

## On Rains Cave, Longcliffe, Derbyshire.

(Continued from Vol. XI., page 45.)

### SECOND REPORT.—THE EXCAVATION AND GENERAL RESULTS.

BY JOHN WARD.



SINCE the first report, three years ago, systematic excavation has been carried on in this cave at irregular intervals, chiefly in winter. My helpers have been the two brothers Rains, and their cousin, Mr. C. Gregory, the young men, it will be remembered, who made the discovery of bones in this cave. Upon them has fallen the chief share of the above work; and I cannot proceed without first testifying to the highly creditable manner in which they have done it, and to their keen interest and perseverance, in spite of its laborious character. They deserve the best thanks of our Society.

The results have come short of what was anticipated. For this nobody, of course, is to be blamed, unless the old users of the cave for their want of appreciation of 19th-century archæology! In cave-digging, as in barrow-digging, appearances are decidedly deceitful, and one must be prepared for blanks. Still, although the investigation, so far, cannot be said to have thrown new light upon primitive man and his times, it has by no means been a wasted work, as will be seen in the sequel. The chief aim, however, of this report is to set forth facts rather than inferences, and facts so presented that the readers may form their own conclusions and pronounce upon those herein stated. There is a very

special reason for this. A cave cannot be twice dug: so, unless the facts are plainly set forth, the reader has perforce to accept the reporter's conclusions on simple trust—a most unscientific procedure. While admitting that the cave-digger is in the best of positions as an eye-witness to interpret the facts, his prime duty is to observe, and to fully and faithfully report what he has seen. In this spirit I proceed.

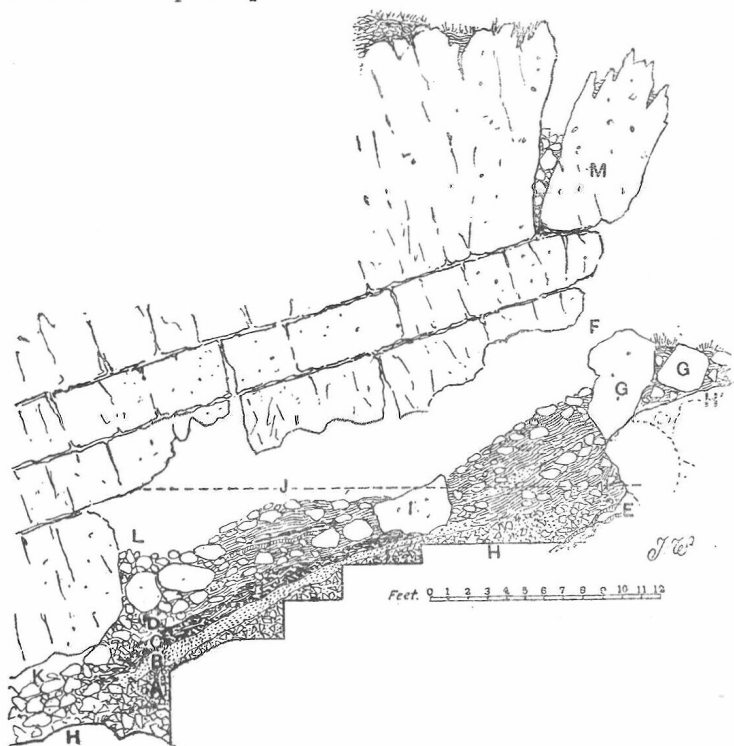


FIG. 1.—LONGITUDINAL SECTION OF RAINS CAVE.

Our first operation consisted in making the cave more accessible. To enter, one had to slip through a small hole, and drop somewhat uncertainly on the floor inside, which (as may be seen in the accompanying section of the cave, where F is the entrance) was on a much lower level than the ground outside, and steeply sloped downwards towards the rear. On November 7th, 1889,

we commenced a trench in front of the entrance, with a view to making an inclined way in. Nothing noteworthy was found in this operation beyond a fragment of coarse hand-made pottery about 15 inches below the surface, an iron hook at about half that depth, and a few bones. In the interval between this date and December 26th, some of the large blocks (G,G, *Section*) about the entrance were blasted and removed, in doing which it was clearly seen that they had naturally fallen from the rocks above. A huge block (J, *Plan*) still covers more than half of the real mouth of the cave, and its original position on the rocky face above can be readily traced. A large number of loose stones (chiefly those thrown up in the first diggings) were also removed from the interior, thereby lowering the floor considerably in places.

By the last-mentioned date the cave was ready for systematic work. We adopted the usual method. A horizontal cord (A,B, *Plan*) was stretched from near the entrance to the back, thereby dividing the interior into a left and a right region: this was the datum line. Upon the horizontal plane of this cord a plan was prepared by a process of simple triangulation: its level is shown as J, on the *Section*; and the *Plan*, as here given, was afterwards completed on the same plane. The next step was to divide up the area on this plane into a series of strips, each one foot wide, at a right-angle right and left of the datum line, as indicated on the *Plan*. These were indicated on the sides of the cave by letters of the alphabet in white paint, "A" being the foot-strip nearest the entrance. Choosing a tolerably level portion of the floor on the left side, about one-third way down the cave, we there dug a trench one foot wide and deep, and corresponding to that portion of "J" which lay to the left of the datum line. The only contents, other than limestone and soil, in this parallelo-piped, were a few animal teeth and splinters of bone: these we placed in a bag which we labelled "J. *Left*," and in that bag nothing else was placed. We proceeded similarly with the next foot of soil, "I. *Left*," only instead of removing it to the depth of one foot, we removed it to the level of the bottom of "J. *Left*." "H"

and "G" were treated in precisely the same manner; and before the end of January, 1890, the whole of the anterior portion of the cave was planed down to this level, with the exception of a few feet just within the entrance, which were left to continue the inclined way into the interior.

A second layer, one foot thick throughout, was next removed in strips, as above; these were distinguished by the prefix "I." In like manner, the next layer of strips below was distinguished

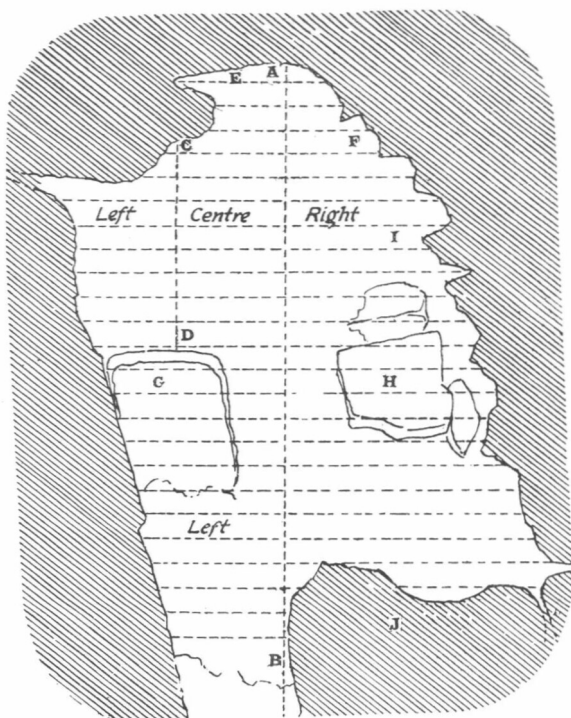


FIG. 2.—PLAN OF RAINS CAVE.

by "2," and so forth. This looks simple enough; in practice however, it was not always possible, or even desirable, to follow, it out. Frequently the floor consisted of a matted mass of stones, with large blocks extending into the neighbouring foot-strips: these could not be broken up and removed with any regard to the



latter. The large piece of rock, H, *Plan*, and I, *Section*, for instance, extended into no less than thirteen of these parallelopipeds of cave-earth. Then, at a later stage, when the bedding was distinct, it was deemed preferable to "peel off" the beds singly, in breadths of one foot as before, but in depth determined by the thickness of the bed—this, in order to keep the objects of the different beds separate. Not only were all the objects likely to be of use placed in bags, as above explained, but notes were taken on the spot of the positions and other circumstances of the more important of them, as well as of the character of the soil.

The superficial portion of the cave floor consisted, as already stated, very largely of loose stones, small and great. These removed, stones still preponderated as a rule, but were everywhere mixed up with a variable loam, which sometimes simply filled their interstices, and at other times formed patches almost devoid of them. We shall have occasion to revert more particularly to this cave loam.

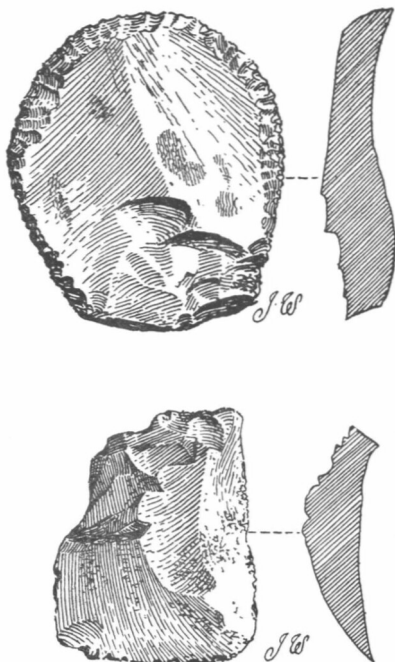
Up to March 13th, very much digging was done, but with poor results. As soon as the left region was reduced to a convenient slope for ingress and egress, we turned our full attention to the right. The soil at and near the surface, particularly in the left region, contained diffused particles of charcoal, and was patchy from the presence of vegetable mould. From its kneaded appearance, and being in the track of animals and men passing to the rear of the cave, we concluded that the mould was to a large extent trampled in, and that the charcoal was in a similar way transported from the rear, where we afterwards found several patches of it. Autumnal leaves blown in, doubtless, also did their share in the production of the mould. No definite bedding was discovered up to the above date, except a seam of crystalline stalagmite at the extreme front of the right region (E, *Section*.) It varied from 1 to 2 inches in thickness, and was sometimes laminated: after trailing down the rock, it dipped towards the middle of the cave, becoming much broken and soon lost. Subsequently, we found many loose pieces of stalagmite in the vicinity, which

probably originally belonged to this sheet. There was, however, a general tendency for the materials of the cave floor to be arranged in irregular and ill-defined bands or drifts, sloping downwards towards the back of the cave—stony here, loamy there, gravelly, gritty, etc.

By March 5th, all the excavation that has been done in the anterior half of the cave was finished. In this portion very few bones and objects of human handiwork were found. These were most plentiful towards the middle of the cave, and at a depth that increased as that part was reached, but we quite failed at this stage to detect that they belonged to any special bed. These objects consisted mainly of animal bones, mostly in a fragmentary condition, and small fragments of charcoal and hand-made pottery; occasionally fragments of human bone, flint, and iron were also found.

By this date we also had removed the superficial soil of the rear part of the right region, with similar results, except that generally the "finds" were more numerous, and particularly so the deeper we sank. On the 10th, however, we reached an irregular seam of charcoal (its position indicated by I on the *Plan*, and as a dark line below J on the *Section*), apparently the site of a fire. It was thickest (about two inches) at the cave side, but nowhere was it sharply defined, and it died out before the datum line was reached. Associated with it were numerous fragments of animal bones, some burnt, a few scraped as with flint implements, and one gnawed; potsherds, mostly in a very friable condition, and all of hand-made pottery; and many implements and irregular pieces of flint. These objects considerably outspread the charcoal, particularly towards the end of the cave. Most of the flints from both here and elsewhere were superficially quite white and opaque, doubtless by the action of the soil; but in a few instances the process was incomplete, the surface being finely flecked, and very rarely indeed was a piece found quite untouched. Of the eighteen or twenty pieces found in this layer, only seven can be regarded as worked, the rest being mere shapeless lumps. Of these, five are here illustrated full-size. The elegant

horseshoe-scraper (Fig. 3) has a neatly bevelled cutting edge nearly all along the semi-circular margin. A much smaller scraper (Fig. 5), belonging to the kite-shaped variety, has a similar edge all round. Fig. 4 may be regarded as a chisel; its flat cutting edge has not

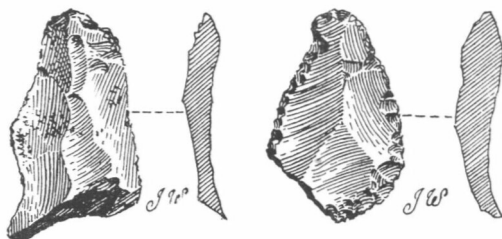


FIGS. 3 AND 4.

been produced by chipping, but by one well-directed blow. Fig. 7 is a long ridge-flake, with one edge finely serrated (flake-saw). Then there are two poor flakes, and part of the cutting end of another scraper, or scraper-like tool, finely chipped, and with signs of wear. At the cave side, charcoal belonging to this seam was embedded in some soft granular stalagmite deposited by a small stream. But this stream already had long been in existence, for as deep as we went below this seam there were laminæ of stalagmite of varying thicknesses, and the intervening layers of cave earth were loosely cemented into a tufaceous mass. All

these stalagmites dipped and died out towards the central region, passing below the charcoal layer in doing so.

From this date we were decidedly more fortunate. The foot-strips below these stalagmites were rich in both animal and human bones, potsherds, charcoal, and flints of no great interest. On March 13th our work brought us to the entrance (below F, *Plan*) of the small N.E. cave, the passage to which, it will be remembered from the first report, was small and descending. We now found that the floor of this passage was the surface of a huge fallen block. It fell previous to the accumulation of most of the soil we had so far dug into, and had dammed it back from the small cave, which otherwise must have been filled up. On its under-surface is (for most of this block is still *in situ*) a thick layer of stalagmite, formed while it was part of the side of the cave. The water now drips from the roof above, and, by the date we are dealing with, had given rise to a rather large stalagmitic boss on its apex. But of greater interest was the discovery at this point of the general bedding of the floor deposits.



FIGS. 5 AND 6.

One result of our diggings in the right region was to leave a vertical section along the middle line of the higher ground on the left. Towards the end of the cave this face presented a succession of four distinct deposits; and having now the clue we could readily trace them forwards for a considerable distance, becoming more and more indistinct and (except the lowest bed, which we never cut through) thinner. A fair idea of these deposits may be obtained from the *Section* we have already more than once referred to. But it must be remembered that this *Section* is diagrammatic,

representing as on one vertical plane what in reality were horizontally separated. The line H, H, H', represents the extent downwards of our diggings, mostly in the right region; H' represents a part of the external inclined trench. We found that almost from the first we had unconsciously made acquaintance with all these beds, and it accounted in great measure for the widely different results of the foot-strips. The top bed (D), with its seams of stalagmite and hearth, has been sufficiently described for the present. Before dealing with the rest, it is well to point out wherein they all agree. With about only a dozen exceptions—and most of these clearly imply human agency—all the stones contained in these beds were derived from the parent rock (dunstone) of the cave. They were all angular or sub-angular; none were water-rolled, or took the shape of boulders. The loam, whether fine or coarse, whether approximating to a clay or to sand, had also the same source. To this loam we will devote a few minutes.

In general character it was identical with the sub-soil of the district—a fawn-coloured, more or less gritty calcareous loam, derived from the disintegration of the bed-rock, a dolomitized carboniferous limestone, commonly known as dunstone. The normal limestone of this formation consists of calcium carbonate, with a variable but always small percentage of earthy matters insoluble in water charged with carbonic acid, as all terrestrial water is. These earthy residues alone, or to a very large extent, form the true cave-earths of caves excavated out of this rock, and generally they largely contribute to soils derived from it. They exist in dunstone, but play only a comparatively small part in the products of its disintegration. This is owing to the less solvent quality of the magnesium-calcium carbonate (dolomite), of which this rock is so largely built up, compared with that of simple calcium carbonate. The action of natural water (*i.e.*, water charged with carbonic acid) may be illustrated by that of diluted hydrochloric acid. If some dunstone is treated with this acid, there is a brisk effervescence, which, however, soon subsides, or nearly so. If the residue is dried and weighed, it is found that

only a small proportion of the stone (the calcium carbonate) has been dissolved, the residue consisting of the double carbonate *plus* the insoluble earthy matters above alluded to. Now treat this residue with *hot* acid: the double carbonate is dissolved, the earthy matters remain. The small crystals of dolomite constitute to a very large extent the gritty element of the soil in the vicinity of Rains Cave.

As might be expected, the relative quantities of the above constituents vary considerably in the soil of the cave; but the insoluble earthy matters are always in great excess compared with those of the mother-rock. Calcium carbonate, too, is always present, perhaps in a stalagmitic form. The following is a fair average analysis of this soil:—

Calcium carbonate ... ..	20
Calcium-magnesium carbonate ... ..	65
Insoluble earthy residue ... ..	15

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100 by weight.

To resume the work of excavation. The discovery of definite bedding modified our procedure, which henceforth consisted in the investigation of the cave floor, *layer by layer*. The little that remained of the upper two beds right of the datum line, was soon stripped away. This process was repeated on the left side; but the space on that side, in the posterior half of the cave, being too wide for working conveniently, we divided it into a central and an extreme left region, the one being excavated before the other. The top bed of these regions had no features of special interest. At the end of the cave it was about four feet thick, and consisted almost wholly of loose stones, some so large as to require to be blasted before removal. In one place the stones seemed to be artificially laid, so as to form a rude pavement.

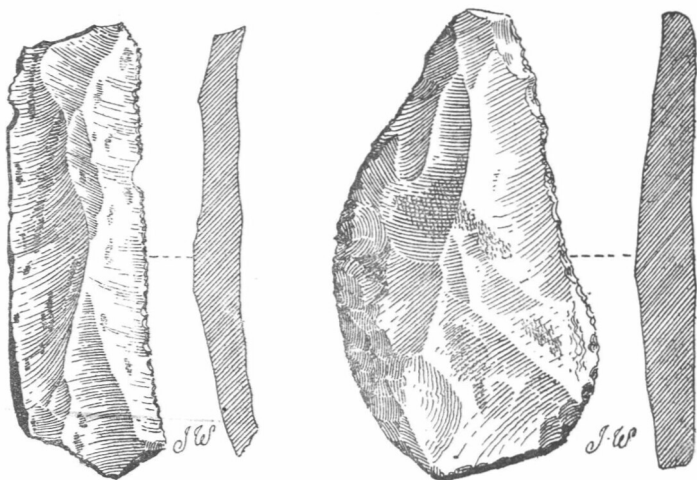
The underlying bed (C), normally dark and mottled, was the most important in the cave. It varied considerably in thickness, in character, and in the proportionate quantity of bones and objects betokening human presence. It was thickest in the central region, but rarely exceeded six inches where definable;

while in a forward direction it became thinner, also less dark, less noticeable, and with a smaller proportion of bones, etc. Almost from the first, we had unconsciously made its acquaintance, and with little doubt most of the "finds" up to this date (except those associated with the hearth) were derived from it. While this bed was everywhere tolerably well defined from the underlying loam or breccia (the loam apparently thinning out in places), it was not always so with regard to the top one; in the central region especially, it passed into, or was mixed up with, the latter, a point to be remembered. As implied above, the animal bones were unevenly distributed in it: this particularly was the case with the human bones and the potsherds—another point to be remembered; while the charcoal, though generally diffused, was aggregated here and there in thin patches. So numerous were these objects sometimes, that in more than one place in the central region the bed was little else than a matted mass of bones (human as well as animal), potsherds, and charcoal, in no discernible order.

The animal bones, like those of the top bed, belonged to fauna still existing in Europe. The larger ones as a rule were broken, and the fractured surfaces indicated that most of these were so done when in a fresh state. Now and again they were scraped; precisely as those of the hearth. This was especially the case with rib bones. A few were scored and punctured as by the teeth of some carnivore, perhaps dog; and still fewer charred or even calcined. Now and again we found fragments of human skull also charred; *these*, however, were not widely spread, and all belonged to one individual.

About a dozen pieces of flint were found in this layer, but only four can be regarded as worked, the rest being mere shapeless lumps. One is a core from which flakes have been chipped; one part of the natural surface of its rounded end has been much bruised—perhaps it has been used as a hammer. The most elaborately worked one (Fig. 8) might, at first sight, be taken for a javelin head; but it cannot have been intended for such a weapon, for the apex is too blunt, and each margin (which has been bevelled to a rude cutting edge) is worn from use for a short

distance about midway from the apex to the middle, which could not have been the case had it been a piercing implement. The broad end is only imperfectly chipped into shape. A neat little untrimmed flake (Fig. 6) has its edges still very sharp; I pointed my pencil with it in making some of the accompanying drawings. A small broken ridge flake has signs of wear; and another piece of flint is undoubtedly an unfinished implement, broken in the making. A thin flat slaty pebble, oval in shape and about two inches long, is ground along one edge to form a cutting tool or a scraper. The bruised core, the unfinished implement, and the



FIGS. 7 AND 8.

shapeless pieces, point to the manufacture of flint implements in this cave. This is confirmed by a quartzite boulder weighing about 10 oz., which has been used as a hammer. It is bruised at the sub-angles, not, however, on their summits, but on their sides. I cannot conceive of any other use than flint-knapping to cause this.

All the potsherds of this seam were rude, friable, and hand-made, and in most instances too decayed to stand removal. As a rule, they were dark superficially, and always black within, for which reason the smaller fragments were often passed by for



charcoal. In the right region of the cave several much decayed pieces of pearly shell appeared to belong to the *Anodonta cygnæa*. Was this fresh-water mollusc eaten? Were its shells used as utensils or personal ornaments?

The lower beds were not very complex. Immediately below the one I have just described was a seam of loam (B), showing very distinctly on the median section. It was even in texture and colour; contained few stones; and, so far as we could make out, no bones, or objects of human make. Like the layer above, it had a tendency to get thinner and obscurer towards the entrance, its maximum development was a little behind the middle of the cave, where it attained a thickness of seven inches. Towards the end it was vague and irregular, and, like the layer above, most of it in the right region had been removed before we were aware that it was a separate bed.

Below this lay an unconsolidated breccia (A), that is, a deposit of angular rock-fragments in contact with one another. The interstices as a rule were filled with loam identical with that above; where not so filled, as at the back of the cave, the stones were usually loosely cemented with films of stalagmite connected with the stalagmites below the charcoal layer described above. So deep as we went it contained no bones nor any objects indicating the contemporary presence of man.

By the end of March our work for 1890 concluded. The amount of work done on the spot in the present year (1891) has been considerably less, and was confined to February and March. It consisted at first in the further excavation of the central and extreme left regions. This we did down to the base of the dark ossiferous layer (C), and horizontally as far as it was practical or worth while. The yield of bones and other objects was not great, but in other respects it accorded to former results. It was plain enough now that no further systematic digging could be made, except at the cost of a very large amount of labour. With a view to the prospects of further digging, we decided to ascertain what was below the breccia. For this purpose we chose the back of the cave, where the floor consisted of little else than loose stones.

After sinking about 7 ft., we reached the orifice of another cave (K, on the *Section* ; E, on the *Plan*), filled almost up to its roof with stones, many of which were cemented together with stalagmite. It is quite likely that this is part of the same cavity as the N.E. cave, each being simply a lofty part of its roof. No attempt was made to excavate it. The "finds" consisted of loose bones, human and animal, among which was a very perfect badger's skull with lower jaws attached. Most of these bones, and certainly all the larger ones, had slipped down from the front cave. Here and there were patches of fine earth, so highly charged with bones of small animals, that after separating the earthy matters of a sample, the residue (consisting almost entirely of these bones) formed quite two-thirds of the original volume. We failed to pass through the breccia. We dug down to some large blocks which would have necessitated powder and sledge-hammer, and the removal of much of the surrounding soil ; and the favourable turn in the weather withdrew my helpers to their agricultural pursuits. The *débris* of this last stage of the excavation was for convenience stacked in the right half of the cave, thereby spoiling considerably the open appearance of the interior. But so altered and roomy is it still, that those esteemed members who knew it of old would fail to recognise it as the dark creep-hole they struggled into and groped about three and a half years ago.

How came these beds ? From an early stage of the work, the conviction grew that they were essentially a talus of rubbish slipped down from time to time from above the entrance. Their downward slope, coupled with many minor circumstances, particularly of the top bed, amply proved this. Indeed, a glance at the *Section* almost tells the story without words. Look at the entrance ! Large blocks of rock have fallen from above. Another huge mass is about to fall. Wind, rain, and frost, have weakened the thin shaly seam in the limestone at its base, and the block has tilted forward, leaving a chasm behind. Let the weather continue its disintegrating work ; let more stones wedge themselves in the chasm, and the huge mass will fall, and with it a shower of stones and soil, perhaps to block the entrance for hundreds, or even

thousands, of years. Now what would take place, supposing we had not interfered with the floor? Some of this *débris* would fall directly into the cave, the less angular of its stones rolling down the slope to the back. The rest would be piled up at the entrance, but soon to gravitate (rain, wind, and animals aiding), some into the cave behind, some over the area immediately in front. Within, the slope is very steep at first, but it gradually spreads more and more over the floor. Centuries pass without further violent changes. The drip, drip, here and there within deposits films and seams of stalagmite on the floor below. But the rocks above the mouth, resting upon uncertain foundations, are always liable to collapse. Moisture and wind etch out, frost wedges out, their fissures and joints, only to end as before, in a fall of *débris*. Meanwhile, ever and anon a heavy thud within tells of the fall of a block from the roof or sides, loosened by similar means. Thus the work has and will go on: the mouth recedes; the roof is elevated; the floor is raised.

It is almost needless to say that the accumulation above described must have been formed vastly more rapidly than the ordinary deposits of a cave, that is, those beyond the reach of an external talus. In the famous Torquay Cave, Kent's Hole, a superficial black mould, rarely exceeding 1 ft. in thickness, contained objects covering the whole of historic time, and extending back into prehistoric to the Neolithic period—a length of time exceeding, perhaps, all that has been brought to light in Rains Cave. But recent as the deposits of this cave are, compared with the hoary antiquity of those which have been excavated at Torquay, we must not underrate their age. The bedding implies intervals, one at least very considerable, in the process of infilling. A consideration of the top bed alone will sufficiently show how very intermittent, and therefore slow when measured by human time, this process has been. Several thin seams of stalagmite were noticed in this bed: these imply intervals in which the cave floor must have remained unchanged for years. Equally telling was the fact that at all levels stones and bones had their upper surfaces encrusted with films of this material: these show that in the rear

half at least, the top bed was introduced little by little, and not by several great leaps. That this must have been the case is plainly proved in another way. We know that water, wind, and ice, are still doing their slow but sure work of disintegration; but have the scarps and ravines of our country perceptibly changed in our time? Have they perceptibly changed since the Romans made their acquaintance? The fall of blocks from above the entrance and the roof of Peak Cavern has not entered into the practical consideration of the rope-spinners below; perhaps they have never thought of it. We see the impending rock above the mouth of Rains Cave: probably it was in much the same state a century ago, and may be so a century hence. But, until it falls, whence shall the talus below receive further accretion?

Whether the cave was always open to daylight during the accumulation of the top bed, we cannot say. It certainly was frequently accessible to man; and at one time especially he resorted to it to make a fire in the right region towards the back, when he did a little feasting, and besides leaving bones, left also sundry lumps, chippings, and tools of flint, and potsherds, lying about. But what may be termed the *era* of human occupancy was considerably earlier. This introduces us to the dark ossiferous bed (C).

Here we tread upon equally firm ground. The animal bones of this layer were undoubtedly the rejectments of human food; and the layer itself must be regarded as consisting essentially of ancient refuse, its dark mottled earth being loam discoloured with animal and vegetable matters, and perhaps mixed with a little vegetable mould trodden in from without. Its large dimensions implied a good deal of feeding—whether in connection with one stretch of human tenure or repeated visits we cannot tell. But we can picture the primitive folk eating their food, which consisted chiefly of beef and mutton, in the middle part of the interior where the floor was less steep, and throwing the waste down the slope behind. The diffused charcoal suggested cooking: where was the hearth? Charcoal in sufficient quantity was found nowhere in the right region, or the rear, in connection with this bed. It

must have been outside, or else just within the entrance, which at that time was probably much larger than even at the present moment. In either case we failed to reach it, our diggings hereabouts being merely sufficient to produce a convenient slope into the cave.

The presence of human bones in this bed at first sight suggests cannibalism. But there are several circumstances which, taken together, prove that the cave was used also as a burial place. (1) These bones were not so evenly distributed as one would have expected, had they been cast away as the *exuvie* of human food in common with the animal bones. (2) The long bones were sometimes found unbroken; and in several instances when broken, their component parts were lying near one another, indicating that when originally deposited they were whole. Moreover, the fractured surfaces, when sufficiently preserved to judge therefrom, were not such as would be produced in a fresh bone, smashed to extract the marrow; on the contrary, they were identical with what is habitually seen in ancient interments, where the bones, having become brittle through the loss of gelatinous matters, are very liable to fracture through unequal subsidence of the surrounding soil, or the interference of burrowing animals. (3) In one case, at least, some bones were lying in anatomical relationship to one another. On March 22nd, 1890, we distinctly traced through a maze of animal and human bones, potsherds, etc., in the central region, a pair of human fibulæ, one associated with its tibia; fragments of femur; a few lumbar, dorsal, and cervical vertibræ; some broken ribs; an atlas; part of a lower jaw, and an upper one; and a radius—all evidently belonging to one individual, lying on its left side, and with its feet towards the back of the cave. (4) In no case was a bone, or fragment of one that could be identified as human, scraped or hacked; nor during the systematic excavation was there found a gnawed one. In the earlier diggings, two femurs were found near the surface, with their lower extremities broken off apparently when in a new condition, and for two or three inches above the fractured ends extensively gnawed. These bones belonged to one

individual, and were so remarkably new-looking—like some pieces of skull found at the same time, and referred to in the first report—that I cannot but suspect that they were modern. Still, this must not be too much insisted upon: we were occasionally astonished at the fresh appearance of bones undoubtedly contemporary with their neighbours which were in the last stage of decay. These differences were obviously due to the varying character of the soil. (5) Lastly, all the potsherds of the lower beds, which were sufficiently perfect to show their ornamentation, belonged to vessels which are universally regarded as sepulchral.

The above remarks will perhaps give rise to an impression that the cave was simply the by-no-means infrequent case of a dwelling turned into a cemetery. This undoubtedly is true so far as it goes; but the actual history is more complex—much more complex, perhaps, than we think. The refuse layer undoubtedly points to a period of habitation: no funeral feast could have ended in so thick and extensive a deposit of remains, nor could a succession of such feasts have left one so solid, as the intervening interments must have given rise to breaks. If *all* the human remains related to interments, there must have been an earlier and a later sepulchral era. The diggings carried on by the Rainses and their friend in 1888 were *entirely above* the charcoal layer of the right region. Amongst the objects then found were two fragments of human frontal, which I distinguished as “E” in my first report. In the later diggings we found other fragments of this skull scattered widely about the refuse layer, some in the central region, but most *below* the above-mentioned charcoal deposit and thin stalagmites. From this we learn, (1) that these bones were either coeval with the refuse layer, having been originally scattered as we found them (in which case we must suspect cannibalism); or they formed part of an interment deposited shortly after the completion of this layer, and subsequently disturbed and scattered before sufficient time had elapsed for the accumulation of an upper layer. And (2) that, after a long interval (how long we can only guess, but during which the charcoal layer was deposited), the refuse layer was dug down to, in or towards the central

region, and among other things the two fragments of frontal found by the Rainses were thrown up.

The disturbance, and consequent commingling of human remains, brought about by later burials, is familiar enough to barrow-openers; as also is the fact that the disturbed earlier interments rarely show signs of re-arrangement. The same cause undoubtedly is responsible for the confusion in this cave. If skull "E" relates to an interment—and I have little doubt that it does—the body must have been simply laid on the floor and covered up with stones and soil. The early disturbance of this interment implies the early introduction of others—at least, *one*, as several fragments of another skull were also found under the charcoal layer. The interments of the later era must have been in graves; some deep enough to reach the refuse layer; thus accounting, not merely for bones, etc., of the earlier era being brought up to higher levels, but for the commingling of both in that layer, and the disturbed condition of the upper soil in the central region already noticed. As might be expected, it was only possible to distinguish between the bones of the two sets of interments in exceptional cases. Besides the fragments of the two skulls which belonged to the more ancient interments, another may be attributed with less degree of certainty to the same period—that to which the burnt fragments related, nothing belonging to it being found above the refuse layer. On the other hand, as the remains of the two most completely restored skulls—the "C" of the last report, and "G" of the next; and those of another—the "A" of the last—were all found very near the surface, mostly during the earlier diggings, we may, with a like degree of certainty, assign these to the later era. Now if these two sets of skull-fragments are compared, those of the former are noticeably thicker than the latter. This is probably more than a mere coincidence, for scattered fragments of at least one other thick skull were found in the refuse layer, while some of other thin ones were found nearer the surface.

The potsherds not only corroborate this testimony of the skulls, but carry it a stage further. Beneath the charcoal layer were some fragments of two typical "food vases," several of the one

being intercalated in the stalagmite below; and fellow-fragments of both sets were found superficially in the central region. These vessels, it is almost needless to say, were sepulchral, not domestic: for this reason they cannot well be identified with the refuse layer, and as the only alternative is the earlier human remains, their testimony must be held to be conclusive of the sepulchral origin of the latter. There were numerous other potsherds found bearing the characteristic decoration of vessels of this sort, but their relative age was indeterminate.

Another point must not be overlooked. When the cave ceased to be used as a burial place, its floor would no longer have cause to be disturbed. Hence all objects contained in subsequent accretions of soil and stones were presumably of post-sepulchral age—I say, *presumably*, because we must never forget the depredations of burrowing animals, and the possibility of objects already ancient being introduced *with* the *débris*. Here again, facts corroborate theory. I will firstly instance the curious earthen cauldron\* found in the earlier excavations, and described and illustrated in the first report. All the fragments were found near one another, and, of course, above the charcoal layer. This indicated that the vessel fell to pieces on the spot, and that the surrounding soil had not since been disturbed. Not only was it post-sepulchral from position, but it was decidedly of *domestic* type. Although it was of hand-made ware, like the older sepulchral ones, it was markedly different in other respects, being harder and redder; and it was not alone, several other plain potsherds of simple character being superficially found—notably one in the trench just outside the entrance. We pass to another testimony, that of the wheel-made pottery. It is a general opinion that ware of this sort was unknown in Britain before the Roman occupation, hence was of comparatively late introduction. Here again, facts jump with theory: the wheel-made potsherds, although of primitive type, were all found near the surface, two of them during the earlier

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\*On page 40, Vol. xi. of this *Journal*, a vessel remarkably like this was wrongly attributed to a Durham cave: it was found, with other pottery, in a trench close by a barrow at Heslerton Wold.



excavations, when also a *turned* spindle-whorl, similarly situated, was picked up. Iron, as a common material for implements, was another late introduction, and of the ten or more pieces (all too fragmentary and oxidized to make out their former use) found in this cave, only one was as low down as the charcoal layer, and its association with that layer was very doubtful.

These lines of reasoning leave but little room for doubt that there was an earlier and a later sepulchral era, in the interval of which the charcoal layer was deposited. It is evident, then, that this layer, or its extension—the floor-surface of the time—was broken through, in order that the interments of the later era might reach those of the earlier and the still older refuse layer. This, of course, would displace and commingle objects of the former layer with those of the three other periods. I think it very likely, although I have no very cogent reasons for saying so, that the hammer-stone, the flint core, and some of the pieces of flint, including the unfinished implement found in the latter layer, originally belonged to the above extension. Apart from these, the character and numerousness of the flint objects found in the charcoal layer were highly suggestive that the cave was at that stage temporarily used by a flint-knapper.

The fragments of charred skull may be urged against the sepulchral origin of the earlier human bones. As, however, fire was a well-nigh universal concomitant of prehistoric interments (perhaps with a view to the ceremonial purification of the graves), it must have often happened that the bones of older interments were accidentally burnt thereby. These fires probably explain the small patches of charcoal in the central region in and above the refuse layer.

We now pass to the underlying loam and breccia. The breccia first: its slope corresponding with that of the above beds proclaims its nature—a talus. It differed from the topmost bed in several particulars. It did not vary so much. Its stones were more closely packed and angular, and of more constant size; and the interstitial loam was finer and lighter in colour. It gave one the idea of a shingle, afterwards interstitially filled with loam. On the

other hand, the former bed was undoubtedly introduced as a mixture of earth and stones, sometimes the one preponderating, sometimes the other; and its frequently weathered stones indicated that it consisted largely of external sub-soil. In a talus, the larger materials tend to spread out, being more given to rolling than the finer, which, on the other hand, are rapidly lost in the interstices, before the fringe is reached. As the cave entrance when the breccia was introduced was almost certainly more forward than at present, the zone of fine detritus would also be more forward, the breccia being its fringe. This, however, scarcely explains the greater angularity of its fragments. A fall of rock at a cave mouth does not necessarily involve a fall of sub-soil as well; in the implied contingency it is reasonable to think that the rock-slip would resolve itself into a coarse angular *débris*, with comparatively little finer material. The overlying loamy seam, which was identical with the interstitial loam, had all the appearance of rain-wash. In being washed down the cave, it would naturally sink into the interstices of the shingle before accumulating above it, or invading those portions beyond. This is just what was found to be the case. The loam formed a distinct bed only where the breccia was interstitially filled below; while nearer the back of the cave, where this deposit was more or less open, the loam occurred only in obscure patches. The lack of bones and other foreign objects in these lower beds was probably due to the cave being sealed up during the time of their accumulation.

The sequence of the deposits suggests the question of time. Time, as measured by years, plays but a small part in the history of most cave deposits, and it is so in that of the present one. The wheel-made potsherds carry us back at most to the Roman occupation, say, 1,700 years ago; and the iron objects *may* be a few centuries older. These are the extreme limits: it does not follow that these objects are so old. We know that previous to the introduction of iron into Western Europe there was a stage of time characterised by certain traits of civilisation and art, known as the Bronze Age, because that alloy was the best available

material for implements; also that previous to this there was a less well-defined stage known as the Neolithic Age, because stone was the best available material for this purpose. These, however, are to us but mere stretches of vague duration, for as yet there are no reliable means of measuring them in years. The sepulchral potsherds furnish a *point d'appui* for at least the earlier sepulchral era of the cave. They so exactly accord with the well known pottery of the British "round" barrows as to leave but little doubt as to their contemporaneity. There are few prehistoric remains whose relative position in time is better known than these barrows. They are almost universally considered to belong to the earlier part of the Bronze Age. The refuse layer was, of course, older, but whether it reached back to Neolithic times is quite uncertain. The animal bones of this layer, as also those of all the more recent deposits, belong to that long, long period when viewed from the standpoint of years, but which is as a minute to a day compared with the life-history of the globe—the Recent Period of the geologist. Throughout this æon, the physical geography and the fauna and flora of Europe have remained practically unchanged, and civilisation and art, unbroken by any vicissitude of nature, have slowly developed into the intricate human world of the present.

There is no reason to doubt that this cave contains deposits of the Pleistocene period; but whether considerably below our lowest diggings or otherwise, the attempt to excavate them would involve the removal of at least much of the great talus that still chokes up the interior. And after all, there is no guarantee that such deposits, assuming that they exist, are worth so great a labour.

I hope to have a third paper, consisting of reports on the pottery, the human remains, and the fauna and flora (which Professor Boyd Dawkins is kindly investigating) ready for next year's *Journal*.