

After a welcome tea at the "Grapes" Hotel, to which about thirty sat down, under the chairmanship of the President, thanks were returned to the Director; and, the weather having cleared, a pleasant evening stroll of about a mile brought the party to the brickfield at Woodhatch, where a most interesting junction between the Weald and Atherfield Clays was exposed. In the upper part of the blue Weald Clay was a calcareous band apparently composed of partly dissolved *Cyrenæ* and a layer of ironstone; and several fish-scales were found. Above the swampy junction came the nodular band of the Atherfield, crowded with *Perna Mulletii*, which also yielded coniferous wood, an undetermined gastropod, and other fossils probably referable to *Pecten interstriatus* and *Pinna sulcifera*.

A rapid walk, across Earlswood Common and past the deeply iron-reddened section of the Hythe Beds at Redhill Common, brought the excursionists back to the railway-junction, and terminated a day not by any means unsuccessful in spite of the weather.

REFERENCES.

- Geological Survey Map, Sheet 8.
 Ordnance Survey Map, New Series, Sheet 286.
 W. H. FITTON.—"Strata below the Chalk." 'Trans. Geol. Soc.,' Ser. 2, Vol. iv, pp. 140-143; 1836.
 W. H. FITTON.—"Observations on . . . the Lower Greensand." 'Proc. Geol. Soc.,' Vol. iv, p. 201; 1843.
 C. J. A. MEYER.—"Excursion to Redhill." 'Proc. Geol. Assoc.,' Vol. vi, p. 373; 1880.
 W. TOPLEY.—"The Geology of the Weald." 'Mem. Geological Survey,' 1875, pp. 113, 121, 141, 148, 154, 233.
 G. J. HINDE.—"On Beds of Sponge-remains in the Lower and Upper Greensand of the South of England." 'Phil. Trans.,' Part ii, 1885, p. 403.

EXCURSION TO CIRENCESTER AND MINCHINHAMPTON.

MONDAY AND TUESDAY, MAY 30TH AND 31ST, 1887.

Directors: Professor ALLEN HARKER, F.L.S., F.G.S., Professor of Natural History, Royal Agricultural College, and EDWIN WITCHELL, F.G.S.

(*Report by* PROFESSOR HARKER.)

An informal Excursion was made on May 29th to Birdlip, to give such of the Members as could join a general idea of the lie of the Cotteswolds. It is not until the stranger reaches the actual escarpment that he realizes that he has gradually been ascending from the town of Cirencester through a vertical height of nearly 600 feet.

From a projecting spur of the escarpment in the grounds of the "George" a magnificent view of the valley of the Severn is obtained—the hills of the Forest of Dean, May Hill, and the Malverns forming the background from left to right; Gloucester Cathedral, the Abbey at Tewkesbury, Cheltenham, and to the north Bredon Hill, being conspicuous landmarks in the vale; nearer still the outliers of Churchdown and Robin's Wood Hill, the latter still capped by Inferior Oolite, evidence the mode in which the vale has been partially excavated. Close to and below the grounds of the hotel the Birdlip Section of the Inferior Oolite was examined; and then the party walked to Crickley Hill, where a well-exposed section reveals some feet of the characteristic Pea Grit or Pisolite. The weathered, lozenge-shaped granules mainly composing this rock were strewn in vast numbers over the slopes of the hill beneath the beds, and from their fairly uniform size present a striking appearance. Several of the characteristic Brachiopods were obtained, and most of the party eagerly secured specimens of the Pisolite. A return to Birdlip was made across the northern side of the hill, whence a still better view is obtained of Cheltenham and the escarpment, extending to the opening of the Vale of Evesham. On the drive back to Cirencester the successive beds of Great Oolite and Forest Marble passed over were pointed out.

May the 30th.—After a visit to the Corinium Museum, the Members assembled at the Royal Agricultural College, and devoted some time to the inspection of its Museum, of which Lycett, in his 'Geology of the Cotswolds,' speaks very highly. In addition to the College geological collection, Professor Harker had arranged in his laboratory a small collection of fossils obtained by himself and students from the quarries in the neighbourhood, illustrating the Great Oolite, Bradford Clay, Forest Marble, Cornbrash, Kellaways Rock, and Oxford Clay, most being from quarries which were in the programme for the day. A visit to a huge concretionary block of Kellaways Sandstone, which has been mounted on a pedestal in the midst of a grove of trees in the Botanic Gardens, concluded the inspection of the College. Professor Allen Harker, who acted as *cicerone* for the day, described the block (which weighs over 25 cwts.) as specially interesting, as having come from a section which was the *pièce de résistance* of the day's excursion. The party then walked to Jarvis's quarry, two miles on the Ackman Street, or Bath road, where there is a section showing the uppermost beds of the Great Oolite, capped by a few feet of fissile

Forest Marble. A number of fossils were obtained, including *Terebratula maxillata*, *Pecten vagans*, teeth of *Lepidotus* and *Strophodus*, and *Lima cardiiiformis* in abundance. This concluded the morning's programme, and a return was made to Cirencester for lunch.

At 2 p.m. the party drove to South Cerney, a distance of four miles. On the way, in crossing the Thames and Severn Canal, the classic spot was pointed out where William Smith found the Kellaway's Rock. The carriages were left near the village, and a careful examination of the section on the Swindon, Marlborough, and Andover Railway, through the Kellaway's Rock, was made. This very remarkable section has been described by Professor Harker (with a photograph of it at the most picturesque period of its excavation) in the 'Proceedings of the Cotteswold Club.*' Some hour and a half or more were spent in examining the curious concretionary masses *in situ*, and in excavation, with their fossils (notably their large masses of imbedded wood); and, after a brief description of their history, a discussion was held on some of the remarkable features presented. Among the chief fossils in the Kellaway's Rock were *Ammonites Calloviensis*, *Myacites recurva*, and *Waldheimia obovata*.

A walk back towards Cirencester along the railway brought the party to the village of Siddington, where there is a large quarry in the Forest Marble worked for the sake of its shelly limestone, which is used for a road material, and for its tile-stones, largely employed in the neighbourhood for roofing-purposes. Here, again, fossils are fairly plentiful, the chief species being *Ostrea Sowerbyi*, *Pecten annulatus*, and *Lima cardiiiformis*; but they are not so numerous as in a railway-cutting not far off, where a small section shows the Cornbrash and its junction with the Forest Marble. The Cornbrash is about 7-8 ft. in thickness, and quite full of fossils. *Homomya* and *Pholadomya* are genera very abundantly represented, as well as Brachiopods and Ammonites. Among the chief species are *Terebratula lagenalis*, *T. intermedia*, *Waldheimia obovata*, *Ostrea flabelloides*, and *Ammonites macrocephalus*. A short account was given by the Director of the extent and character of the Forest Marble as shown by this cutting and the quarry just left, these two sections, with a few smaller ones in the neighbourhood, exposing the whole of the Forest Marble at its average thickness.

* Vol. viii, p. 176 (1885).

On the way back to Cirencester two collections of the local ornamental stone, known as the "Dagham stone," were visited, one very large accumulation being kindly shown in the private garden of its owner, Mr. Gillett, who invited the party to pass his way. The stone is a hard oolitic limestone, perforated by irregular holes in such a manner as to present a reticulate appearance.* It is used in buildings and rockeries.

Tuesday, May 31st, 1887. (Report by Mr. E. Witchell, jun.).—The party proceeded from Cirencester to Stroud, where they were met by Mr. E. Witchell, F.G.S., Mr. W. H. Hudleston, F.R.S., the Rev. H. H. Winwood, F.G.S., and several other members of the Cotteswold Field Club. The direction of the party for the day was under Mr. Witchell.

A move was soon made for Dudbridge, some of the party riding, while others preferred a walk by the side of the canal. The brick-pit at Dudbridge was visited, and the Middle Lias beds were explained by Mr. Witchell, who compared them with those at Stroud, which are more ferruginous and consolidated. The "*spinatus*"- and "*margaritatus*"-beds were found in close contact, and it was remarked that Dr. Wright had observed the same occurrence at Dursley. A few fossils were obtained, of which *Avicula inæquivalvis*, *Unicardium*, and *Pleuromya* were most abundant. At the upper brick-field there was an excellent section of the *spinatus*-bed, with the overlying Upper Lias; and here, in the concretionary rocks, were found many characteristic fossils.

The party then proceeded to Rodborough Hill, passing over the Upper Lias and Cotteswold sands, and making the next halt at the parish pond, behind which there is a small exposure where the Pea-Grit was shown, at this point overlying 40ft. of Lower Limestone. At the request of the President, Mr. Witchell pointed out the successive formations they had now passed. He traced the bed before them, from Birdlip, where it was eight feet thick, to where it vanished at a point five miles away in an opposite direction. The presence of a small oyster on the upper surface of the Lower Limestone beds proved that a pause of some duration had occurred in the deposition of the strata, enabling the oyster-bed to form. Hammers were soon at work in the Pea-Grit beds, and the characteristic shells *Terebratula plicata* and *Rhynchonella sub-*

* These holes may be due in part to the decay of organic remains, such as branching corals or sponges. *Vide* S. P. Woodward, 'Geol. Mag.,' 1867, p. 405.

angulata were obtained. The next section visited was the old quarry below the Fort, which has now been sloped down and all the beds covered up, but two small exposures remain, showing the Oolite Marl with its characteristic *Terebratula fimbria*, and with the *Nerinæa*-bed beneath. But from the hard nature of the rock, fossils can only be obtained at the expense of time and labour, and few or no prizes were taken from this quarry. *Terebratula submaxillata* and *Rhynchonella sub-tetrahedra* do, however, occur. A move was then made for the upper quarry, near the Fort, where the Upper Freestone Beds and Ragstone Series above form a fine section. The characteristic gryphite (*Gryphæa sublobata*) was found, and good specimens of other fossils—*Terebratulæ* and *Trigoniæ*—were taken. *Terebratula globata* was especially abundant in the upper beds, or *Clypeus* Grit and White Freestone. A short explanation was here given, and on leaving the quarry the party formed a circle upon the escarpment of the common, where Mr. Witchell gave a short discourse upon the physiography of the district. It was remarked that the presence of the same beds lying in one plane in adjoining hills prove the rocks of the neighbourhood to have been originally connected, and the valleys between them to have been formed by the slow but sure process of denudation.

At the Bear Inn the company partook of a light lunch, after enjoying a fine view of the Woodchester valley, and obtaining a few specimens from the roadside quarry. The Great Oolite quarries on Minchinhampton common were afterwards visited, and some fossils were found, the fine character of the stone being much admired by all present. Among the most characteristic species are *Purpuroidea Morrisii*, *Nerinæa Voltzii*, and *Tancredia brevis*. The party then crossed the common to Walls quarry, another rich field for geologists, and here several ladies and gentlemen inspected the large cave under the guidance of a native whose geological studies had been strictly professional, and who used a pickaxe in place of the amateurs' hammer. Soon after four o'clock the signal was given for the return to Stroud. The Members dined at the Imperial Hotel, and Mr. Witchell received a cordial vote of thanks for having conducted them on one of the pleasantest field days they had ever enjoyed.

Those who took part in this excursion and remember the geniality of Mr. Witchell, and his readiness to impart his wealth of

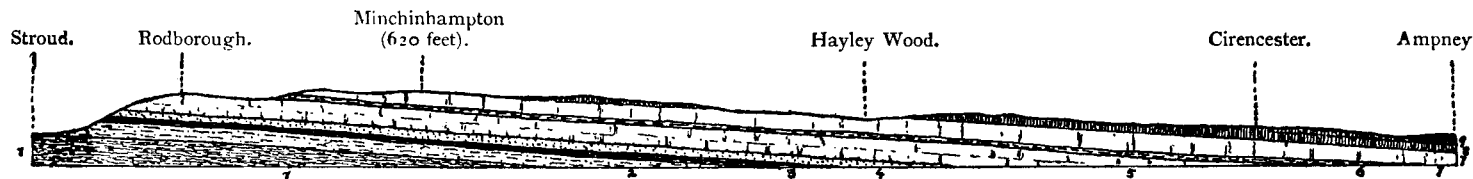


FIG. 1.—Diagram-Section from Stroud to Cirencester. (LENGTH, ABOUT 15 MILES.)

By H. B. WOODWARD, F.G.S.

1. Lower Lias.
2. Middle Lias.
3. Upper Lias Clay.
4. Cotteswold Sands.
5. Inferior Oolite.

6. Fuller's Earth.
7. Great Oolite.
8. Forest Marble.
9. Cornbrash.

local knowledge to any Member who appealed to him, will have heard with profound regret of his sudden death in a quarry a few weeks after the Whitsuntide excursion.

REFERENCES.

- Geological Survey Map, Sheet 34; and Explanation (Geology of parts of Wiltshire and Gloucestershire), by A. C. RAMSAY, W. T. AVELINE, and E. HULL; 1858.
- BUCKMAN, Prof. J.—“On the Oolite Rocks of Gloucestershire and North Wilts.” ‘Quart. Journ. Geol. Soc.,’ Vol. xiv, p. 98; 1858.
- HARKER, Prof. ALLEN.—“On a Remarkable Exposure of the Kellaway’s Rock in a Recent Cutting near Cirencester.” ‘Proc. Cotteswold Nat. Club;’ 1885.
- LYCETT, Dr. J.—‘The Cotteswold Hills. Hand-book introductory to their Geology and Palæontology;’ 1857.
- WITCHELL, E.—‘The Geology of Stroud;’ 1882.

EXCURSION TO RICKMANSWORTH.

SATURDAY, JUNE 4TH, 1887.

(In conjunction with the Hertfordshire Natural History Society.)

Director : JOHN HOPKINSON, F.L.S., F.G.S.

(*Report by* THE DIRECTOR.)

Sections exposed in making the new line of railway from Pinner to Rickmansworth were examined by the Association in June, 1886.* The London Clay and Woolwich and Reading beds were then seen, and the line was left near Moor Park before it crosses the valley of the Colne. On the opposite side of this valley the Chalk has been cut into, and this Excursion was originally arranged to enable the Members to examine sections of the Upper Chalk thus exposed. It was found, however, towards the end of May, that the cuttings in the Chalk were no sooner completed than they were covered up with a layer of soil on which grass was destined soon to grow, and the programme had to be altered. Although the route now chosen was not, perhaps, so interesting geologically as that which had to be abandoned might have been, it had the advantage of being more picturesque.

From Rickmansworth (London and North Western) Station †

* See ‘Proc. Geol. Assoc.,’ Vol. ix, pp. 548-550.

† The Metropolitan Station has now been opened.—*Sept.*, 1887.