EXCURSION TO HYTHE, SANDGATE, AND
FOLKESTONE.

SATURDAY, 10TH JUNE, 1893.

Directors: F. G. HILTON PRICE, F.S.A., F.G.S., AND
THOMAS LEIGHTON, F.G.S.

PART I. HYTHE TO FOLKESTONE.

(Report by THOMAS LEIGHTON.)

A PARTY numbering upwards of 40, and including Mr. John Griffiths, the veteran fossil collector of Folkestone, assembled at Sandling Junction Station at a quarter to eleven. A move was at once made by the high road to the railway cutting near Saltwood, on the branch line to Sandgate. It should be remembered that the Saltwood Tunnel, described in Mr. Topley's "Memoir of the Weald" (p. 128), is on the main line to Folkestone, a little to the north of the tunnel adjoining the section about to be described. The beds described in the first Saltwood Tunnel, however, appear to be the same as those shown in the cutting adjoining the second tunnel.

From the level crossing near Saltwood Church the party proceeded up the line to the tunnel (No. 2), which is driven through the Folkestone Sands, just beyond their junction with the Sandgate Beds, which junction it was pointed out might be taken at the line of vegetation rising through the bank. Mr. Leighton here explained that he had only undertaken the direction of this portion of the excursion as the monthly circular was going to press, in consequence of the unfortunate illness of Mr. Hilton Price; the latter gentleman would meet the party at Folkestone in the afternoon, but he was not at present sufficiently recovered to undertake the whole of the day's work. Mr. Leighton said under these circumstances, since he was known to be somewhat unorthodox on the subject of the Lower Greensands, it would be his duty simply to describe the beds as they were interpreted and mapped by the Geological Survey, but he would not hold himself responsible for the correctness of those views, and when he differed from them he hoped he might be allowed to point out his reasons for such difference.

"The buff sands," Mr. Leighton proceeded to say, "through which the tunnel is driven, and which are seen at the north-west end of the cutting, are the Folkestone Sands, in the condition described on page 139 of Mr. Topley's Memoir (and quoted by Professor Boulger and myself on page 12 of the 'Proceedings,'

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vol. xiii). You will notice that the section consists of buff sands only, such as you are accustomed to recognise as Folkestone Sands throughout Surrey, the hard beds of stone, chert, etc., which you will see presently between Sandgate and Folkestone, have disappeared here. I will now call your attention to the dip. In his communication to *Nature* of March 16th last, our late President, Prof. J. F. Blake, describes the Sandgate Beds as dipping east at a moderate angle, but you will see that that is certainly not the dip here, for, since this cutting runs almost exactly north-west south-east, it is obvious that a true easterly dip should show beds falling slightly down the line, whereas you see them falling somewhat sharply up the line. The dip as seen here agrees with that given by the Survey, which is a little east of north. I believe this to be the true dip throughout this area, although of course there may be local dips in many places. Now as to the Sandgate Beds themselves, the uppermost member of which is before you, you see a dark grey clayey sand, it would appear more clayey but for the continued dry weather of the last three months; still, although not by any means strictly impervious to water, the line of springs occurs at the junction of this bed and the Folkestone Beds above. There are less pervious beds below and this bed itself would soon become water-logged. As we proceed down the line, you will first come to dark green stratified beds, clayey sands in various degrees of admixture, but always more sandy than clayey. Below these you will find more homogeneous beds, almost black in colour, concerning which there is evidently some confusion, but confusion for which I fear this Association is mainly responsible.

I must now be considered as speaking for myself alone, as what I am about to tell you is not in accord with the published description of previous observers. Before I touch upon the point in question, however, I wish to say that in my opinion we are still far too ignorant of our Lower Greensand area as a whole to be able to say for certain that any one bed is anything more than of Neocomian age. Mr. C. J. A. Mejer has done excellent work in the Godalming district, but until the whole area has been examined with equal care I do not see how the various beds can properly be brought into line. We know far too little of the fossil contents of these beds. I may instance that although Mr. Hilton Price calls the bottom bed of the Sandgate the zone of *Rhynchonella sulcata*, in the table of fossils published in the Weald Memoir, that species is not recorded from the Sandgate Beds at all, but only as occurring upwards from the Folkestone Junction Bed (zone of *Am. mammilaris*?). I must presume that the junction bed referred to is the zone of *Am. mammilaris*, although that species is not recorded in the same table from the Junction Bed but from the Folkestone Beds themselves, but that may be simply a printer's error. I mention these

matters only to show that one has excuses for being a little unorthodox. Now as to the bottom bed of the Sandgate, I have little fault to find with the Survey Memoir, none with the facts as there stated, but I believe the correlation (page 128) of the 'clay, dark green, tough and adhesive, almost black when first brought to the surface, and containing very little sand,' found by Mr. Simms in the Saltwood Tunnel No. 1, with the upper part of the Sandgates (the green clayey sands) of Mill Point, to be an error. No doubt that was the best correlation that could be made at the time, when evidently there was not much evidence. I have myself seen the black clays below the green clayey sands at Mill Point, but of course exposures there vary according to the state of the slips. Professor Blake describes both beds as exposed there this spring in his paper in *Nature* (*op. cit.*); I saw the same beds with him the Saturday after the landslip, both here and on the shore at Sandgate, and you will see both these exposures to-day. Mr. Simms's clay, I should say without doubt, is at the bottom of the Sandgate Beds.

"Now as to the confusion concerning this bed for which we are as an Association more or less responsible. In vol. iv of our 'Proceedings,' on page 136, we published a section by Mr. Hilton Price, which shows the bottom Sandgate Bed as a 'clayey bed': this is correct, but in the description accompanying the section it is described as 'black sands.' Now, was this through a printer's error? I am, of course, quite unable to say. The matter did not, however, end here. In 1883 a new section was drawn for us by Mr. Topley, details of the Sandgate Beds taken from the *description* accompanying Mr. Price's section, and thus the wrong description of the bottom bed of the Sandgate was perpetuated, and that section we have reprinted recently.* Now since we are obviously more or less to blame for all this, I think the best thing we can do is to go to the section and decide how we are to describe this bed in future."

The party walked down the line to the section, which was unfortunately very dirty from the long drought. Mr. Leighton produced a sample of the bottom bed for an opinion, when Mr. Holmes stated that he would prefer to call it a loam, although no doubt it would be impervious to water. Mr. Leighton said it was a great pity the weather had been so dry, but he would accept Mr. Holmes's definition with the qualification that it was a "stiff" loam.

No report of this excursion would be complete without reference to a discussion which was initiated here by Mr. C. J. A. Mejer, and well maintained by him and some others at various points during the day. On behalf of the opposition, Mr. Mejer asked, without committing himself to the opinion that it was so, why the clayey beds in the railway cutting should not be the

* This vol., p. 42.

Atherfield Clay, given as about fifty feet thick here, and the buff sands overlying them, the lower beds of the Hythe Series as seen in Surrey? The beds hereabouts were much faulted and broken up by the collapse of clays on the shore, and he particularly wished to know on what grounds the buff sands, differing so materially from those seen in the coast section from Sandgate to Folkestone, were classed with them as of Folkestone age? Mr. Leighton said that the explanation he had given was strictly in accord with the Survey mapping, with which he fully agreed so far as our present knowledge extended. He would prefer to have some evidence of faults before dealing with them, and further he thought that as the party proceeded along the road to Hythe it would become clear enough that the clayey beds of the railway cutting were regularly superimposed on the Kentish Rag Beds of the Hythe Series. As to the buff sands at the base of the Hythe Series in Surrey, he had never seen any sign of them in this district, and a very considerable lithological change from east to west being admitted on all hands, he did not see why their absence here should be noteworthy. The junction of the Kentish Rag Beds and the Atherfield Clay had been seen at Hythe and there was no buff sand between.

Leaving the railway at Saltwood Castle the party took the high-road to Hythe; when near the cross-road close to the edge of the Sandgate outcrop, Mr. Deedes, of Hillhurst, near Hythe, informed the party that the land hereabouts was "very heavy, difficult to work." Mr. Leighton at once pointed out that this was the result of, and evidence of, the clayey nature of the bottom bed of the Sandgate Series. At Hythe the old sea-cliffs, now inland, were examined and explained, the party then proceeded to the eastern quarry of the Kentish Rag, the beds of which were briefly described. The best fossils are found in the other quarry, to the west of the road by which the party arrived; that quarry was not in the programme on this occasion however, from want of time.

Proceeding towards the railway station the clay-pit close at hand was visited. The blue clay now chiefly worked is evidently the Weald Clay, as shown by the presence of Cyprids, but the bluish-grey sandy clay at the top of the section may represent some of the squeezed-up Atherfield Clay. A short visit was paid to the old pit immediately above, but marsh plants were the only evidence, that could now be found, of the Atherfield section which was shown here on a previous occasion. The party took train at 1.21 p.m. from Hythe to Sandgate and upon arrival proceeded at once to the foreshore, where the recent removal of shingle has left the beds well exposed in places.

Below the military hospital and but a short way from where the sea-wall shows the commencement of the landslip, Mr. Meyer found a shale with *Paludina*, evidence of the presence of the

Weald Clay. This would appear to come in at about its normal horizon, but the find is an interesting one which the natural craving for lunch alone hindered from complete investigation at the time. Judged roughly on the spot the distance from the outcrop of the top bed of the Hythe might be forty paces, which would bring the position well within the Weald Clay. The matter is, however, well worthy of careful measurement since it is just here that Professor Blake draws his westernmost fault. The outcrop of the Hythe Beds was carefully examined, with the clays and green clayey-sands of the Sandgate Beds squeezed up above them by the landslip, still well exposed on the shore.

Mr. Leighton then drew attention to the ledge of Hythe limestone further to the east, dipping in-shore at a high angle, which he agreed with Professor Blake must necessarily show the existence of a fault, or of a disturbance such as Mr. Topley allowed of so considerable a nature that it amounted to a fault. It would appear however that Professor Blake has drawn his fault (*Nature, op. cit.*) too far to the east, since evidence of the highly inclined ledge was found high up on the shore in a position which accords well with the old quarry mentioned by Mr. Topley in his paper. There is no other evidence of fractures or of slipped ground at this part of the shore and since the main outcrop of the Hythe Beds, showing a considerable width of limestone bands regularly ranged in line, must almost necessarily show the true dip, and the fault throws the Hythe Beds up into the cliff, it is not easy to accept Mr. Topley's explanation of the cause of the high dip noted by Professor Blake. Mr. Topley's explanation of the high dip, however, might apply to masses torn off to the east of the fault, nevertheless there is good evidence that a fault must exist, since there appears to be a complete succession from the Weald Clay to the Sandgates on the shore to the west. Further, Mr. Topley has seen the Hythe Beds in the cliff near Wellington Terrace, at which point they cannot be brought into line with the outcrop on the shore since they are but sixty feet in thickness.

Mr. Leighton stated that he did not exactly understand Mr. Topley's comparison of the landslip in this district with those to the east and west, from which almost all Mr. Topley's illustrations were drawn. He thought that different causes entirely must be found to account for landslips here, to those seen in operation at the Warren beyond Folkestone, or at Hythe. At both those places solid beds (Chalk at the Warren, Hythe Beds at Hythe) slipped over and plunged through, slippery clays, but at Sandgate the loose Folkestone and Sandgate Beds rested on the Hythe Limestone, the foundations of which appeared to be protected. Mr. Leighton was not prepared to admit that there was an undercliff formed by land-

slips between Sandgate and Folkestone. He looked upon the strip of ground there beneath the cliff as talus mainly. Of course a discussion might be raised here as to what constituted a landslip, but east of the point where the lower Folkestone road diverged, atmospheric weathering appeared to be the chief destroying agent, and falls of rock and sand from that cause were locally, although not correctly, termed landslips.

After luncheon at the Royal Kent Hotel Mr. Leighton briefly described Mr. Topley's views of the nature of the Sandgate Landslip, which will be found on page 40 of this volume. Mr. Leighton added that considering that there was considerable difference between Mr. Topley and himself as to the details of the local geology, which he had endeavoured to explain during the morning, it was somewhat surprising that little if any difference existed as to the cause of the landslip. Indeed, he did not see quite how Mr. Topley accounted for the slip at all if the Sandgates were "not completely retentive." Mr. Leighton thought that the broken rocks of the undercliff had slipped forward on the Sandgate Clay, but since we had had many wet periods in the past without a landslip he was inclined to think that the removal of shingle from the foreshore, which was far more extensive than was generally supposed, must be said to be the chief cause of the slip. It was the only visible cause, since, although he would like to have some details of the slip of 1827, he looked upon the Sandgate undercliff as practically at an angle of rest, under ordinary conditions. The undercliff was well covered with soil everywhere and there were no signs of slips over the broken ground before the present year. Water falling on the surface of the undercliff would not do any damage, but it was worthy of remark that after the slips had occurred several springs broke out at unusual places and were yet running in spite of the long drought. This looked as if from some (unascertained) cause the water-line in the Folkestone Beds had risen, so that although the dip was inshore, water had poured over into the broken rocks, which had thus become too heavy, with the withdrawal of the support of the shingle, to maintain their previous angle of repose. Of course this was more or less problematical, still it would be seen that in the Encombe Grounds and elsewhere the slip had exposed the junction of the Folkestone and Sandgate Beds in the small sections, and why should water now come from this junction at spots which were not so affected previously by wet seasons? Mr. Leighton thought, therefore, that water must be a cause of the landslip, although at present it was impossible to say precisely how it had been brought into operation.

The determination of the Sandgate Local Board to drain the line of junction of the Folkestone and Sandgate Beds would render matters secure in future. Mr. Leighton said he was glad

to read in Mr. Topley's recently published paper that this was to be done, as he was interested in the welfare of Sandgate and had little faith in the deep drains at right angles to the cliff which he had, perhaps erroneously, understood to be the plan proposed at the time the paper was read. After examining the chief places of interest on the slipped area, the party took the lower road to Folkestone in the high section above which the peculiar local characters of the Folkestone Beds were noticed, as mentioned above. At five o'clock Folkestone harbour was reached; here Mr. Hilton Price joined the party and at once undertook the direction.

PART II. FOLKESTONE AND EASTWEAR BAY.

(Report by F. G. HILTON PRICE.)

The party first proceeded to the end of the pier in order to get a good view of the cliff sections of the Upper Neocomian Beds to the east. Mr. Price then said:—

"This section consists of the Sandgate Beds, the Folkestone Beds, with the Gault capping them. The Sandgate Beds consist of four divisions, and are supposed to attain a thickness of about eighty feet, but as they are below tide mark very little beyond the upper part of bed IV. is seen. The base bed No. I. is composed of black clayey sands, and is very fossiliferous, containing *Rhynchonella sulcata*, *Astarte*, sp., *Crassatella Cornueliana*, *Cucullæa glabra*, *Cytherea*, *Corbula*, *Exogyra sinuata*, *Gervillia anceps*, *Myacites plicata*, and others. This bed can only be got at during the spring tides, and the fossils are very difficult to preserve.

Bed II. consists of dark green sands, passing up into yellowish green sands containing a few fossils.

Bed III., black clayey sand.

Bed IV., yellowish-green sands, which are succeeded by brownish clayey sands.

"The Folkestone Beds, which are about seventy feet in thickness, rest conformably upon them. Bed I. of this series consists of a brown ferruginous sandstone about one foot in thickness, containing phosphatic nodules, many much rolled, in which casts of fossils occur, such as: *Corbula*, *Cucullæa*, *Lima*, *Lucina*, *Trigonia*, *Avellana*, *Janira Morrisii*, and two Ammonites.

"At Baker's Gap, which is half-way between the harbour and Copt Point, a slight anticlinal can be seen in the cliff, and false beddings may also be noticed.

"Bed II. is about two feet in thickness and consists of dark greenish clayey sandstone, reminding us of the hassocky Hythe Beds, which have been seen this morning; it is fossiliferous, containing amongst others: *Serpula*, *Rhynchonella*, *Waldheimia pseudojurensis*, *Avicula pectinata*, *Ostrea frons*, *Pecten orbicularis*, and *Janira Morrisii*.

"Bed III. is about sixty feet thick, and consists of seams of coarse calcareous sandstone, varying from two feet to a few inches, all of which are interstratified with layers of loose yellowish sands. It is from this bed that the Folkestone stone is extracted, largely used for building purposes. You will observe large white tabular masses of branching sponge upon the rocks and boulders. Twenty feet up the sand takes a black clayey character, but this is not constant; *Pecten orbicularis* has been found in it. About ten feet from the top a seam of chert occurs. You will observe upon the rocks many large specimens of *Exogyra sinuata*, which come from this bed, and many other fossils have been found.

"Bed IV., which is styled the zone of *Ammonites mammilaris*, consists of an irregular seam of large rolled nodular masses or grits, composed of coarse grains of quartz, glauconite, jasper, and phosphatic nodules. These nodules require a very heavy hammer to break them; when broken up they will be found to contain rolled casts of a great many fossils and dark pipings of Gault, they have the appearance of having rolled about on a shore for a long period of time and when in a soft state they accumulated the debris lying on the shore.

"This seam is succeeded by about four feet of loose yellowish sands and is capped by a line of pyrites nodules which forms the base of the Gault.

"All these before cited beds dip N.N.E., and finally disappear below the beach a little eastward of Copt Point."

The party then walked round the harbour and Mr. Price pointed out the site of the "Elephant Bed" at the Battery on the West Cliff, just above the road opposite to the Pavilion Hotel. Some years ago a large quantity of bones of large mammals was found here: many of them are deposited in the Folkestone Museum.

Having descended to the beach to the east of the harbour, a stiff walk brought the party to Copt Point, where small sections showing the various fossil horizons of the Gault had been prepared by Mr. Griffiths. Mr. Price then resumed his discourse as follows:—

"Copt Point, composed of Gault, is gradually growing smaller and smaller, probably nearly a quarter of a mile of it has been denuded since the beginning of this century, but by far the greatest havoc has been caused to it and the whole of Eastwear Bay since the South Eastern Railway built out their extension of the pier.

"The Gault is here at Copt Point about 100 feet thick, the whole of the lower Gault and part of the upper is here *in situ*; to get a section of the remainder of the Upper Gault you will have to walk about a mile further east.

"Round about Copt Point on the shore at low water a large

quantity of fossil wood, specimens of *Ammonites interruptus*, and other ammonites and fossils can be readily picked up. After passing Copt Point no more cliff is seen, as the whole area between the chalk hills on the north and the beach consists of the results of landslips, confusedly mixed with the chalk detritus thrown out when the tunnels and railway were constructed. Landslips are of frequent occurrence here in the wet seasons and many serious ones have been observed.

"Before proceeding further I may tell you that the Gault is divided into two large divisions and again subdivided into eleven zones or beds, to all of which numbers and names have been given, indicative of the colours of the clays or of their fossil contents.

"The lowest bed, No. I., is the zone of *Ammonites interruptus*. The clays of the Lower Gault, with the exception of the Crab Bed, No. III., is of a dark colour and contain a larger proportion of oxides of iron and pyrites than the clays of the Upper Gault, which contain far more lime and less iron. The fossils of the Lower Gault are frequently highly pyritised and of a brilliant colour, whereas those of the Upper Beds are frequently enveloped in phosphate of lime. A large number of Lower Gault fossils became extinct in bed VIII., the nodule or junction bed. Taking the list of the fauna from my paper on the Gault as 292 species, as many as 124 species appear to be extinct in this junction bed and 46 forms are continued into the Upper Gault; it also contains 20 species peculiar to it, and 57 new species occur in the beds of the Upper Gault. You will observe as you walk along the shore tabular masses of a light fawn-coloured iron stone, perforated throughout with the borings of some mollusc; this comes from Bed III.

"Selinite occurs in large pieces in Bed II., and in no other part of the Gault.

"Before leaving the Lower Gault it will be well to note that most of the Siphonostomata become extinct in the passage bed No. VIII.; with the exception of a few species of *Aporrhais*, the fossils of the Upper Gault are mostly Holostomata.

"As we come upon bed IX. we find the silvery casts of *Inoceramus sulcatus* in great abundance; a hybrid form is also found here, called *Inoceramus subsulcatus* from which circumstance the bed is aptly named by Griffith the 'half-and-half' bed. The crushed band of *Inoceramus sulcatus* marks the division between this zone and Bed X. The Gault now becomes more homogeneous and hard and has a pale cold grey colour and is poor in organic remains. *Kingena lima* is found here, which gives the name to the bed.

"The next and uppermost bed of the Gault consists of hard cold grey marls, and is upwards of fifty-six feet in thickness, in fact thicker than the lower ten beds put together. The best place to

see this bed *in situ* is that part of Eastwear Bay known as the Pelter (after the name of a brig wrecked here). About thirty-five feet up in this bed there is a band of dark greensand three feet three inches in thickness, this latter was measured by cutting a section east of Copt Point and south of Martello Tower No. 3. Seventeen feet above this is the so-called Upper Greensand *in situ*. The Gault above this seam of Greensand, called the Middle Greensand by Griffith, is of the same consistency as that of the same bed below. Casts of very large Ammonites occur in this zone.

"The dark greenish sand, calcareous and clayey, commonly called Upper Greensand, reposes more or less conformably upon the Gault, into which short pipings extend for about three or four inches. It is simply the sandy base of the Chalk Marl, into which it gradually passes upwards. It is about fifteen feet in thickness, and is followed by my bed II. of the Chalk Marl, about ten feet in thickness, very hard and coarse in texture and very fossiliferous.* Then comes on the soft grey Chalk and the Lower Chalk, but the Chalk is out of our province to-day."

The examination of Eastwear Bay was somewhat interfered with by the target practice of a battery of artillery, nevertheless a small party accompanied the Director through the Warren to see the effects of the various and frequent landslips upon this area, upon which an interesting paper has recently been read before the Association by Mr. Topley. Within the memory of man the land extended fully a quarter of a mile further seawards than at present. After tea at the Warren Inn the party returned to town.

REFERENCES.

Geological Survey Map, Sheet 4.
New Ordnance Survey Map, Sheet 305.

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- See also the References given on p. 47.

* See "The Beds between the Gault and Upper Chalk near Folkestone," *Quart. Journ. Geol. Soc.*, vol. xxxiii, p. (1877.)