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REPORT OF AN EXCURSION TO BANBURY.

AUGUST 1ST TO 5TH, 1913.

By EDWIN A. WALFORD, F.G.S., *Director of the Excursion*.

AUGUST 1ST.

THE party, some 16 in number, reached Banbury on Friday, August 1st, and headquarters were established at the White Lion Hotel. Mr. H. Tinker acted as the Excursion Secretary.

In the neighbourhood of Banbury the Middle Lias rock attains not only its maximum thickness of 25 to 30 ft., but also along the Edge Hill escarpment reaches an altitude of 730 ft. It makes that pleasantly diversified landscape where, in the high vales, the scarp is cut through into the gypsiferous marls, here and there developing the terraced banks credited with so many myths in the story of their making.

The Friday evening's walk to the old brickfields of Constitution Hill showed the relationship of the water-bearing marls to the rock-bed above (zone *Ammonites spinatus*), the sequence of the Upper Lias (*Ammonites serpentinus* and *Leda ovum* beds) and the Inferior Oolite (*Ammonites parkinsoni* zone and *Trigonia signata* sands).

AUGUST 2ND.

The long escarpment of Edge Hill, stretching from Warming-ton to Shennington, was driven over on the Saturday. The flat Warwickshire Lower Lias plain below, spread its patchwork of field and hedgerow, broken in the foreground by the outliers of the Burton Dassett Hills. Away westward it was bounded by the fragments of the Cotteswolds, the Inferior Oolite hills of Ebrington and Ilmington. The low ridge of the Trias Keuper was seen far beyond Kineton, the verge of the old battle-ground.

At the quarries of Coombe Hill, Ratley Grange, the Director

gave a summary of the condition of deposition of the Middle Lias rock, there known as the Hornton Stone. For centuries its excellence as a building stone has caused it to be largely quarried, and more recently as an ironstone it was passing into a high commercial place. He said the varied beds were so largely made up of crinoidal remains as to have led him to believe that from the Midlands into Yorkshire the sea-floor was, at the time of its deposition, a crinoid tangle, broken here and there by incursions of parasitic brachiopoda. He had collected slabs of ironstone showing the round columnar stems of crinoids piercing the stone, whilst stage above stage were beds of arms and finer segments. Some type forms of *Tetradium punctata* and also large *T. subpunctata* were found, though the red rock is not very prolific in the shells of Liassic mollusca. The gradual change of the calciferous rock into the ferruginous phase was not so well illustrated in the red beds, as in other places where it was not an ironstone of high percentage.

A short walk to Ratley, a village of quaint beauty, built on the banks of the vale at the back of the escarpment, brought to view the usual water supply of the North Oxfordshire villages from the marl below the twenty-five feet of Lias rock. Gogswell, the Bachelor's Trough and the Tight Head were on the banks, north-west of St Peter's Church (593 O.D.) in the vale hollow.

During the interval for tea, on the terraced garden of the Round House, there was time for some informal talk over the Edge Hill fight of 1642. Afterwards the western extent of the drive was reached at Shennington, when Mr. Walford directed attention to the Terraced fields of Kenhill and Rattlecoombe Slade. He explained their origin as being one merely of earth movement, pointing out that they occurred mainly below the Lias rock, which capped the high banks. The regular sweep of the banks, in semicircular or straight lines, with varying depth of step, was upon the gypsiferous marl, based by the impervious beds of the Zones of *A. margaritatus* and *capricornus*. The banks were broken sometimes by drift through them to the stream flowing laterally along the foot. It was seen how the steps or terraces followed the contour of the hill, curving upwards before they broke down into the lynch and vale at the end. Some discussion ensued upon the vineyard theory of their making and the lynch which the cross stream had made. The greater lynch at Hook Norton was pointed out from the Station on the morning of the Monday's excursion. The old Oxfordshire word "linge," to lean against, was, the director contended, one of the derivations of "lynch," which, with its "lynch law," need not go to the United States for its origin as the "Oxford Historical Dictionary" stated. The custom was English, and if rough handed—not American. The little steps of the Kenhill ground were like cross ripples over the larger banks.

AUGUST 4TH.

Monday's work was begun at Hook Norton, when first the nodule beds of the *Spirifer oxygona* hemera at the base of the "spinatus" rock were searched. Good shells of *Hinnites davæi*, *Spirifer oxygona*, *Waldheimia indentata*, *Ostrea sportella*, *Terebratula punctata*, *Rhynchonella tetraedra*, and *R. northamptonensis* were found. It is the line also of a new polyzoan *Cisternifera*, which was searched for but without success. Mr. W. H. Littleboy, of the Brymbo Ironstone Company, led the party through the new east to west drift of their lower works, and pointed out the fine bank of ironstone there. So with the study of the nodule beds, and the Edge Hill and Hook Norton phases of the rock bed, a fairly good knowledge of the whole was gained.

It had been further heightened by a previous visit to the Middle Lias Transition bed at Chipping Warden: section as measured thus—

Section at Mr. Wilson's pit, near Chipping Warden.

	ft.	in.
1. Soil.	1	0
2. Grey Upper Lias clay with fragments of white limestone containing <i>A. subplanatus</i> , <i>A. crassus</i>	2	3
3. Limestone (Upper Lias) in two bands with fish remains, <i>Euomphalus minutus</i> etc. (Fish bed)		3½
4. Grey friable Marl with <i>A. acutus</i> , <i>A. holandæi</i> , etc. (Transition-bed)		6
5. Ferruginous Limestone (Middle Lias) "spinatus" zone	4	0

The fauna leaped at once into an exceptional luxuriance, numerous forms of a dozen species of Upper Lias ammonites had been found and the last of the "spinati" had died there. The mollusca were equal to those of May and Fontaine-étoup-four in Normandy in their beauty of form and preservation. The Director had years since gathered a harvest of the shells and corals which had been described, and some figured, in the Proceedings of the Warwickshire and Northamptonshire Field Clubs. Many new forms remain yet to be figured.

Though the bed is but six inches in thickness it has been traced far over North Oxfordshire and Northamptonshire, and westward beyond the Warwickshire border; it is difficult to understand the sudden invasion and change of life. The rock bed of the Middle Lias, with its layers of crinoidal segments and parasitic brachiopoda, bring before us rather deep sea conditions than other; the Transition bed with its hundreds of species of small mollusca, its minute corals, and its Ammonites of Upper Lias type are all as if of some lagoon-like sea. Whence the fauna was derived there is at present no evidence. Though the *Rhynchonellæ* of the Ferro-crinoid sea lived on, they became modified

in form and dwarfed in size. One species only of the "spinati" lived to represent the "spinatus" group of Ammonites of earlier time. Perhaps there will be need to look beyond the Anglo-Norman province for the key to this genesis of form. So far neither the high edge of our Lias uplands, nor the pockets on the

FIG. 5—SECTION AT SHARP'S HILL QUARRY.—E. A. Walford.

Palæozoic floor of Normandy throw any light upon it. The overlying argillaceous shales and limestones of the Upper Lias as abruptly drop the curtain over the small life of the Transition time, which bears its midland stamp, differing in small detail from the Ilminster and Normandy types.

The break which the River Stour makes in its back cut through the hill barriers of West Oxfordshire has brought down the Great Oolite, Sub-Bathonian and Inferior Oolite 400 ft.

Sharp's Hill quarry, at the mouth of the valley, was an hour's walk from Hook Norton. It was the object of the afternoon's walk of Monday. The section (Fig. 5) shows the order of the strata there.

The strata make a synclinal curve in the hollow of the high ground surrounding the quarry, and the upturned edges of the beds of the Inferior Oolite have been seen squeezed into a vertical fold in the foreground of the hollow. The presence there of the coral *Clausastræa conybeari* (*Platastræa endothealis*) proves a remnant of the upper Trigonian grit. The *Trigonian signata* sands and limestones of the Inferior Oolite (16 and 17 of the section) were seen at the base of the quarry, blotched with carbonaceous fragments, together with bits of stems of Calamites, and occasional *Perisphinctes parkinsoni*. The hard crystalline Chipping Norton limestone of the Sub-Bathonian, much diminished in thickness, covers the Inferior Oolite. The striped bed (plant bed of the section) washed into a friable marly-oolitic stone, yielding Trigonian and Cardium, covers the road stone (the Chipping Norton [Sub-Bathonian] and Inferior Oolite limestones).

The Neæran series is perhaps best restricted to Nos. 12 to 6 of the section. The beds are characterised by the occurrence of a small Leda-like shell, described by Morris in "The Great Oolite Mollusca." The mollusca occurring with Neæra are so akin to the Lincolnshire (Ponton) beds described by Professor Morris as to link the Oxfordshire with the Lincolnshire strata.

The Perna bed (No. 11), with its massive shells of *Perna rugosa* and new species, is possibly the equivalent of the Perna bed at Cold Comfort, so often sought for in vain. It is a conspicuous stratum, and was easily determined, as were the *Kilvertia* and *Astarte* limestones (Nos. 9 and 10). Some good slabs of those well-marked agglomerations of small shells were got, the detail of their preservation being exceedingly good.

The Coral bed (8), the next in ascending order, is a marly limestone somewhat impersistent and difficult to trace. Fine specimens of *Cyathopora bourgeti*, also *Cardium stricklandi* and *C. subtrigonum*, *Corbula buckmanni*, *Gervillia waltoni*, and *Neæra ibbetsoni* are found. For *Rhynchonella concinna* should be written *R. hopkinsi*.

Beds 5, 4, 3 and 2 are the dwarfed representatives of the striped marls and limestones of E. Oxfordshire and Northamptonshire. They are fairly developed in the cuttings of the Aynhoe and Ashendon railway on the E. Oxfordshire border. The *Ostrea* beds close the Sub-Bathonian series.

The Great Oolite, with the *Rhynchonella concinna* marls and limestones, was seen in the upper part of the quarry. The heavy courses of white limestone of the upper zone showed in the lime-kiln pit on the Traitor's Ford road, whilst yet nearer the Ford and

lower down were fissile blue limestones of Forest Marble up-tilted by the fault.

The party rested at Traitor's Ford for a while, well pleased with the view of the Stour brawling across the road, the pine coverts rising above the high pitched limestone courses and the green banks covered with *Gentiana amarella*, Rest Harrow, and Campanulas.

The route across the Stour vale led to the other limestone quarries of Barren Hollow and Belle Isle Farm, near Sibford, where the Great Oolite limestones of the upper zone were shown capped with flaggy limestones with Corbula and Astarte passing into the Forest Marble of the high vale.

The geology of the little vale which had been the principal part of the day's excursion is of exceptional interest. From the source at Stourwell (542 ft. O.D.) the undercut of the drift, through the higher Great Oolite series, has brought down in trough faults the Forest Marble beds at Swerford Grange (500 ft. O.D.); then the high Great Oolite beds of Belle Isle Farm, whilst on the uplands of Hook Norton Lodge and the Gate Inn, the Sub-Bathonian (Neeran) are left stripped at an altitude of 560 ft. The opposite bank at Sibford, altitude about 587 ft., bears the Inferior Oolite of the "Parkinsoni" zone and its sub-stage with *Astarte elegans*, stripped also.

At Temple Mill the *Ostrea* beds of the Great Oolite were formerly to be seen on the west bank, whilst the hill crest has a covering of the heavy limestone of the upper zone. Of the vale's mouth at Sharp's Hill and Traitor's Ford (365 ft. O.D.) the cross stream from Otley Hill has made the little plexus of faults already dealt with.

Tea at Hook Norton ended the day's work.

AUGUST 5TH.

On Tuesday the massive limestones of the Great Oolite, Forest Marble, and Cornbrash, which draw in the Cherwell vale at Enslow Bridge (Bletchington), were taken for a day's study. At Flight Hill and the Navvies' pit the beds are extensively worked for cement manufacture and lime burning; the old Gibraltar quarries on the west bank of the river are now disused. The order of the beds may be summarised as:

	ft.	in.
Cornbrash limestone rubble with <i>Terebratula obovata</i> and <i>Avicula echinata</i>	6	0
Forest Marble, flaggy and false bedded limestones, fissile, with a black clay bed at the base. The limestones are largely made of crinoid seg- ments, spines and plates of echinoderm, shell fragments, and polyzoa	25	6
Great Oolite limestone in courses, with <i>Terebratula</i> <i>maxillata</i> bed towards the top	25	0

Remains of the great *Cetiosaurus oxoniensis* are described in Phillips' Geology of the Thames Valley as found here. The excursion closed with the visit to the Enslow Bridge sections.

The Director's collection of fossils, illustrative of the several days' work, was shown at his house in West Bar on the evenings during the excursion. Interest was especially directed to the examples of crinoidal structure in the Lias ironstone and in the crinoid remains of the chalk-like limestones of Ardley and Blackthorn Hill. Some beautiful Comatulæ from Naples, Carboniferous and Silurian crinoids, together with slabs of Bathonian *Milleriocrinus pratti* helped to the understanding of the features of the local strata.

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EXCURSION TO CUFFLEY AND HERTFORD.

SATURDAY, JULY 5TH, 1913.

Directors: R. W. POCKOCK, B.Sc., F.G.S., and L. FORTESCUE
 WELLS (*Resident Engineer*).

(*Report by MR. POCKOCK.*)

THE object of this excursion was to examine some sections on the new line of the Great Northern Railway between Cuffley and Hertford.

About 30 members travelled from King's Cross to Cuffley, the present terminus of the line, where they were joined by Mr. Wells and several other members and visitors.