dining-Room: Early gold ornaments; Roman, Saxon, Merovingian, and Mediæval brooches and other antiquities; posy and other rings; Mediæval seals; Hispano-Moresco pottery. In the Drawing-Room: Greek and Roman coins and medallions; Ancient British, Saxon, and English coins and medals; early plate; ancient needlework; Lambeth pottery, and various porcelain and pottery. To give some idea of the number of the objects exhibited it may be stated that there were about 500 rings, of which between 300 and 400 have inscriptions. Of local interest was a collection of nearly 200 coins struck at Verulam, which have been discovered in various parts of the kingdom. The splendid collection of Palæolithic and Neolithic flint-implements, however, attracted the largest share of attention.

Before leaving, the party assembled on the lawn, and Mr. Rudler, in the absence of the President of either Society, proposed a hearty vote of thanks to Dr. and Mrs. Evans for their kind and hospitable reception. The return journey was made from King's Langley Station, Dr. Evans sending his carriages

to convey most of the ladies there. The Members of the Hertfordshire Society numbered about 80, and of the Geologists' Association 25.

## REFERENCES.

Geological Survey Map, Sheet 7.

HOPKINSON, J.—“Field Meeting at Boxmoor and Nash Mills.” ‘Trans. Watford Nat. Hist. Soc.,’ Vol. i, pp. xli-xlii (1877).

— Introduction to Pryor’s ‘Flora of Hertfordshire,’ pp. 12-17 (1887).

WHITAKER, W.—“On the Chalk Rock.” ‘Quart. Journ. Geol. Soc.,’ Vol. xvii, pp. 166-170 (1861).

— “The Geology of London and part of the Thames Valley,” Vol. i, (1889). See Index “Bennet’s End” and “Boxmoor.”

## EXCURSION TO BRENTWOOD.

SATURDAY, MAY 25TH, 1889.

(In conjunction with the Essex Field Club.)

*Directors* : R. S. HERRIES, F.G.S., H. W. MONCKTON, F.G.S.,  
and H. B. WOODWARD, F.G.S.

(*Report by THE DIRECTORS.*)

Leaving Brentwood Station, the party proceeded southwards to Warley Common, and by a private road to the Barracks. In the course of this walk, as remarked by Mr. Monckton, the party had passed from the London Clay at Brentwood Station, over the passage-beds connecting that formation with the Bagshot Sands, and on to the Bagshot beds. With these Bagshot beds there had been included by the Geological Survey certain pebble-beds, to which attention was now especially directed.

The party was first conducted by Mr. Monckton to a pit west of Warley Scrubs, where gravel had been dug to a depth of eight or nine feet. On the Geological Survey Map this was coloured as “Pebble Gravel,” distinct from the “Bagshot pebble-beds.” The gravel consists mainly of flint-pebbles, but contains also a number of pebbles of quartz, some of large size, as well as angular flints. Mr. Monckton explained that he did not believe this gravel was part of a marine formation, though he thought that some of the Hertfordshire Pebble Gravel, which is coloured with the same tint on the map, may be marine. In his opinion, we have in this instance merely *débris* of the neigh-