

## EXCURSION TO THE BRISTOL DISTRICT.

APRIL 17TH TO 23RD (EASTER), 1919.

REPORT BY PROFESSOR S. H. REYNOLDS, SC.D., F.G.S., AND  
J. W. TUTCHER, *Directors of the Excursion.*

PLATES 6 AND 7.

SOME forty members and friends took part in the Excursion,  
and Mr. B. A. Baker, F.G.S., acted as Excursion Secretary.

THURSDAY, APRIL 17TH.

THE TORTWORTH INLIER (S.H.R.)

THE first excursion was to Charfield to examine the fossiliferous Silurian and associated igneous rocks of the Tortworth Inlier. The exposures are in the main poor, but several had been opened in preparation for the Association's visit by the kindness of Lord Ducie. The party first proceeded to the quarry (Cullimore's) north of the station and obtained a considerable number of fossils from the calcareous tuff which there rests on the trap. Passing some little overgrown workings which indicate the presence of a bed of Wenlock Limestone near Poolfield farm, the party crossed a tract of alluvium bordering the Little Avon to Avening Green, where specimens of the trap containing quartz xenocrysts were collected. They then walked along the picturesque valley of the Little Avon to Damery, where many fossils were collected in the decalcified sandy limestone of Llandovery age in the little quarry south of the river. The large trap-quarry north of the river was not in work, and here the members searched unsuccessfully for fossils in the red micaceous shale which underlies the trap and is the oldest rock seen in the inlier. From Damery the party walked on to Middlemill, where nothing could be seen in situ of the ashy limestone, which here rests on the trap, and is probably equivalent to that at Cullimore's quarry, Charfield. The character of the rock could, however, be well seen in loose blocks, and a fair number of fossils, especially *Favosites gothlandicus*, were found. The party returned to Charfield, via Oldbrook and Brook farms, and at the latter spot a halt was made to examine a fine exposure of Old Red Sandstone.

On their way through Charfield the party passed, but did not stop to examine, a heap of Wenlock material thrown out in sinking a well. *Meristina tumida* is very common here and the following fossils have also been found:—*Rhynchonella stricklandi*, *Leptaena rhomboidalis*, *Favosites forbesi*, *Cyathophyl-lum* sp.

FRIDAY, APRIL 18TH.

CARBONIFEROUS LIMESTONE OF THE LEFT BANK OF THE AVON.  
(S.H.R.)

Crossing Rownham ferry the party walked down the left bank, halting to view the Observatory Hill fault and the minor thrusts which accompany it. The Director pointed out that on the left bank of the river the fault does not, as might have been expected, follow the line of Nightingale valley or that of the smaller valley which lies to the north of the promontory on which Stoke Leigh Camp stands, but cuts across the promontory. The Observatory Hill fault repeats the series from the lower part of S<sub>2</sub>, but the series as repeated by the fault is not in good condition for examination on the left bank, and no time was spent on it. The first beds, to the examination of which much time was devoted, were the D beds of the riverside exposure, where the corals and brachiopods are splendidly seen. The S<sub>2</sub> beds are also well seen in the riverside exposure. The S<sub>1</sub> beds are somewhat poorly seen in quarry 4, but members obtained plenty of specimens of *Lithostrotion martini*, and saw examples of the characteristic fossil, *Caninia cylindrica* mut. S<sub>1</sub>. The marked lithological types of C<sub>2</sub> (*Caninia*-dolomite and *Caninia*-oolite) were noted in quarry 3, many fossils being seen in the lower part of the *Caninia*-oolite, though few could be collected. The party climbed to the top of quarry 3 for lunch and enjoyed a splendid view over the whole Avon Section. The large quarry in the upper *Zaphrentis*-beds (quarry 2) was being worked in spite of the day being Good Friday, and the rocks were in too dusty a state for collecting to be satisfactory; many fossils were obtained, however, in quarry 1 (Z<sub>1</sub>), and in the K beds of the riverside exposure, where attention was drawn to some newly recognised algal bands.

In the evening Prof. Reynolds gave a lantern lecture at the University on the geology of the district.

SATURDAY, APRIL 19TH.

## BURRINGTON AND CHEDDAR (S.H.R.)

The party arrived at Burrington at 10.41 and, passing through the picturesque little village began to ascend the Combe, the rocks being traversed in descending order. The highest beds (D) were not examined, and little time was devoted to the *Seminula* (S) beds, but in the relatively unfossiliferous *Syringothyris* (C) beds, which are far less dolomitized than in the Avon section, an unusually good series of fossils was obtained. The favourite collecting grounds of horizon Y (of Vaughan's earlier notation) and Z<sub>1</sub>, yielded an abundant harvest of specimens. Proceeding

up the valley of the Western twin stream, its disappearance into a swallet was seen, and then the party, passing the mouth of the Goatchurch cave, got a splendid view of the whole course of the Combe from a spot opposite the point where the course of the Combe turns sharply to the east. Descending into the valley of the Eastern twin stream the marked lithological types of the lower *Cleistopora* (K) beds were noted, especially the Bryozoa-bed, the associated coarse crinoidal oolite, and the underlying ostracod shales.

A somewhat tiring ascent brought the party to the top of Blackdown, where they struck south-eastwards to the top of the Cheddar Gorge. Time did not admit of any examination of the Cheddar succession, but during the descent attention was drawn to the relation between the slope of the sides and the dip of the rocks, to the site of the rock-fall of Feb. 1906, and to the outflow of the Cheddar stream. Some of the party visited one or other of the famous caves.

#### MONDAY, APRIL 21ST.

#### THE LIAS AND COAL MEASURES OF THE RADSTOCK DISTRICT (J.W.T.)

THE members left Temple Meads station on the 10.10 train, and alighted at Welton, a mile and a half west of Radstock. A rather steep ascent over the Trias and Rhaetic outcrops, brought the party to a Lias platform, where several quarries have been worked in past times. The most important of these exposures, locally known as Bowldish (Bold Ditch) quarry, has been described by E. B. Tawney and by R. Tate, and a section is given by H. B. Woodward in "The Jurassic Rocks of England," vol. iii., p. 130. About 5 feet of White Lias is exposed at the base of the quarry and crushed specimens of the index fossil, *Modiola langportensis*, were collected from it.

Nearly all the quarries in the Radstock area exhibit sections in the White Lias which is extensively used for building purposes.

Above the White Lias at Bowldish there are 9 feet of strata in which six Lias zones can be recognised. Adopting the broad zonal divisions of Wright those here present are, in ascending order, *planorbis* (lower part), *bucklandi* (upper part), *turneri*, *obtusum*, *raricostatum*, and *armatum*.

It will be observed that part of the *planorbis*, all the *angulatum*, part of the *bucklandi*, and the *oxynotum* zones are missing. Some of these missing deposits may be seen in quarries at no great distance; but *Ammonites oxynotus* is not found in the district, although large *Oxynotes* (*Radstockiceras* Buckman) of a later type are frequent in the basal part of the *armatum*-zone. The lower part of the *bucklandi* series (*rotiforme*-zone),

so well developed in the neighbouring area of Keynsham, is also generally missing around Radstock.

It is suggested that earth movements along the line of the Mendip axis, have thrown the rocks of this area into a series of folds. Partial denudation of the Jurassic rocks has followed, thus causing numerous local non-sequences of varying extent. Thus, six furlongs west of Bowldish the *Spiriferina walcotti* bed, which everywhere in the district marks the top of the *bucklandi* series, rests directly upon the White Lias; whilst one mile south-east about 20 feet of *planorbis-bucklandi* beds separates these two levels. These facts, combined with original paucity of deposit, account for the condensation of many zones into a few feet of strata that is so conspicuous a feature of the Lower Lias at Radstock.

The quarry, in common with most of those visited, had not been worked for a long time, consequently very little excavated material was available for examination. Despite this disadvantage, many characteristic fossils were obtained, including *Ammonites* (*Echioceras*) *varicostatoides*, *A.* (*Zipheroceras*) *planicosta*, *A.* (*Agassicerias*) *cf. sauzeanum*, *A.* (*Coroniceras*) *gmuendense*, *A.* (*Arnioceras*) sp.; the Brachiopods found were *Rhynchonella radstockensis*, *Terebratula ovalissima*, and *Spiriferina walcotti*. The last mentioned occurs in great profusion over a large area at the top of the *bucklandi* zone, and this level is in consequence locally designated 'the *Spiriferina* bank.'

The members next proceeded to Clan Down, six furlongs east of Bowldish. Leaving the road where it is crossed by the stream from Clan Down bottom, a footpath over Mount Pleasant leads to the Colliery, on the west side of which there is a quarry in the Lias. Here, in addition to thicker deposits of the *armatum*-zone the succeeding *jamesoni*- and *valdani*-zones are seen. The nature of these deposits illustrates another characteristic feature of the Radstock Lias—the lower Charmouthian of other districts consists of thick clays with occasional bands or nodules of limestone; here the equivalent deposits are limestones with very little clay.

Fragmentary *Ammonites*, including *A.* (*Uptonia*) *jamesoni* and *A.* (*Platypleuroceras*) *rotundum*, were obtained; also many Belemnites, Brachiopoda, and Pelecypoda. At one level in the *jamesoni*-zone *Pholadomya ambigua* occurs in large numbers. Owing to the rubbly state of the rock, due to surface weathering, complete *Ammonites* of any size were difficult to obtain; but Dr. Trechmann exhibited a good specimen of *A.* (*Deroceras*) *aff. leckenbyi* that he had secured a few days previous to our visit.

The next halt was made at the tips of the adjoining colliery for the purpose of collecting some of the beautifully preserved specimens of coal plants from the recently thrown out blocks of shale. When it was known that material could be left at

the Railway Station from which our return journey would be made, and that the station was only half a mile distant, all down hill, some members did not hesitate to take quite bulky examples of this fossil flora.

Passing through Radstock the party then proceeded to visit two quarries on the south side. One of these is situated at the junction of the roads to Charlton and to Kilmersdon, about half a mile due south of Radstock station. This is the only quarry visited at which any recent excavations had been made. Many Ammonites of small size, and Belemnites were obtained, whilst Brachiopoda and Pelecypoda were abundant. The zones exhibited in this quarry are, in the main, similar to those already noted, but the *planorbis*-zone is here considerably thicker and there is some trace of the *angulatum*-zone. On the other hand the *turneri* and *bucklandi*-zones are reduced to a few inches and the *Spiriferina* bank is scarcely traceable. The upper portion of this quarry has yielded specimens of *Ammonites* (*Acanthopleuroceras*) *valdani*, and at the near-by pit head there is a small section in the *striatum*-zone; this consists of micaceous clays with small ochreous nodules, but there are no fossils.

Returning towards Radstock another quarry of great extent, showing similar beds, but not now in work was entered, and the remaining time spent in collecting specimens from the scattered material on the floor of the quarry. The fossils most numerous were Belemnites and Brachiopods, including fine specimens of *Cincta aff. numismalis*; fragments of large *Devocerates* from the *armatum*-zone were seen, and one member obtained a good example of *Ammonites* (*Asteroceras*) *cf. stellare*.

Tea at the Bell Hotel, conveniently near the Railway Station, from which the members returned by the 5.10 train, brought to a conclusion an excursion the enjoyment of which was enhanced by the beautiful weather it was our good fortune to experience.

In the evening the members visited the City Museum and Art Gallery, which had been specially opened for their benefit through the kindness of the Director, Mr. H. Bolton, M.Sc., F.R.S.E., who, with the aid of his daughters, had also provided refreshment. The geological collection was, unfortunately, not visible, the gallery in which it is displayed in normal times having been used for war purposes, but much attention was paid to the magnificent geological model of the Bristol district, and a general inspection of the Museum and Art Gallery was made, under the guidance of the Director. Before they left, the members accorded a hearty vote of thanks to Mr. Bolton and his daughters for their kindness and hospitality.

TUESDAY, APRIL 22ND.

PORTISHEAD (S.H.R.)

THE rocks at Portishead are much faulted and their relations to one another have not yet been fully studied. The first point visited was the Portishead Dock Station, where a section of highly inclined lower Carboniferous (Km), and upper Old Red Sandstone beds are seen, with the Dolomitic Conglomerate resting unconformably on them. Climbing down to the shore below the Pier Hotel the Pennant Grit is seen faulted against the Carboniferous Limestone with overlying Dolomitic Conglomerate, the limestone being much disturbed. The party then walked to Battery Point, where the lower *Zaphrentis*-beds with silicified fossils and upper *Cleistopora*-beds are seen, the latter being thrown into a series of some six little anticlines and synclines by a thrust fault which brings the Bryozoa-bed over them. Specimens of the zonal fossil *Cleistopora geometrica* were found. Crossing Woodhill bay the fine section of Old Red Sandstone was examined. Several lithological types are met with shale, sandstone, conglomerate and cornstone--while ripple marking and evidence for accumulation in shallow water are well displayed. Several faults traverse the rocks and the Dolomitic Conglomerate is seen resting with strong unconformity on the Old Red Sandstone. (See Fig. A, Plate 6).

AUST.

On their return from Portishead the members were met by breaks at Bristol station and drove thence to Aust. This well-known section has been so frequently described, and such a full report by the Rev. H. H. Winwood, of the last visit of the Association in 1901, is published in the *Proceedings*, that a very brief reference to the present visit will suffice. Considerable rock falls had recently taken place, somewhat obscuring the well-known 'Step fault,' but providing much material for the hammer, and in particular, blocks of the peculiar 'Crazy Cotham,' the local representative of the well-known Cotham Marble. (See Plate 7.)

WEDNESDAY, APRIL 23RD.

WESTON-SUPER-MARE (S.H.R.)

LEAVING Bristol at 9.30 the party reached Weston-super-Mare at 10.30 and driving in a motor charabanc to Spring Cove, descended to the beach over red limestone (hor. C2 base) containing abundant examples of *Campophyllum cylindricum*.

A careful examination was made of the igneous mass, but it has been so fully described in a previous issue of the *Proceedings*, (vol. xx., 1907-8, pp. 64 and 155), that no further details need be given here. The party then walked through the picturesque Kew Stoke Woods, and across Sand bay to the Woodspring promontory. The highest rocks seen, which form the dip slope on the southern side of the promontory, are the lower part of the *Caninia*-oolite, which here contains abundant examples of *Orthotetes crenistria*. The ridge was then crossed to the most westerly of the four igneous sections, the details of which are given in the *Proceedings*, (vol. xx., 1907-8, p. 63). Attention was drawn to a fact which had not been recognised on the occasion of the previous visit, viz., that the basalt flow is not a continuous mass, but is broken up into several detached portions separated by tuff. The second and third exposures further to the east, which show only tuff, were also visited, and several fine specimens of *Michelinia favosa* were obtained from the calcareous tuff of the latter. Before returning by charabanc to Weston the members had the privilege, through the kindness of Major V. T. Hill, of visiting Woodspring Priory, an early 13th century foundation, interesting from its close connection with the murderers of Thomas à Becket.

The party returned to London by the 7.30 train.

#### EXPLANATION OF PLATES 6 AND 7.

PLATE 6, A.—Dolomitic Conglomerate unconformable on Old Red Sandstone, South of Woodhill Bay, Portishead.

B.—Basaltic lava with pillow-structure, resting on fine tuff with calcite veins. Western igneous section, Woodspring Promontory, Weston-super-Mare.

PLATE 7, A.—Juxtaposed faults, southern end of Aust Cliff.

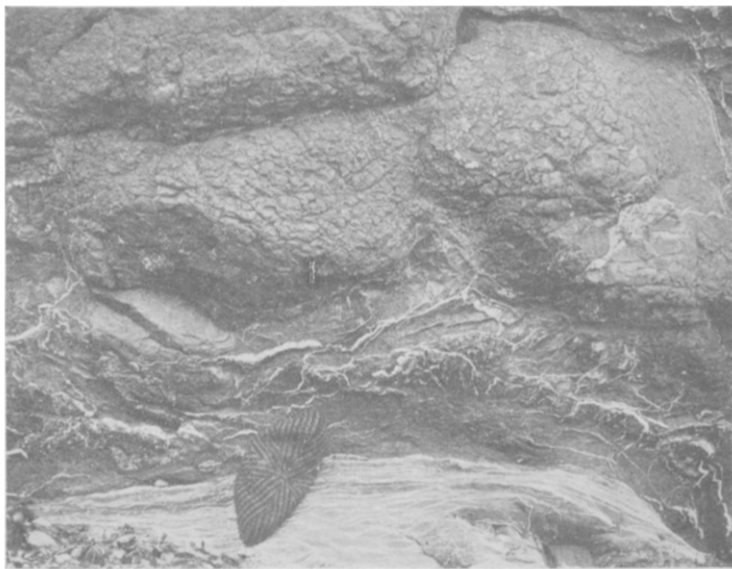
B.—Vertical and horizontal bands of gypsum in Red Marls, Aust Cliff.

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A.—UNCONFORMITY, SOUTH OF WOODHILL BAY, PORTISHEAD.  
*Photo, T. W. Reader.*



B. BASALTIC LAVA WITH PILLOW-STRUCTURE, WESTON.  
*Photo, S. H. Reynolds.*





*Photo, S. H. Reynolds.*

A.—JUNTAPOSED FAULTS, AUST CLIFF.



*Photo, T. W. Reader.*

B.—GYPSUM BANDS IN RED MARLS, AUST CLIFF,

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