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certain places in Iceland. They are now used as stores for fuel for the winter, which is thrown in through a round hole in the top of the roof; and when the fuel has been gathered in, the hole is closed up with a quantity of dung. Whether this pit still retains anywhere in rural speech the name of *dyngja* I am unable to tell.

Monday, 12 March, 1906.

W. M. FAWCETT, M.A., Vice-President, in the Chair.

A paper was read by Mr W. A. RHODES,

ON DENTISTRY : ANCIENT AND BARBARIC.

Mr W. B. REDFERN exhibited an antique spring-gun, a Japanese gun, and some moulds for making ginger-bread.

H. D. CATLING, M.A., exhibited objects from the Wrestlers' Inn, and the Coach and Horses Inn.

E. LLOYD JONES, M.D., exhibited some Chinese Celts.

W. L. RAYNES, M.A., exhibited an octagonal watch of the Tudor period.

Monday, 30 April, 1906.

The Reverend the President in the Chair.

The following paper was read :

ACCOUNT OF A PALAEOLOGIC SITE IN IPSWICH.

By NINA FRANCES LAYARD.

In accepting Professor Ridgeway's kind invitation to give an account before this Institute of my Palaeolithic discoveries in Ipswich, I feel I shall best comply with the wishes of the meeting by avoiding theories, and simply giving as correct a record as I can of the actual work done, and the results obtained in five years spent among Suffolk flints.

As I am often asked how the discovery of this interesting Palaeolithic site came about, it is possible that some fellow flint-

hunters here might be interested to hear the story from the beginning.

I had for some time been carrying on archaeological researches in Ipswich, more especially on the sites of the old conventual buildings, which have now almost completely disappeared. This involved a certain amount of excavating, but as this is no easy matter in a town, I had often to content myself with following in the track of the destroyers, who have been busily pulling down all that is old and beautiful in Ipswich, and out of the exposed foundations of these ancient buildings gathering treasures of pottery, bone and horn implements, with other relics too numerous to mention.

In November, 1900, I happened to be daily visiting a gang of workmen employed in rather shallow operations for laying gas-pipes in the Tower Ramparts. Nothing more interesting than a few sixteenth century relics had been turned out, when one of the workmen produced from his pocket a small piece of so-called "rock" which he had found elsewhere in the town. I at once recognized this as a fragment of mammoth tooth in a much decayed condition. To make a long story short, following up this clue, I soon found myself at a gravel-pit from which both teeth, tusk and bones of Rhinoceros and Mammoth were procured. The next thing was naturally to search for the signs of Palaeolithic Man among the remains of these animals which were his contemporaries. There was not much of this valley gravel exposed, but I was almost immediately successful in finding two Palaeolithic flakes, and a very fine core which had been finished into a useful chopper. As this pit was soon closed and the land built over, my happy hunting-ground disappeared under bricks and mortar.

Still keeping to the valley of the Gipping, I kept a sharp look out for any chance opening of the gravels at this level, but the opportunities were meagre. The draining of a road, the opening of the foundations of a house, stone heaps by the road-side, these were what I had chiefly to depend upon. But I never ceased questioning the workmen, till at last instead of the vague look and stolid shake of the head to which I was accustomed, my question as to the finding of flint implements

was quite eagerly answered in the affirmative, and this splendid Palaeolithic hatchet, which had been found a year before in Levington Road, Ipswich, was brought to me.

The importance of this find consisted in the fact that Levington Road is on a plateau above the town of Ipswich, and at a considerable height above the river level, where I had never thought of searching for flints. Thus encouraged, I worked on for another eighteen months, gathering a number of interesting relics by the way, but keeping the one object ever in view, namely to discover a Palaeolithic site if such a site existed in Ipswich. It was however a whole year before I found so much as a single Palaeolithic implement, and that was in the gravel path of my own garden, where I picked up a very fine scraper, which I afterwards presented to Sir John Evans. Six months later, in March, 1902, when questioning a workman in a newly opened gravel-pit, I was directed to a clay pit on a level with the spot at which the large hatchet had been discovered, and told that several flint tools had been found there. I was shown five of the beautiful implements you see before you, including two double-headed hatchets, one perch-backed implement, and one triangular. The foreman at once offered to show me where they came from. Hidden away from the Foxhall Road by a row of cottages was an extensive brickyard covering many acres and almost worked out. A gang of men were employed digging for clay, and at a depth of $12\frac{1}{2}$ feet the flints had been found. Only the old foreman, who had been in Norfolk, recognized the "fighting stones," but he was laughed at for his credulity. Walking round the pit, I picked up two more fine specimens which had been carelessly thrown out, and over which the grass was growing, so that at once any fear of the flints not belonging to the place was set at rest.

All flint-hunters will understand the caution that was now necessary in dealing with this most interesting discovery. How to interest the men sufficiently without arousing their cupidity or getting the place talked about outside, was the difficulty. On the whole I preferred the possible loss of implements for a time to running this risk. At this critical

junction the whole gang of men was suddenly removed to work at another and distant part of the field, so now the coast was clear. With the kind consent of the owner I then commenced serious work, and employed two workmen to dig for me, whom I trained in the art of flint-hunting.

As method in work of this sort is essential if correct measurements are to be taken, I commenced by marking out an area on the surface of 10 yards by 6, and putting in numbered pegs a yard apart. Thus when a flint was found, its latitude and longitude, so to speak, could be at once fixed. My object was to work regularly from west to east of the pit, but this was not so easy a matter as it at first appeared, for quarry regulations necessitated a system of platforms for the safety of the diggers, which complicated matters considerably, and made the measurement of the depth of almost every individual flint necessary.

Our first implement was found at a depth of $9\frac{1}{2}$ feet. After nearly a fortnight's work with nothing to show for it, the sight of a well worked oval flint in a clean bed of sandy clay, was very acceptable, and I had the block containing it cut out with the tool *in situ*. This was on October 28th, 1903. It is now in the Ipswich Museum. The next week was a very successful one, no less than eight good implements being found in a space not exceeding 6 feet square.

As we seemed to have struck on a rich bed, I invited Sir John Evans to visit the pit with me. This was on November 9th. Three days before an implement of unusual beauty, showing the ogival curve, had come to light, and we were fortunate enough to find another of a similar pattern close to it, which was cut out in the presence of Sir John Evans, and which is now in his possession. It was eleven days before our next platform was cut down to the same level as that in which these implements were found, and then a third tool almost exactly similar was discovered. All three were lying within a few feet of one another.

Judging from the position of these implements, which were to all appearances the work of the same hand, I concluded that they were either left in the exact position in which they were

found, or had been shifted only a short way from their original site. Later on, the finding of two small pointed tools lying point to point, with a small oval implement close to them, confirmed this opinion.

Later I noticed for the first time some small rough tools all of the same description, lying together in large numbers, and this could hardly have been accidental. As many as 46 small scrapers roughly formed by working down a flint flake on one side only, were found within a space of 6 yards square, while 33 selected flat flints lay beside them, evidently for use in the same work. These pieces appear to have been collected together because they are flat with a natural knife-like edge. In many cases they are merely selected chips from a workshop, but when not flat enough for whatever purpose they were to serve, a few deft blows have reduced them to the necessary shape. I do not know whether this type has been noticed before, or at any rate as occurring in connection with scrapers. They correspond closely to Neolithic forms found in abundance on newly ploughed fields. I have called them selected flat flints, as they can hardly be considered actual tools. I have brought a few specimens with me.

Our plan of working regularly from west to east soon proved that although on the west side flints were found at a depth of 11 to 12½ feet, and not deeper than 7½ to 8 feet on the east side, they were really all on the same bed, which slanted upwards, and met the gravels above the clay. In our earlier excavations one implement, and one only, was found in gravels immediately above the bed of clay, which contained most of the oval tools. It was a well worked oval flint, richly coloured by the red gravels in which it lay. I found it myself, and it required a stout workman's pick to dislodge it from its position about 7½ feet only from the surface. As this pointed to another and higher bed in which tools were to be found, these upper gravels were carefully searched during the next year's operations, with the result that implements of precisely the same type as some of those below were found. Even so distinctive a form as the oval implement with the ogee curve was there, its only distinction being that it showed

more signs of weathering than those encased in the compact clay below.

Early in January, 1905, as we worked along the western wall southward, I found that we were coming to an end of the clay which seemed to run like a tongue into the surrounding gravels, and a fine example of false-bedding came to light. Now it was easier to understand why flints of similar pattern had been found both above and below the clay, for here the two gravels containing them met, though I suppose the gravels above the clay were deposited considerably later than those below. Still they were exactly similar in composition. At the same time the clay on the south wall also thinned out and disappeared as it almost met the west wall. I sent a drawing of this to Prof. Boyd Dawkins, and this was his explanation—

“Your interesting sections find their explanation in the normal action of currents in depositing materials. The river currents which have deposited with swift movement the gravels, slower movement the sands, and with slowest of all the mud, have moved in the direction of the pencilled arrow. The deposits are of the ordinary false-bedded type. When the bottom of the shore had been filled up to *A*, the ‘way’ sand and gravel were deposited above it parallel to the level of *A*. The exact direction of the current you can tell by combining the slopes of the beds of sections I. and II. My arrows only indicate the apparent direction. The clay is the *latest* of the sloping beds.”

As the arrows pointed N. and E., I conclude that the current ran in a north-easterly direction.

The geology of the pit is of considerable interest, for although it presents certain perplexing features, still there are a few definite characters which are not without significance.

This section shows how the pit appeared during the earlier part of the excavation. Working from the surface downwards, we passed through $1\frac{1}{2}$ ft. of dark surface material, $4\frac{1}{2}$ ft. of red gravels (in which flints were afterwards found), $5\frac{1}{2}$ ft. of white brick earth, and 1 ft. of white sandy clay. Below this the white brick earth again became compact, and here at a depth of $12\frac{1}{2}$ ft. from the surface it was marked out by a red gravel

stain, immediately above and below which the implements were found.

A boring taken from the lowest point of this Palaeolithic bed showed $2\frac{1}{2}$ ft. of white brick earth below the flints, then 1 ft. of coarse gravel and sand with fragments of bone, teeth and tusks of Elephant, Rhinoceros, Ox and Deer, another 5 ft. of brick earth, 3 ft. of yellow clay, 1 ft. of loamy gravel, 2 ft. of strong brown clay, and finally at a depth of $14\frac{1}{2}$ to 15 ft. below the flints, and about 27 ft. from the surface, chalky boulder clay, into which we bored 4 ft. but without getting through it. As boulder clay was found higher up in other parts of the field, it is believed by Mr Clement Reid that the clay pit represents a silted-up valley hollowed out of boulder clay. As to the agency by which the filling up of this valley was brought about, there have been various opinions. Mr Reid believed that the materials had been blown into their present position, but our last year's work, revealing the false-bedding, I think appears to point to water action.

Here we seemed to find ourselves on the brink of a pool in the bed of a turbulent river, into which first the gravels and sands had been discharged, and where later the finer silt had settled down, finally compacting into a deep bed of white clay. It was in this pool and up its banks that the flints first found were lying, and this accounted for the irregular depths at which they occurred. Later work showed that the horizontal bed of gravel which afterwards covered the silted-up pool also contained implements similar to those found below. My work at the present time (though its object is hunting for and happily finding Anglo-Saxon treasures) has led me into a geological section on the other side of the valley, where the strata are so strangely mixed and contorted that I am rather shaken in my belief as to any great significance being attached to the fact of flints being found under or above the boulder clay. In the section to which I allude, boulder clay is oftener seen below shelly red crag than above it, and there seems to be a sort of general rebellion against the laws of stratification. Although I cannot produce a flint tool out of this boulder clay, I have brought with me a very strangely grooved boulder from about

4 ft. deep in the clay, and about 8 ft. from the surface. This is the section as I sketched it.

As I have had very little experience of ice-action on various stones, I bring this specimen more to get the opinion of geologists upon it than to attempt to give one myself, though it certainly bears a striking resemblance to human workmanship.

To return to the Palaeolithic site.

The types of implements found in the small area which has been dug over, are unusually representative, including kite-shaped, perch-backed, flat-triangular, shoe-shaped, oval, ovate with and without the curve, double-headed axes, borers, scrapers, humped implements, typical drift implements with crust left on, leaf-shaped, heart-shaped, etc., with several unique forms, one of which, a cutting tool with re-curved edge, is shown in the *Journal of the Anthropological Institute*, while another small implement has been described as a toy tool.

It would take too long to describe all the points of interest in the flints themselves. Suffice it to say that tools of the roughest possible description lay beside others finished with exquisite care.

There has been much discussion as to the probable object of the ogee curve in some of the ovate implements. Sir John Evans, I think, considered it simply the accidental result of the way in which the stone was held in the hand when being manufactured, but may there not have been some intention behind the decision to give blows only on the one side at a time, instead of alternately from left to right? Certainly the object was attained in this way of a far sharper cutting edge; for the zigzag chipping tended to blunt the edge.

The rougher pointed implements which I found with some crust left upon them are usually flat on one side, and in eight out of nine had no secondary work on the flat side.

I examined the contents of the boulder clay in another part of the field, and perhaps it is not too much to say that they suggest the possible course of the ice-berg that left this deposit in Ipswich. We may not read the diary of its travels correctly, but it is at any rate not impossible that they give the clue. Chalk of course we find in abundance which might have

been picked up from north, south, east or west, but a lump of red chalk must have travelled some distance, for I think we have none nearer than Hunstanton in the north of Norfolk. *Gryphaea incurva* from the Lias may have come from Lincolnshire or Yorkshire, and abundance of Oolite also possibly from Yorkshire, but a rolled pebble of igneous rock, showing Felspar crystals in a fine matrix, is more difficult to place. Leicestershire would seem somewhat out of the course, if the red chalk spells Hunstanton, and I should like to think that Roxburgh gave that small contribution to the geological treasures of our boulder clay. That such a conclusion is as liable as the fragment itself to be regarded as "far-fetched," I am well aware, but I merely throw it out to provoke any other alternative suggestion.

If proof were necessary that these odd fragments of rock were brought by the agency of ice rather than water, besides flints showing ice scratches (which are not always convincing to the sceptic) I have here a small scrap of Oolite which seems by its condition to answer the question conclusively. Everyone is acquainted with the roe-like appearance of Oolite, but in this case, one side only of the fragment has been so ground down as to reveal in cross-section the nucleus of quartz grains round which the roe-like lumps had formed, while the other side is left uninjured. How this fragment could have been brought from the great distance at which Oolite is found, without turning over, and becoming rolled and rubbed down on all sides, it is difficult to conceive, unless it had travelled firmly packed in ice.

Another interesting fragment found about a foot below the flint implements is a small lump of red ochre, which is certainly suggestive of Palaeolithic war-paint. It has been found, I believe, in Palaeolithic Cave Dwellings of the Reindeer period.

The animal remains, which consisted of very fragmentary portions of bones, tusks and horns, of Mammoth, Rhinoceros, Ox and Deer, certainly appeared to belong to a distinct stratum some two feet below the bed which contained the implements. They were in coarse sandy gravel with large stones much rolled and scratched. Two of these had some resemblance to imple-

ments of earlier Palaeolithic type, and appear to have been shaped by alternate blows on either side of the edge, but as these were the only examples found, they must be classed with "uncertain implements," and not given the undue value too often bestowed on such questionable forms.

Monday, 7 May, 1906.

W. M. FAWCETT, M.A., Vice-President, in the Chair.

JOHN WILLIS CLARK, M.A., Trinity College, read the following paper :

NOTE ON THE LIBRARY OF THE BENEDICTINE MONASTERY OF *LA CHAISE DIEU* IN AUVERGNE.

The origin of the monastery of La Chaise Dieu (Maison de Dieu—Casa Dei) may be referred to the year 1043, when Robert, a monk of noble birth, left a monastic community in Brioude, with two attendants, and betook himself to a spot in the wild highlands between Clermont Ferrand and Le Puy, about 30 miles north of the latter town, where he and his community could carry out without fear of interruption the two great objects of the monastic life, prayer and work. The site of the House is at a height of 3553 feet above the sea-level (a height nearly equal to that of Snowdon), and the country is still sparsely populated, with vast open fields, intersected by the roughest of mountain-roads. Notwithstanding these natural disadvantages, perhaps in consequence of them, the House grew and flourished, and became one of the richest and most celebrated in France.

I have no intention of tracing the history of La Chaise Dieu, which I visited 16 September, 1905, or of describing its buildings more minutely than is necessary for the right understanding of that part of it to which I wish to draw special attention, viz. the Library. I will therefore merely record that the great development of its buildings was due to the generosity of Pope Clement VI, who had been a monk there ;

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