

EXCURSION TO BRIDPORT AND WEYMOUTH.

EASTER, 1898.

Directors : J. F. BLAKE, M.A., F.G.S. ; W. H. HUDLESTON, M.A., F.R.S. ; AND S. S. BUCKMAN, F.G.S.

Excursion Secretary : E. P. RIDLEY, F.G.S.

(*Report by the DIRECTORS and H. W. MONCKTON.*)

THE official party left Paddington Station (G.W.R.) at 3.15 p.m. on Thursday, April 7th, and on arrival at Bridport proceeded to the Bull Hotel, where it was joined by many members who had travelled by other trains or from different parts of the country.

The principal features of the excursion were intended to be (1) the comparison of the development of the Inferior Oolite in the south of Dorset with that examined last year in the Cheltenham district ; (2) the investigation of the general succession of the Jurassic series from the Inferior Oolite to the Portlandian, and (3) the demonstration of the remarkable stratigraphy of the district, showing faulting and folding at different epochs.

In pursuance of the first object the Association had the advantage of the guidance of Mr. S. S. Buckman, who had acted as Director in the Cheltenham area, and whose views will be found in the following Report. The result seemed to be expressible somewhat in this way, that whereas at Cheltenham we saw an abundant development of the middle portion of the series and little of the lower and upper parts, in Dorsetshire there was scarcely any of the middle division, but a fair representative of the remainder.

Friday, April 8th.—The party drove from Bridport to Seaton, a small village on the coast about three miles west of Bridport. Leaving the carriages, the members walked to the top of Down Cliff where Mr. Buckman delivered a short address on the geology of the district (see Fig. 1).

The rocks belonged, he said, to the Jurassic series, capped unconformably by Cretaceous. At Chideock Hill to the north, which had been passed on the drive from Bridport, there was a small outlier with a hard capping of Inferior Oolite. The valleys around had been cut down to the Lower Lias. Last Whitsuntide the Association, when at Cheltenham, was, unfortunately, unable to see the Cephalopoda Bed, which, in that area, is the representative of a considerable thickness of the strata at Chideock Hill.

Mr. Buckman pointed out the position of the junction bed of the Upper and Middle Lias. A few inches of the strata are cemented to the Marlstone, and about eighteen inches from the Marlstone *Ammonites striatulus* is found in the junction bed.

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The Marlstone contains *A. spinatus*. This junction bed above the Marlstone is represented by some 300 feet of strata in the Cotteswolds.

The Geological Survey Map is not consistent on this point, for the clay above the place where *A. striatulus* is found is here mapped as Upper Lias (g³); but in the Cotteswolds the strata with *A. striatulus* and some 250 feet below that are mapped as Midford Sand (g⁴). So that the map has really reversed the true

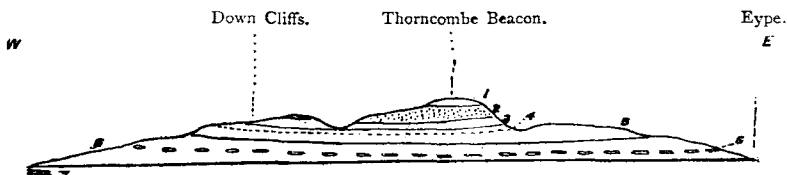


FIG. 1.—SECTION ALONG THE COAST OF DORSET, WEST OF EYPE-MOUTH.—
H. B. Woodward.

- | | | |
|---------------------|--------------------------------------|-----------------------|
| 1. Upper Greensand. | 4-7. Middle Lias—zones of <i>Am.</i> | 5. Yellow sands with |
| 2. Bridport Sands. | <i>margaritatus</i> and <i>A.</i> | “doggers.” |
| 3. Upper Lias—clays | <i>spinatus</i> . | 6. Laminated sands |
| and sandy shales. | 4. Sandy Limestone, overlain | and clays with |
| | by clays and Junction-bed | Starfish Bed. |
| | of Middle and Upper Lias. | 7. “The Three Tiers.” |

Figs. 1, 3, 4, and 5, are reproduced by the kind permission of the Director-General of the Geological Survey.

order of the strata in the two places, and has made the pre-*striatulus* beds of later date than the post-*striatulus* rocks.

Pointing to the cliff section at Thorncombe Beacon, which was in view of the members, Mr. Buckman said that the 70 feet of blue clay seen was the bed he alluded to mapped as Lias here. Below it was a well-marked line in the cliffs. That was the junction bed, about 2 feet thick. The strata of that band were in four layers, viz. :

1. Bed with *A. striatulus*.
2. Bed iron-coated, remainder *A. bifrons*.
3. Bed with *A. falcifer*.
5. Bed with *A. spinatus*,

while Mr. Day spoke of a fifth layer—a *Pleurotomaria*-bed, which Mr. Buckman said he had never been able to find ; but he knew that owing to contemporaneous erosion even the four parts are not found in every portion of the band.

On this section Prof. Blake remarks that it extends from the *Margaritatus*-clays to the Bridport Sands. Towards the middle the narrow band above mentioned is seen, making a feature in the cliff. Below this band were *Margaritatus*-sands, above it is clay ; of this clay two correlations have been made. According

to the Geological Survey it is Upper Lias; according to Mr. S. S. Buckman they are of the same date as the Yeovil Sands of North Dorset, which the Survey, however, map as Midford Sands. Mr. Buckman particularly refused to have anything to do with the terms Upper Lias or Inferior Oolite. His point was that the clay was *Dumortieria*-beds, which are post-striatulan; that on the Dorset coast the *Dumortieria*-beds are called Upper Lias; in the Cotteswolds they and 250 feet below them are mapped as Midford Sands. One, he said, must be wrong.*

Evidence was accordingly sought to determine which of these two views most accurately represented the facts. Lithologically considered, nothing seemed simpler. There were the Middle Lias sand beds, capped by a hard band, with *A. spinatus*—the Marlstone, followed by dark clay—the Upper Lias, passing up into the Bridport Sands.

But the crux of the question lay in the narrow hard band referred to the Marlstone. According to Mr. Buckman this contained not only the zone of *A. spinatus*, but those of *A. falcafer*, *A. bifrons*, *A. striatulus*, and possibly a fifth. The members, therefore, eagerly sought this "quinquezonal" rock. It was almost inaccessible for a party, but blocks that had fallen down could be easily examined. Prof. Blake remarked that, strictly speaking, there were no zones in it at all. The fossils were not arranged in a regular or any order, but thrown miscellaneous together.

Mr. Buckman pointed out that the specimens were not lying horizontally; but though each layer might show that specimens were drifted together, yet, as the result of continuous work at the bed, he had found that the fauna of each layer was practically distinct; that *A. striatulus* occurred only in the top layer, and that therefore the overlying clays were younger than the *Striatulus*-beds. Amongst its fossils the members certainly found *A. spinatus*, Brug., *A. falcafer*, Sow., and *A. bifrons*, Brug., and possibly *A. striatulus*, Sow.

It was plain, Prof. Blake continued, that we had here to do with an *aggregate* deposit formed, as it were, by the sweepings of several zones elsewhere, and that the overlying clays were, at least, younger than the *Striatulus*-beds. Still, there is room in the usually accepted Lias for higher beds than those with *A. striatulus*, and in this way the inclusion therein of these clays might be justified. On the other hand, the occurrence of this curious aggregate rock indicates a break in the order of sequence, and suggests that the succeeding clays belong to a new series.

The approximate junction-line of the clays and overlying sands may, no doubt, be mapped by the aid of springs and

* ["Midford Sands" is used by the Geological Survey as a stratigraphical term to include the Gloucestershire Cephalopoda-Bed and Cotteswold Sands, and also the Midford, Bridport, and Yeovil Sands.—E.D.]

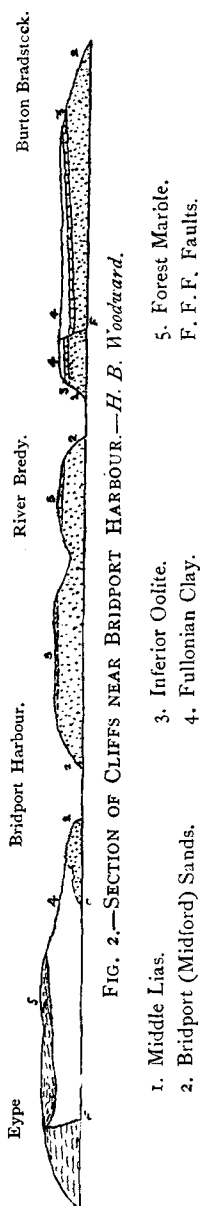


FIG. 2.—SECTION OF CLIFFS NEAR BRIDPORT HARBOUR.—H. B. Woodward.

similar surface indications; but the passage seems a gradual one, and was not accessible to direct observation.

Prof. Blake then led the way eastwards along the shore to Eype, the next point of interest being the great fault which brings down Bathonian beds into juxtaposition with Middle Lias (see Fig. 2). This is one of a series running more or less in an east and west direction and connecting with those better known in the Weymouth anticlinal. The Bathonian beds here are distinguished as Fuller's Earth and Forest Marble, the line of junction being taken below a prominent bed full of *Rhynchonella boueti*. There is not much lithological distinction hereabouts, and the line of junction, Prof. Blake thought, was more or less palæontological and arbitrary. (See Fig. 3; also photograph in Brit. Assoc. Coll.)

At Bridport Harbour a halt was made for lunch. After the luncheon interval the party walked in an easterly direction towards Burton Bradstock, and visited a small quarry in the *Parkinsoni*-zone of the Inferior Oolite. A short halt was made here and a considerable number of fossils obtained, including: *Clypeus altus*, M'Coy; *Collyrites ovalis*, Leske; *C. ringens*, Ag.; *Holcetypus hemisphaericus*, Desor.; *Terebratula sphaeroidalis*, Sow.; *T. stephani*, Dav.; *Ammonites parkinsoni*, Sow.

The river Bredy was then crossed, and beneath Burton Bradstock Cliff the members had a good opportunity of observing the whole of the small thickness of rocks which go by the name of the Inferior Oolite Limestone. The underlying Bridport Sands were easily verified as belonging to the *Opalinus*-zone, in which is included also their limestone capping.

Above this is a very distinct, well separated band, with a base-line of curious nodules or ferruginous concretions, and portions of an ironshot matrix similar to that of the *Murchisonæ*-bed at Chideock Hill. Mr. Buckman calls it *Witchellia*-beds, and others have referred it to the *Murchisonæ* or *Humphriesianus*-zones.

After another break comes a more massive limestone in which *Parkinsonia* abound,

and one of the members obtained a good example of *Morphoceras*, so that the horizon is clearly fixed. It is *above* this limestone that the line between the Inferior Oolite and Bathonian is usually drawn. Here, however, the overlying clay seems to be very closely connected with it, and at the base contains many ammonites usually referred to *Oppelia subradiata*. It would seem, therefore, that stratigraphically a break occurs below the *Parkinsonia* limestone, and that this latter should rather be included in the Bathonian series—a view which on palæontological grounds has been advocated by Messrs. Wilson and Buckman, at Dundry, and is consonant with the German and some of the French classifications.

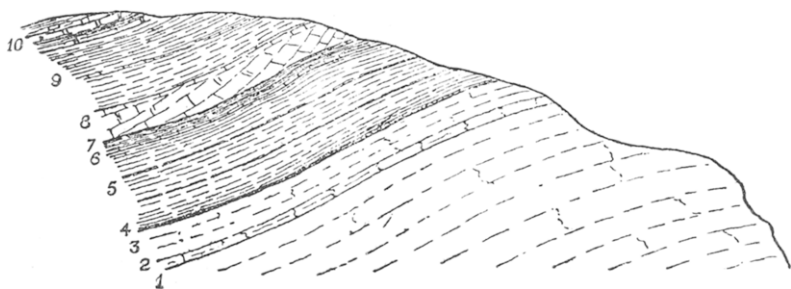


FIG. 3.—SECTION AT WEST CLIFF, BRIDPORT.—H. B. Woodward.

1—3. Fullonian Clay. 4—10. Forest Marble-clays with *Rhynchonella*-Bed (4) at base, and central mass of limestone (8).

Mr. Hudleston's reading of this part of the section will be found in the monograph on "The Gasteropoda of the Inferior Oolite" (Pal. Soc.), Part I, p. 31, and Mr. Buckman's reading in the paper on "The Cotteswold, Midford, and Yeovil Sands" (*Quart. Journ. Geol. Soc.*, vol. xlv (1889), p. 451).

On reaching Burton Bradstock, the party were met by carriages, and most of the members drove back to Bridport. A detachment, however, under the direction of Prof. Blake, left the carriages near North Hill, and visited several quarries in the Forest Marble on North Hill, and between it and the village of Bothenhampton. The section is published in H. B. Woodward's "Jurassic Rocks of Britain," vol. iv, p. 342. Fossils are very abundant, but it is not easy to obtain satisfactory specimens for the cabinet. After spending some time in the quarries, the detachment rejoined their carriage and drove to Bridport.

The Mayor of Bridport honoured the Association with his company at dinner, and, on behalf of the Mayoress, presented a box full of specimens of *Rhynchonella boueti* from the Forest Marble of the neighbourhood.

After dinner the President proposed votes of thanks to Mr. Buckman for assisting in the directorship during the day, and to the Mayor and Mayoress for the present of *Rhynchonella*. Both votes were passed by acclamation, and Mr. Buckman and the Mayor responded.

Saturday, April 9th.—Starting soon after 10 o'clock, under the directorship of Prof. Blake, the party drove by way of Swyre to Abbotsbury, and the Director remarked that those who had visited Bothenhampton on the previous evening, and all the party during the drive to Abbotsbury, were able to appreciate the very considerable amount of material which goes in this district to make up the "Fuller's Earth" and "Forest Marble." It is scarcely to be understood by the use of these terms that only those portions of the series which, in the neighbourhood of Bath, go by these names respectively are here represented, and that the Great Oolite and Bradford Clay are absent, but that lithologically these names are most suitable for the lower and upper portions of a continuous Bathonian series whose relations have as yet been inadequately worked out.

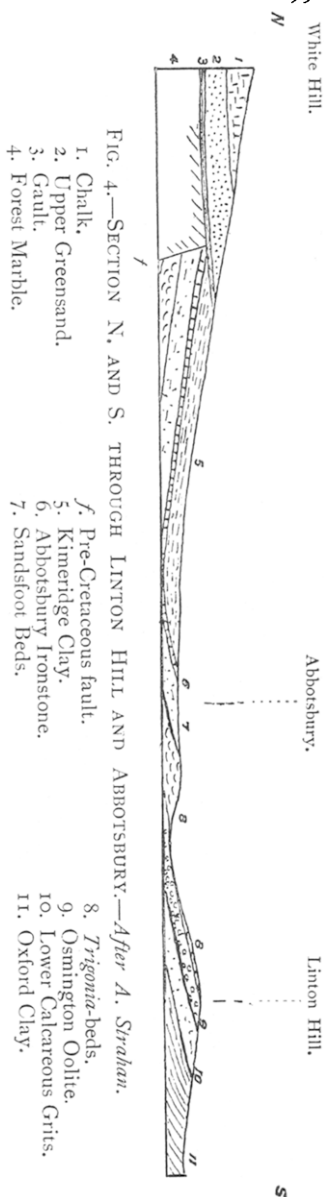
On reaching Abbotsbury new problems came up for solution. Descending the hill towards that village the members were able to satisfy themselves of the great pre-Cretaceous fault, bringing down the Abbotsbury ironstone almost on a line with the Forest Marble; and further to the east the same fault was confirmed, up Red Lane. With regard to the age of this fault, no section could be found in which the Cretaceous rocks were seen actually lying on the Jurassic; but the uniform level and irregular running of the outcrop of the former seemed to indicate that they do so, and are not faulted against them, as marked on *some* copies of the old Geological Map; and in this case it is obvious that the fault must have brought up the Forest Marble and allowed the overlying strata to be denuded before the Cretaceous rocks were deposited. Whether this pre-Cretaceous fault runs into the same line as the post-Cretaceous one that brings down the Chalk to a lower level than the Portland, at Portisham, or whether both are broken off and lost, could not be determined by any direct observations on the ground.

On the other side of Abbotsbury a very complete traverse from the Osmington Oolite of Linton Hill, through the *Trigonia*-beds, the Supra-coralline or Sandsfoot Castle beds, the ironstone, the Kimeridge Clay, the Portland and Purbeck beds of Portisham Hill was satisfactorily made. The Portland Limestone was found to be here not so fully developed as in the Island of Portland, but immediately over the flinty series—here containing *Ammonites giganteus*,—was seen a thin, dark, carbonaceous bed with fragments of wood. On this horizon two large trees were seen—one horizontal, some 6—8 ft. long, and hollowed out in the middle—the other vertical, with large spreading roots. Photographs

of these were taken, but the waning light has prevented them from being suitable for reproduction.* Above this the Purbeck series was continued to a band full of *Cyrena*.

Monday, April 11th.—Monday was devoted to an examination of the series downwards from the Oxford Clay to the Forest Marble, with Prof. Blake as Director. A few of the members crossed the Backwater to the opposite shore, and were able to pick up several ammonites of the *Cordatus* group—representing the upper part of the Oxfordian. The whole party walked along by the side of the railway to the other end of the section and searched the lower part containing *Cadoceras sublaeve*, reaching the Cornbrash at the end.

The rubbly character of this rock was noted, indicating that it is a basal deposit. Though no ammonites have been recorded from the Cornbrash in this locality, numerous examples of *Macrocephalites* were obtained, and one example which would probably be recorded as *A. discus*, but which is more likely to be the *A. Hochstetteri* of Oppel, recorded by him from the Cornbrash of Chippenham, though it has not yet been accorded a place in British lists. The Director drew attention to the fact that on the Continent the zone of *A. macrocephalus* was usually united with the Oxfordian, and that the indications here were that it ought to be so classed. For this purpose the variable character of the underlying Forest Marble in the district was recommended to be noted, and at a later part of the day it was shown to be argillaceous at Radipole, sandy and concretionary at the top of the



* A photograph of this section may be seen in the British Association collection (1256 Dorset), now in the Library of the Jermyn Street Museum.—Ed.

hill to the south, and shelly at Langton Herring, but it was always followed by the same kind of rubbly Cornbrash, everywhere recognisable by its *Avicula echinata*. This confirms the existence of a break below the Cornbrash, while the gradual intercalation of clays, and the similarity of the fauna indicate an absence of any break above it. The *Ornatus*-clays at Chickerel brickyards and the Brachiopod Beds at Herbyleigh provided the members with the desired collections of fossils, among which Mr. Newton named from the latter: *Rhynchonella boueti*, Dav., *Terebratulina intermedia*, Sow., *T. maxillata*, Sow., *Waldheimia digona*, Sow., *W. obovata*, Sow., *Mytilus pectinatus*, Sow., and the very characteristic *Ter. coarctata*, Park.

After dinner the President proposed a vote of thanks to Prof. Blake and Mr. Hudleston for their kindness in consenting to act as Directors, and to Mr. E. P. Ridley for arranging the business details of the excursion. It was carried unanimously.

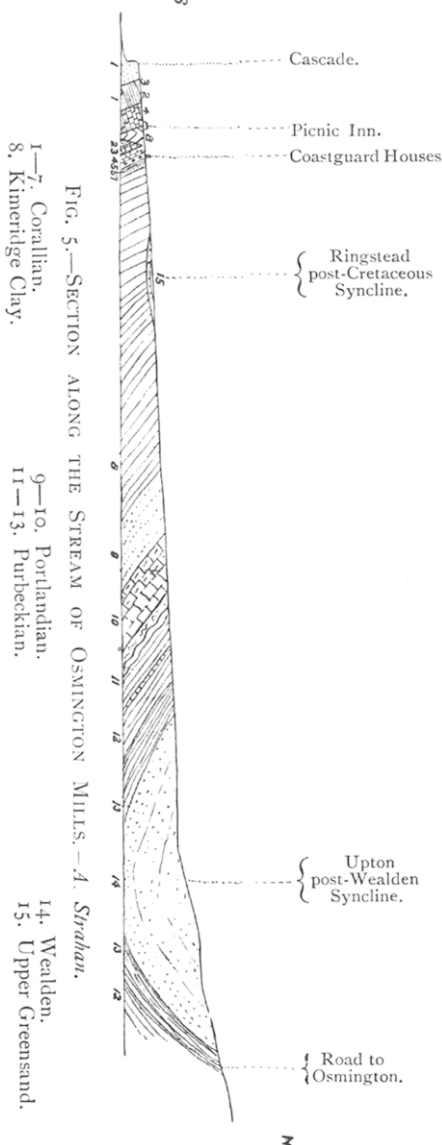
Tuesday, April 12th.—Directed by Prof. J. F. Blake and Mr. W. H. Hudleston, M.A., F.R.S., a party of about fifty left Weymouth at 9.30 a.m., and drove through Osmington to Upton, a small village about five miles north-east of Weymouth, situated in a fertile valley which runs in an east and west direction, with Chalk downs rising some 200 feet above it, both on the north and on the south. Leaving the carriages, the party ascended the southern slope of the south downs, and on reaching the top (about 500 ft.) Prof. Blake said a few words on the physical geology of the district, and pointed out the independence of the Cretaceous rocks to the underlying synclinal.

The party then descended on the seaward side of the down, and met Mr. and Mrs. Hudleston in the ravine above South Down Farm. Mr. Hudleston led the way to a road cutting showing the basal beds of the Upper Cretaceous, here including the Chloritic Marl, succeeded by the Lower Chalk, all dipping at a high angle towards the north. He took the opportunity of delivering a short address on the geology of the neighbourhood.

The district, he said, was one with stratigraphical peculiarities which are not exceeded in point of interest by any throughout the whole of England. On the hill slope above them was a bluff of Upper Greensand and Chloritic Marl overlain by Lower Chalk, all with a dip of about 70 deg. to the north. In the quarry below are to be seen Portlandian beds, which have a similar northerly dip. This high dip of the Cretaceous beds shows that the folding belongs to the system of post-Cretaceous disturbances. The disturbances so well marked in this district occurred at two distinct periods; the example before us belongs to the later of these periods, and is probably of Miocene age. Other disturbances would be seen in the course of the day, which can be proved to be of pre-Cretaceous age,

because they pass under the Cretaceous beds without affecting them.

The Cretaceous here belongs to the Upper Cretaceous down to the base of the Upper Greensand, with part of the Gault in places; and the Wealden would be treated as non-Cretaceous, because the Wealden here belongs to a different system of disturbance, and the Wealden of the synclinal passed over by the party this morning, folds with the Jurassics. (See Fig. 5.) As a matter of fact the Upper Cretaceous rests almost everywhere unconformably on the older rocks. This is remarkably the case on the western brow of the Yorkshire Wolds. There the Cretaceous rests on Corallian, Oxfordian, Lower Oolite, and Lias. Consequently there must have been a great physical change about the period during which the Cretaceous began to be laid down, and this holds true almost all over Europe, in Arabia, and probably also in India — one of the greatest overlaps we know of in the Old World.



At the conclusion of Mr. Hudleston's address the members proceeded to inspect the section, the high dip being very noticeable. The Lower Chalk here contains one or two imperfectly formed flints, but few fossils were seen, a fragment of *Ammonites navicularis*, Mant., in association with *Nautilus* being

found in the Chloritic Marl. The Upper Greensand contained an abundance of green grains and many fossils were found, amongst others *Exogyra columba*, Lam. ; *E. conica*, Sow. ; *Pecten orbicularis*, Sow. ; *Pecten quinquecostatus*, Sow. ; *Pecten* allied to *galliennei*, D'Orb. ; *Arca*, sp. ; *Cyprina*, sp.

Mr. Hudleston remarked that the high dip here seen only extends for a short distance from the line of disturbance, after which the beds became nearly horizontal. He added that, in this case, we were dealing with a fold rather than with a fault, and that folds often cause more complicated disturbances than faults. He then led the way to the cliff near Holworth House, and pointed out a fault which cuts the cliff in a nearly north and south direction. It is a transverse fault and of less importance in affecting the features of the country, the great lines of disturbance always running in an east and west direction. The section on the east side of the fault shows the junction of the Purbeck and Portlandian strata. The Lower Purbeck here is a flaggy limestone with faint traces of a dirt bed in places and with no marine fossils—indeed, few fossils of any kind. The uppermost Portland rock here consists of a kind of "Roach," a hard Limestone full of casts of marine shells, *Pecten lamellosus*, Sow. ; *Cardium dissimile*, Sow. ; *Pleuromya tellina*, Roem. ; and varieties of *Trigonia gibbosa*, Sow., were amongst the species found by the members. The absence (or rarity) of *Cerithium* serves to distinguish this bed from the typical Roach of the Isle of Portland. Mr. Hudleston said that this change from marine to freshwater conditions, shown in the section, was evidence of some interval between the Portland and Purbeck series, and, in fact, he was certain that an extensive planing of the Portland rocks had taken place in the interval between the deposition of those two formations. The Purbecks rest upon different portions of the Portland rocks in different parts of the country, here on a representative of the Roach, at Portisham on the flinty series. A similar transgression of Purbecks over various members of the underlying Portlands was also noticeable in the Vale of Wardour.

On this Professor Blake said he would make a speculative remark. In the South of France there is a series of beds intermediate between the Jurassic and Cretaceous, which are separated from both as the Tithonic stage. If then we have an unconformity at the top of the Wealden and another at the bottom of the Purbeck the intervening beds might be also separated, as a series corresponding to the Tithonic.

The Portland Beds seen consist of :

1. Roach.
2. Representative of the building-stone.
3. Beds with chert.

The party now passed along the face of an undercliff to a point below Holworth House, where Mr. Hudleston pointed out.

blue clay (Gault) resting on the upturned edges of the Jurassic rocks, a splendid example of the great overlap. Immediately above, on the Chaldon Plateau, the overlying Chalk, he said, is fairly level, but a little farther east, for instance at the Durdle, the Chalk and everything else is tilted, and in places even inverted, by the great Isle of Purbeck fold.

The greater number of the party were obliged to turn back at this point in order to catch the official train at Weymouth, but the President and some of the members were able to accompany the Directors on a further examination of the cliffs.

It was not always an easy task to separate the slipped Gault from Kimeridge Clay, and no very definite Gault forms were found, except perhaps *Inoceramus concentricus*, Park. Upper Greensand fossils were abundant. Amongst those collected were, *Pecten asper*, Lam.; *Myacites* (*Panopæa*) *mandibula*, Sow.; *Hamites*, etc.

In the slips of Kimeridge Clay, oil shale was noticed, but the "coal" was not found *in situ*.

The party then walked by the shore westwards to Osmington Mills, where a small stream (the Cascade) flows into the sea. The stratigraphy is sufficiently indicated by Mr. Strahan's figure (Fig. 5).

Mr. Hudleston explained the section, and said that the pre-Cretaceous disturbance, of which such good evidence lay before the party, was exactly in line with the post-Cretaceous disturbance at South Down Farm studied earlier in the day. This is, in fact, the well-known Osmington anticline—a fractured anticlinal fold, which has tilted the Corallian rocks in the bay. He pointed out the connection of the Upton syncline with the Osmington anticline as being parts of a system of folding due to lateral compression.

The party spent some time collecting on the shore and in the cliff, and, as a last effort, proceeded to verify the remarkable lozenge-shaped block of pre-Upper Cretaceous rocks in the defile above Osmington Mills, which is shown in the new Survey Map by Mr. Strahan. There was just sufficient carriage accommodation to enable the party, about twenty in number, to return comfortably to Weymouth.

REFERENCES.

MAPS.—Ordnance, 1-inch Survey. Sheet 17, Old Series. Sheets 327, 341, 342, New Series.

Geological 1-inch Survey. Sheet 17, Old Series. Sheets 341 (Langton Herring), 342 (Weymouth). New Series.

Ordnance 6-inch Survey. Sheets 38, S.W., S.E. (Bridport); 45, N.E., N.W., and S.E. (Burton Bradstock); 46, N.W., S.W., and S.E. (Abbotsbury); 52, N.E., N.W., and S.E. (Langton Herring); 53, N.E. and N.W., and old *whole* sheet 53 (Weymouth); 54, N.W. (Osmington).

N.B.—The 6-inch maps, geologically coloured, are on view in the Museum of Practical Geology, 28, Jermyn Street.

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- BLAKE, J. F.—"The Kimeridge Clay of England." *Quart. Journ. Geol. Soc.*, vol. xxxi, 1875.
- BLAKE and HUDLESTON.—"The Corallian Rocks of England." *Quart. Journ. Geol. Soc.*, vol. xxxiii, 1877.
- BUCKMAN, S. S.—"The Cotteswold, Midford, and Yeovil Sands, and the division between Lias and Oolite." *Quart. Geol. Journ. Soc.*, vol. xlv, 1889.
- "The so-called Upper Lias Clay of Down Cliffs." *Quart. Journ. Geol. Soc.*, vol. xlvi, 1890.
- DAMON, R.—"Geology of Weymouth." Second Edition, 1888.
- HUDLESTON, W. H.—"Gasteropoda of the Inferior Oolite." Part I. *Pal. Soc.*, 1887.
- SOLLY, H. S., and WALKER, J. F.—"Note on the fault in the Cliff west of Bridport Harbour." *Report of Brit. Assoc.*, for 1890.
- STRAHAN, A.—"On Overthrusts of Tertiary Date in Dorset." *Quart. Journ. Geol. Soc.*, vol. li, p 549, 1895.
- "Geology of the Isle of Purbeck and Weymouth." *Mem. Geol. Survey*. IN THE PRESS.
- WOODWARD, H. B.—"Report of the Excursion to Lyme Regis in 1889." *Proc. Geol. Assoc.*, vol. xi, p. 26.
- "The Jurassic Rocks of Britain." Vol. iv, *Mem. Geol. Survey*, 1894.
- "The Jurassic Rocks of Britain." Vol. v, *Mem. Geol. Survey*, 1895.
- "Report of Excursion to Bridport." *Proc. Geol. Assoc.*, vol. ix, p. 200.

EXCURSION TO READING.

SATURDAY, APRIL 23RD, 1898.

Director: J. H. BLAKE, F.G.S., ASSOC. M. INST. C.E., OF
H. M. GEOLOGICAL SURVEY.

Excursion Secretary: W. P. D. STEBBING, F.G.S.

(Report by the DIRECTOR. Communicated by permission of the Director-General of the Geological Survey.)

SEVERAL members left London at 1.33 p.m., and arrived at Reading at 2.25, where they were met by others from the adjoining districts and from Oxford.

The party walked $1\frac{1}{4}$ miles in a westerly direction to a pit, dug in low-lying valley-gravel, situated on the east side of Elm Lodge. The section showed from 17 to 18 feet of stratified gravel resting on Chalk. The gravel consisted of sub-angular flints, some being of large size and but slightly water-worn, together with a few large, rounded quartzites. A few pieces of broken bone have been found in this pit.

The next excavation visited, belonging to Mr. Jesse, was on the sloping ground a quarter of a mile south of Elm Lodge, and about the same distance south-east of the Barracks. The following was the section exposed:

[JULY, 1898.]