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ART. XLIII.—*A Buried Wall at Cuzco and Its Relation to the Question of a pre-Inca Race (Yale Peruvian Expedition, 1911)*; by ISAIAH BOWMAN.

DURING the summer of 1911 the Yale Peruvian Expedition spent some time studying the surroundings of Cuzco, and in a ravine* on the outskirts of the city came upon a group of facts in relation to a buried wall that appear to have a large significance. The wall belongs to the older type of rougher and apparently more primitive architecture which students of Peruvian archeology have for some time been inclined to regard as pre-Inca, though the belief has heretofore not depended upon secure evidence. It appears that we now have a fairly safe basis for concluding that the wall is pre-Inca, that its relations to alluvial deposits which cover it indicate its erection before the alluvial slope in which it lies buried was formed, and that it represents the earliest type of architecture at present known in the Cuzco basin.

The wall extends along the border of a ravine on the southwestern edge of Cuzco, BM₈—BM₁₀, fig. 1. The detailed topographic features are brought out in figs. 2 to 5. The lower end, BM₁₀, fig. 1, is now almost entirely uncovered; the upper and middle portions are deeply buried in coarse but well-stratified gravel of prehistoric though postglacial age. A cross-section of the alluvium in which the wall lies buried, fig. 2, gives one a clear idea of its peculiar position. The ravine itself is relatively new, fig. 5, and we were told that it had been opened, at first artificially, about ten or twenty years ago.

* It was in a neighboring ravine that the vertebrate remains were found which have been described in earlier papers in this Journal, vol. xxxiii, pp. 297–333, 1912. See these papers also for a preliminary statement on the buried wall and related facts.

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Clearly from its present condition it has been enlarged and made irregular in detail through water action extending over a short period of years. Though the material exposed along the banks and the adjacent slopes is gravel, it stands up in steep and, in many places, vertical bluffs. Its recent origin is also indicated by the rapidity with which the stream, now running through the ravine in wet weather, is cutting its banks and carrying away alluvial material. The wall, therefore, has no

FIG. 1.

FIG. 1. Ayahuaycco Quebrada, near Cuzco, Peru, surveyed and drawn by Kai Hendriksen. [From this Journal, vol. xxxiii, Plate II, Contributions of the Yale Peruvian Expedition of 1911.]

Altitudes based on railroad survey. Contour interval, 20 feet. Scale about 800 ft. to 1 inch.

necessary relation to the ravine as an artificial canal, though the ends of the wall perhaps afforded modern man a clue to an earlier relation between a now buried canal and the wall.

The main facts calling for explanation are as follows:

(1) The buried wall runs, not down, but at right angles to an alluvial slope.

(2) It is made of blocks of cherty limestone which have been cut and fitted in a rough manner, giving a face as shown in

fig. 6. Both the face toward the ravine and the face in contact with the gravel consist of cut stone.

(3) The wall is covered at one point with six feet of stratified gravel. Stratified gravel also faces the ravine side of the wall at "A," fig. 2.

(4) On the down-slope side, fig. 6, stratified gravels may also be seen abutting sharply against the wall wherever portions of it were removed.

(5) The wall does not now conform to the alluvial grade of the surface of the deposits in which it lies buried, nor to the gradient of the ravine floor, being less steep than the surface of the alluvium and steeper than the present channel.

(6) The deposits in which the wall is buried form part of a great series of deposits with comparable physiographic features, equivalent ages, and definitely determinable origin.

(7) The definitely known Inca buildings stand *upon* alluvial

FIG. 2.

FIG. 2. Cross-section of belt of alluvium bordering the hills southwest of Cuzco. The former undissected slope and its relation to the buried wall are also shown. A and B represent the relation of the eastern border of the ravine with respect to the wall at two stations.

slopes now in process of dissection; not as in the case of the wall, *below* the level of the alluvial surface.

We shall now inspect the facts indicated above to ascertain their nature and then examine their bearing on the question of a pre-Inca race. It is not proposed to draw hard and fast conclusions. Such conclusions can be formulated only when much more field work, particularly in the way of excavation, has been done, and a larger amount of archeological data gathered. On the other hand, it is not proposed to present mere facts alone, and to shirk the responsibility of interpreting them.

At first sight the buried wall appears to be directly related to the present drainage. It forms, for a part of its length, a sort of lining to a channel along which water is now at times conveyed. Imagining small changes in stream volume from time to time, one reaches the temporary conclusion that in times of high water a deposit would form on the inside (stream

side) of the wall. In later periods of low water, these deposits might in turn be cut partly away. Such an argument calls for no pronounced modifications of prevailing climatic conditions, associates the wall with existing topography, and is the most natural explanation following a first inspection of the field. Further consideration of the conditions leads one to take a quite different view from the one outlined. Difficulties arise which appear to be solved only by more radical explanations.

In the first place, if the wall were built as a lining to the existing ravine, why was its eastern face, fig. 6, made of dressed stone? One does not find this condition prevalent

FIG. 3.

FIG. 3. Details of inner structure of the buried wall in enlargement of A, fig. 2.

among walls facing the *andenes* or artificial terraces about Cuzco. I have seen it in a few walls, though under circumstances leading one to suppose that the prominent position of the wall called for greater care, indeed almost needless care, in its construction. About the only purpose a faced wall would serve on a terrace scarp would be to strengthen the wall against the strain imposed by the soft earth behind it. We must grant, however, that the existence of a faced wall is not in itself conclusive proof of unusual relations.

On the other hand, we have in the stratified gravels that abut sharply against the outer face of the wall a condition of a totally different nature. The wall was carefully removed, stone by stone, leaving the gravels undisturbed for a photograph, fig. 6, in which the stratification is clearly apparent. But stratification may also show on the upper side of a terrace wall since the constant movement of irrigation water down the

slope of the terrace accumulates sand and gravel on the upper side of the wall. It should be noted, however, that the buried wall is faced not only on its upper, but also on its lower side by stratified gravels at least 15, and possibly 40 or 50 feet thick. Irrigation can not account for the material since it would here imply the up-hill flow of water. The difficulty disappears if we apply the hypothesis of burial by aggradation from above, and have the material move down the slope of the alluvium (fig. 2).

FIG. 4.

FIG. 4. The alluvial fringe in which lies the buried wall. The waste-cloaked rock slope of fig. 2 is on the right; the alluvium begins on the line marking the change of gradient. The Cuzco basin and the western border of the city of Cuzco in the middle distance.

It is indeed the slope of the alluvium that has the most striking relation to the buried wall. It is a smooth slope with an entirely normal appearance. It breaks distinctly with the thinly-cloaked rock slope from which its material was chiefly derived; and when the plane of the slope is continued downward it is seen to correspond in level with the slope on the opposite side of the ravine. Furthermore, the lower section of the slope has a flatter gradient than the section above in the manner of alluvial material accumulated under natural conditions. Beyond the wall (right, fig. 2) the natural alluvial slope becomes broken, in some places almost at the wall, in others some yards away. The irregularities are caused by artificial excavation, by breaks in the wall, which have permitted the

water of the ravine to escape and erode the gravels, and by the natural effects of continued cultivation and irrigation away from the higher edge of a terrace. A wall not too deeply buried in loose material with a pronounced surface slope is a defence against excessive erosion of material above it; it cannot prevent the erosion of material below it. While the terraced fields below the wall were gashed by the incipient ravines of irrigation water, the slope above the wall remained practi-

FIG. 5.

FIG. 5. The buried wall is several feet behind the gravel bank on the extreme left, looking south toward Cuzco.

cally intact. The agreement of the gradients on opposite sides of the wall as shown in fig. 1 is too close to be explained by accident; it can be explained only by assuming that both slopes are part of a general surface built up during a period of aggradation which has now given place to a period of stream dissection.

It is now necessary to consider the work of individual floods which may effect great changes in the minor slopes of the land and in the position of loose surface material. A series of floods in a succession of unusually wet years may lead to changes which appear almost cataclysmic. But the changes may be recognized as the work of sudden and unusual floods, (1) by the coarseness of the material where coarse material is available

and (2) by the immediate change from aggradation to degradation as soon as the floods cease. Now in the ravine in point the gravels are clearly coarse below, but they become finer above and the top of the section in some places exhibits finely laminated sand. Moreover, the mass of material with which the alluvium of the ravine is correlated is so great, from a few feet to 50 feet thick in places, and so widely distributed in the Cuzco basin, as to give it a much greater importance than that associated with occasional floods.

FIG. 6.

FIG. 6. Relation of the buried wall to the gravelly alluvium. A, the undisturbed wall; B, the gravel above the wall, to the right undisturbed, to the left removed since the gravel here faced the wall in addition to lying above and behind it; C, the outer layer of faced stone removed to show filling of rubble; D, the inner layer of faced stone removed and undisturbed stratified alluvium showing behind it; E, the inner face set up roughly stone by stone. The bottom of the wall lies three feet below the present channel floor in the shaded foreground of the photograph.

All about the Cuzco basin the lower slopes are composed of land waste, a great alluvial fringe or piedmont belt of alluvium which extends up the tributary valleys. In some cases the older alluvium interlocks or interfingers with glacial material

disposed in the form of terminal moraines or coarse outwash from moraines, and therefore belongs to the glacial series. The alluvium consists of a finer series below and a coarser series above. When studied in detail the deposits indicate two periods of glaciation. The alluvium of whatever kind has been eroded periodically, giving rise to a series of terraces along the streams. These vary in number according to the headwater relations of the draining streams; they also vary in width and breadth and somewhat in their position with reference to the valley mouths. In this connection it is sufficient to note that the alluvial fringe in which the buried wall occurs belongs to the last series of deposits which represent one of the last phases of broad climatic changes which culminated in the glacial period and have since declined, and is intermediate time between the climax of the glacial period and to-day. It was produced during one of the later and feeblar climatic pulsations which did not lead to glaciation though they tended in that direction. If the last glacial invasion occurred 50,000 years ago, the lower terraces might be said to be formed at intervals about 30,000 and 10,000 years ago. If we accept 25,000 years as the length of the post-glacial interval, then 15,000 and 5,000 years would represent the age of the upper and lower terraces respectively, as very roughly approximated from the thickness of the deposits and the depth of erosion.

The lack of correspondence between the grade of the alluvium and the grade of the wall forms one of the strongest reasons for concluding that the wall has not been sunk into the alluvium, but has been covered by it. Fig. 2 indicates but one element of the alluvial slope; the second element is a southward descent in the direction of the wall, though with a steeper gradient. If a trench had been dug and the wall sunk into or built into it, it is clear that the same relations *might* prevail though it is unreasonable that they should prevail, unless the trench were dug in the bottom of a natural water channel eroded in alluvial material in process of dissection. The dissection would dispose the material on a flatter gradient, that is, it would decrease the gradient of the channel as compared with the gradient of the original alluvial slope. A wall then built into the channel would likewise have a flatter gradient than the alluvial slope above. The channel can not be natural however since it runs not down a slope but along it.

On the other hand, our reasoning is entirely in accord with the facts if we suppose the wall to have been built before the last period of alluviation, and with a gradient conforming to the slope of the surface. A later climatic change would then account for the beginning of aggradation and the increased

gradient of the surface. The buried channel and wall would then have flatter gradients than the surface channel and slope. Later excavation, either artificial or natural, would expose the buried wall and make apparent the discordance between two sets of things made at two different times under different conditions.

This line of reasoning is further supported by the fact that the stratified gravels abut sharply against the wall on both sides and even overtop it in an unbroken series. The wall was not built into alluvial deposits, but was covered by them after it was built. Even if a wall were built squarely against a cleanly cut gravel bank, it could not fit the face of the bank so closely but that percolating water would rearrange the material and leave, between the undisturbed stratified gravel and the wall, a zone of unstratified fill like that so often seen on the outside of an old house foundation in process of re-excitation. The difference in gradient is interpreted, then, as a condition which might be due to the building of a wall in the bottom or along the side of a ravine, were it not that the gravels abut sharply against both sides of the wall without a facing of unstratified material.

Among the facts that point to burial of the wall, a second one, the material of the alluvium, may now be considered. The wall rests upon a rather pure sand, distinctly not a gravel, as determined by excavation. Coarse gravels, however, constitute the alluvium that banks against the wall and appear in the section on the side of the ravine opposite the wall. The top of the section consists in general of finer material. In this succession of coarse and fine we have a condition in itself indicative of a change from degradation to aggradation and back again to degradation. The wall rests upon fine material accumulated at a time when wash from surrounding highlands was feeble and transportation slow; the coarser material above it represents the streams in full vigor loaded with detritus both coarse and fine which they accumulated upon a former alluvial slope; the finer material at the top represents the deposits of waning streams.

Quite apart from the repeated testimony of residents that the present channel in which the wall stands was opened in recent years, and therefore that the wall was not used as a retaining dike for terrace front or irrigating stream, is the evidence afforded by the alternating ash and sand beds in the upper few feet of the alluvial fringe. Near the lower end of the map, BM₁₁₁, fig. 1, the ravine cuts through a section of most peculiar composition. On the right hand side (facing down the ravine) are interstratified ashes, pottery, and bone fragments, together with pieces of charred wood, corn, and

quiña. They occur to depths of several feet, the deepest burial being to a depth of about six feet. On the left-hand side of the ravine the section is earth below and ash above, and a huge ash pile on which the refuse of the city is dumped still persists, though its present use is far less extensive than formerly. From the inclination of the alternating ash and sand layers one is obliged to conclude that the ash pile existed in the form of a mound from which slopes led toward the hill as well as in the opposite direction on the farther side of the mound. No other relation will explain the dip of ash beds and sand beds *toward* the hill (west), at one place to the extent of 28 degrees, and in many cases to 10 and 15 degrees. A slight dip of several degrees could be explained by an aggrading stream working on all radii of an alluvial fan; so great a dip as 28 degrees seems explicable only on the assumption of a mound from which ash slipped and was washed on gradients up to the limits of repose.

The alternating beds represent a long period of accumulation. Only a careful study of the pottery and bone material in them will establish their age, though they date back without doubt several hundred years and the lowest may represent the accumulations of several thousands of years ago. Wash from the adjacent hill slope is very slow indeed. Only the smallest and most incipient ravines now break the smooth outline of the thinly cloaked rock slope and the alluvial fringe in front of it. The largest are but a foot or two deep. Under present climatic conditions it would appear to require at least several thousand years for the upper five or six feet of the alluvial fringe to form, for it consists on the whole of fine, not of coarse material, and in this respect is in contrast to the coarser alluvium washed down in the glacial period by vigorous streams, and probably in a relatively short time.

To produce alternating ash layers on the *south* side of the ravine would require its slopes to extend across the space now occupied by the ravine. That is equivalent to saying that during the accumulation of the ash and sand beds the ravine did not exist. We therefore conclude that the ravine is new, both from the testimony of the people and from an entirely independent line of evidence, the position and relations of the alternating ash and sand beds. There is a third independent line of argument for the youth of the ravine; its narrow, steep-walled, fresh condition in spite of the fact that its walls are merely loose sand and gravel, of all materials the most likely to slump down quickly to moderate grades. If the wall ever had served as part of a retaining dike on the border of a ravine like the existing one, such use was abandoned long before the ash beds began forming. Now if we assume a few

hundred years as the time required to produce the last few feet of the alluvial fringe, we should have to assume a much longer time for the whole fringe to form. We have already seen that the wall lies *buried in gravel*, that it was not set into gravel, but that gravel was built against it and that it therefore antedates the alluvial fringe or at least the upper fifteen or twenty feet of it.

Finally, we shall consider the fact that the alluvial fringe is being dissected and that it has for some time been undergoing dissection. It follows that to the time required to form the fringe must be added the time required to dissect it to its present condition in order to arrive at a conclusion as to the age of the wall buried in the alluvium. Here we have as yet no reliable criteria. Erosion is in progress now and is active. I think geologists would in general agree that the work of dissection in the lowest alluvial level would require at least several hundred years. If we add these hundreds to the hundreds required to form the upper part of the fringe, we shall carry the process backward at least to the time of the Spanish Conquest. I am strongly inclined to believe that when the ash beds are studied in detail the lowermost beds will represent a period decidedly earlier. If the upper layers represent hundreds of years, the thick and more extensive lower layers that surround the wall and overtop it represent thousands. According to the chronology of Markham, the first (pre-Inca) king of which legends take note reigned about 900 B. C., or roughly, 3000 years ago. If the wall were built 2000 B. C., or even 4000 B. C., that is to say, from 4000 to 6000 years ago, it would still fall within the period that the gravels appear to represent, and without the period covered by the hundred kings of legend. Not only is the wall pre-Inca; the possibility exists that it may antedate the period in which ruled the legendary pre-Inca kings.

Extensive excavation about Cuzco would no doubt reveal the older walls in relations that would establish their age in a clearer manner than in the present case. The fact that the better built walls, definitely known to belong to the Inca period, stand upon an alluvial terrace, never beneath or in the terrace material, while, as in the case of the buried wall described here, some of the cruder walls do stand buried in the alluvium, seems to indicate a marked difference in their ages, the Incas building after the last period of alluviation and before the present period of dissection set in.

This conclusion is supported by at least one fact easily gathered from the older buildings of Cuzco. It is noteworthy that the buildings in some cases consist of an upper and a lower section of different stone cut in a different manner. The

lower part of the walls in these cases is invariably of cherty limestone; the upper is of andesite. The cherty limestone is easy to work compared with the andesite and has been trimmed into blocks of irregular shape and different sizes. It is laid in tiers of decidedly greater irregularity than may be observed in the andesite blocks above. Furthermore, the blocks of the lower walls are not now in alignment everywhere, but have suffered both horizontal and vertical changes of position, or were originally built more irregularly than the upper parts of the walls of different material. The upper parts of the walls, on the other hand, are decidedly regular and in most cases fairly straight, even when built upon lower walls of irregular trend. The rougher blocks of the lower wall are in many places displaced and built into the upper wall. It is clear in other cases that rebuilding has been done sometimes to the extent of repairing a breach in the lower wall by the use of better hewn blocks of the upper wall. I have never been able to find blocks of the upper wall enclosed in undisturbed blocks of the lower wall. We have then a set of facts clearly trending in the direction of the conclusion that the limestone walls are old and the andesite walls are new, relatively.

Other deductions should also be noted which appear to point to the same conclusion. The limestone is easier to work than the andesite, but it cannot be wrought into blocks of such perfect shape and with such smooth surfaces. It is brittle and flakes unevenly. Though built into a solid and remarkably tight wall (considering the absence of mortar) yet the blocks are nowhere perfectly fitted as in the case of the andesite. Some of the latter are so finely cut that even a needle point cannot be introduced between the curved surfaces of adjacent blocks. Does it not seem natural, in view of the relative ease with which the limestone is worked, that the use of limestone should be learned before that of andesite, however defective it may be for finer uses?

The kings of Cuzco did not conquer a savage but a semi-civilized race whose domestication of the llama, the alpaca, and the dog, and whose conquest of water and the ground point to a great antiquity as that term is used in history. We need not assume a long interval between them and their mythical predecessors. The builders in the old may have become the builders in the new dynasty. Likewise under the stimulating influence of the Incas every art was rapidly advanced, great buildings arose, irrigating channels improved and extended, and, apparently, new walls built in place of or upon the old.

A great deal of further work must be done to enable us to reach satisfactory conclusions as to all the important ramifications of the problem. Of particular importance is the work of

excavation. Trenches dug in well-selected places should yield other walls with even more certain relations. The considerations presented in this paper are based upon a very small collection of facts gathered as by-products rather than as main results during a few days field work about Cuzco. If they should stimulate further work in this almost unexplored and certainly very rich field, the object of the paper will be accomplished. Certainly the temporary conclusions have a most serious bearing on an old problem whose solution should not be postponed much longer, now that a railroad makes access to these ancient treasures moderately easy.